

The role of school improvement in economic development

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Course of Economics of Education

Academic Year 2010/2011

Framework

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Introduction

- Is education the driving force to pass from being a developing country to a developed country, or is one of several factors that are correlated with more fundamental development forces?
- Which are the factors that may affect the educational attainment of a student?
- Is it correct to focus our research only about the years of schooling?
- Is the educational attainment affected only by school?
- Is it reasonable to believe that changing education would directly lead to a change in economic outcomes?
- Necessity to create a semantic distinction between “knowledge and skills” and schooling.
- Is putting resources into school the right way to improve the educational outcomes?
- Do teachers quality affect students attainment and educational outcome? How may we measure teachers quality?
- Does school be affected by policy? In which manner?

Educational level differs dramatically between developed and developing countries. It is natural to believe that a productive development strategy would be to raise the schooling level of the population.

But some uncertainties exist with this strategy:

- Developed countries differ in a myriad of ways other than schooling levels
- A number of countries have expanded schooling opportunities without seeing any dramatic catch-up with developed countries in terms of economic well-being
- Countries that do not function well in general might not be able to mount effective education programs than they are to pursue other societal goals
- Even when schooling policy is made focal point, many of the approaches undertaken do not seem very effective and do not lead to the anticipated student outcomes.

Is it obvious that the education is the driving force or it is merely one of several factors that are correlated with more fundamental development forces?

The aim is to conclude that educational quality is the key issue in development force.

- Years of school attainment and or enrollment rates in school are data easily observable and measured because they appear in administrative data and they are published on a consistent basis in all countries of the world. But what is important is the educational quality that now exist, this is the issue that makes the difference.
- Nowadays, research on the economic impact of schools almost ignore the differences in the schooling systems among countries and the external factors that may affect the educational level of a student. The research design of the author is to firstly document the importance of cognitive skills in determining individual earnings, and by implication important aspects of the income distribution.
- The question is if it is reasonable to believe that changing education would directly lead to a change in economic outcomes. What is assume is that **the educational quality, measured by cognitive skills, has a strong impact on individual earnings, so it has a strong and robust influence on economic growth with a credible evidence that these are truly causal relationship.**
- It is necessary even to create a semantic distinction between “knowledge and skills” and the schooling. In fact cognitive skills may be developed in formal schooling but they may also come from family, peers, culture and so forth.
- **Schools can play an important and active role, in fact quality schools can lead to improved education outcomes.**

- What it is not so much considered but is emerging on several researches is that the **quality of the teachers** has a powerful impacts on student outcomes. The problem, from a policy perspective, is that quality differences are not closely related to the common measure of quality and to the common policy instruments that are employed. Quality is closely related to **teacher education and training, teacher experience, teacher certification or teacher salaries.**
- The opportunity to set an accountability system based upon tests of student cognitive achievement can change the incentives for both school personnel and for students.
- The evidence on a set of larger, and potentially more powerful, policy changes is relatively limited at the current time. There is suggestive evidence that greater school choice promotes better performance. Direct incentives to the teacher and school personnel in the form of performance pay have promise.
- There remains reason to believe that pursuing larger changes could lead to the substantial improvements in outcomes that are desired or hoped for in the policy process.

Individual returns to education and economic inequality

The impact of school attainment on individual incomes refers to the economic returns to differing levels of school attainment for individuals, in particular on how investing amounts of schooling affects individual earnings.

Studies have shown that more schooling is associated with higher individual earnings, such as those of the School of Chicago, including Mincer and Beker.

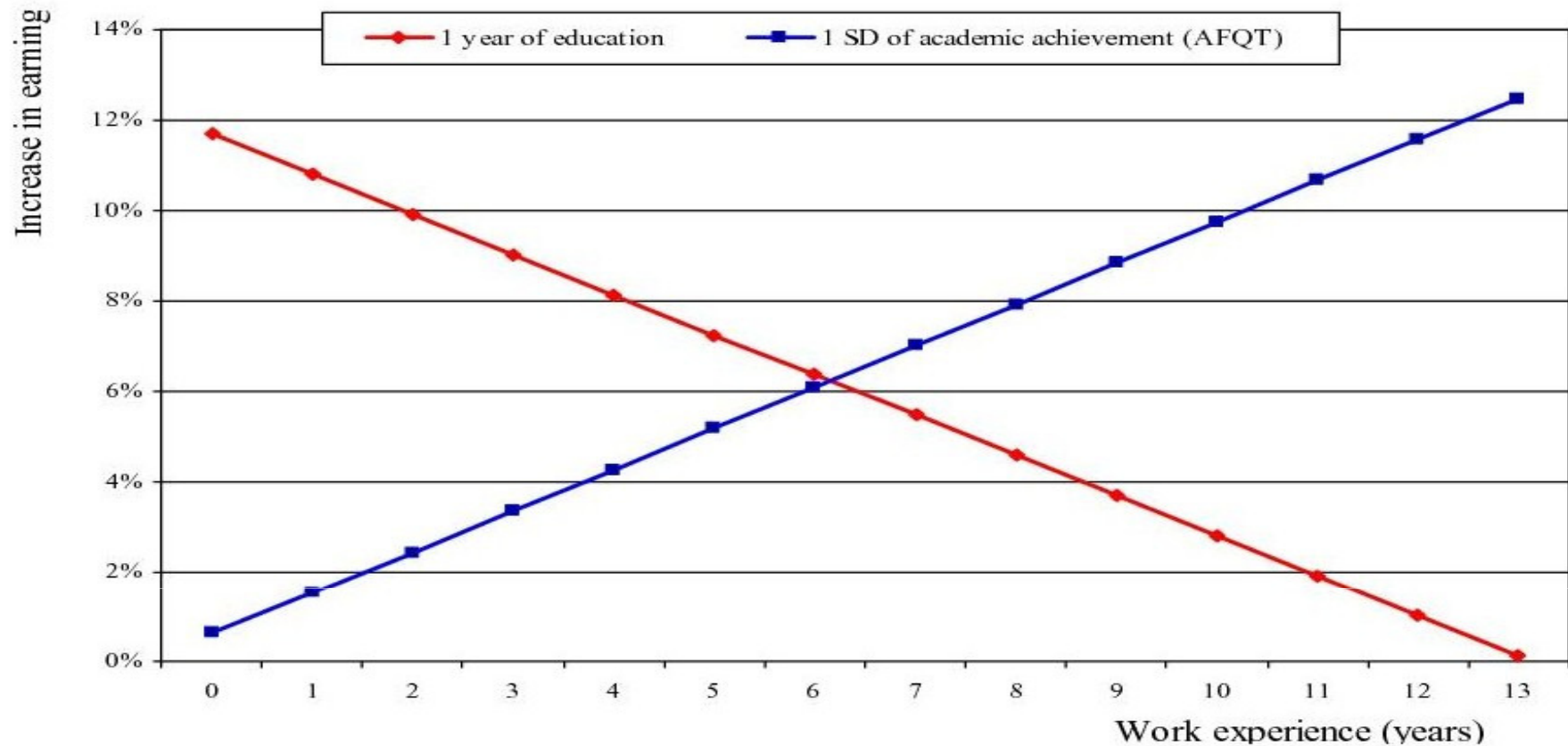
The rate of return to schooling across countries is centered at about 10% with variations in expected ways based largely on scarcity: returns appear higher for low income countries, for lower level of schooling and, frequently, for women.

If more able people tend to obtain additional schooling, the estimated schooling effect could include both the impacts of schooling and the fact that those continuing in school could earn more in the absence of schooling.

The basic estimates of Mincer earnings models are typically interpreted as the private returns to schooling. The most common argument is that the social return will exceed the private one because of the positive effect of education on crime, health, fertility, improved citizen participation, and on growth and productivity of the economy as a whole.

If school is more of a selection device than of means of boosting knowledge and skills of individuals, the social return will be lower than the private one.

- Is not appropriate to assume that any spending on school is a productive investment that will see returns estimated for attainment. It is necessary to ascertain two things: how various investments translate into quality and how that quality translate into economic returns.
- One of the challenges to understand the impact of quality differences in human capital has been simply knowing **how to measure quality**.
- Most of the discussion has identified cognitive skills as the important dimension and the key of schooling outcomes.
- The question is whether this proxy for school quality is correlated with individuals' performance in the labor market and the economy's ability to grow.
- Higher quality as measured by tests similar to those currently being used in accountability systems around the world is closely related to individual productivity and earnings.
- Three recent U.S. studies estimates of the impact of test performance on earnings employing different nationally representative data sets that follow students after they leave school and enter the labor market. They suggest that one standard deviation increase in mathematics performance at the end of high schools translates into 12% higher annual earnings.

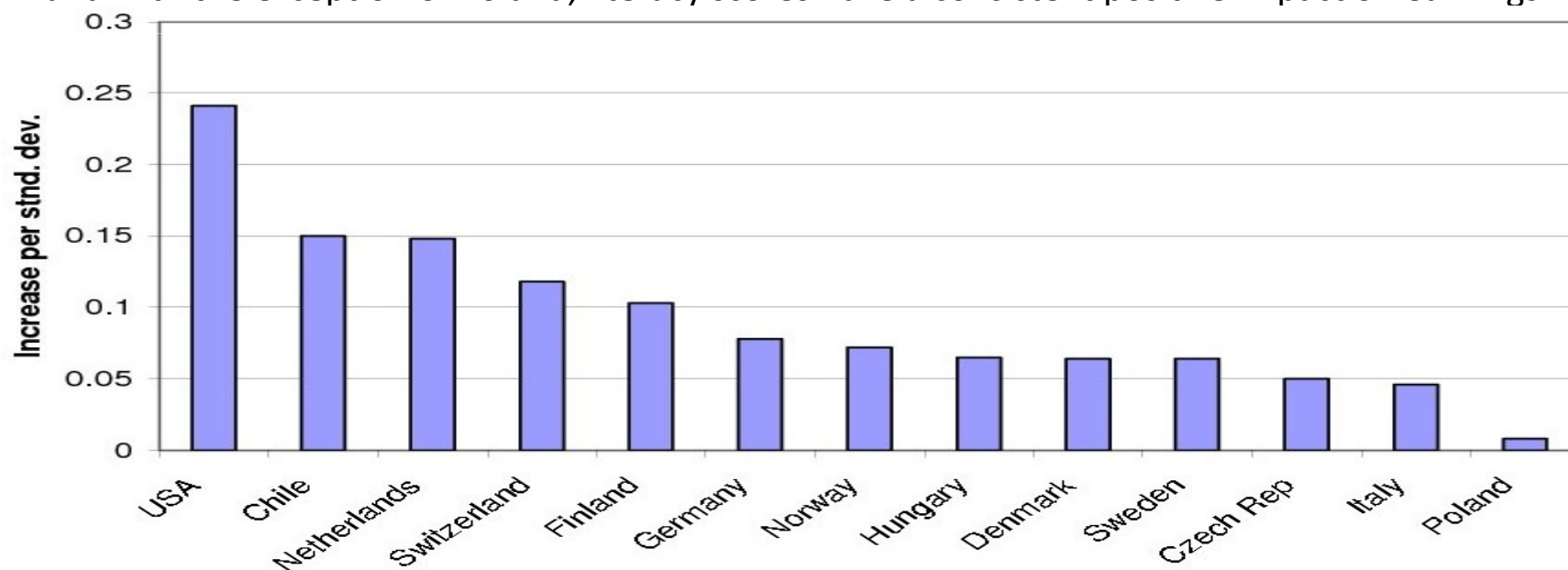


Notes: Based on data from National Longitudinal Survey of Youth (NLSY) and Armed Forces Qualification Test (AFQT)
SD = standard deviation.

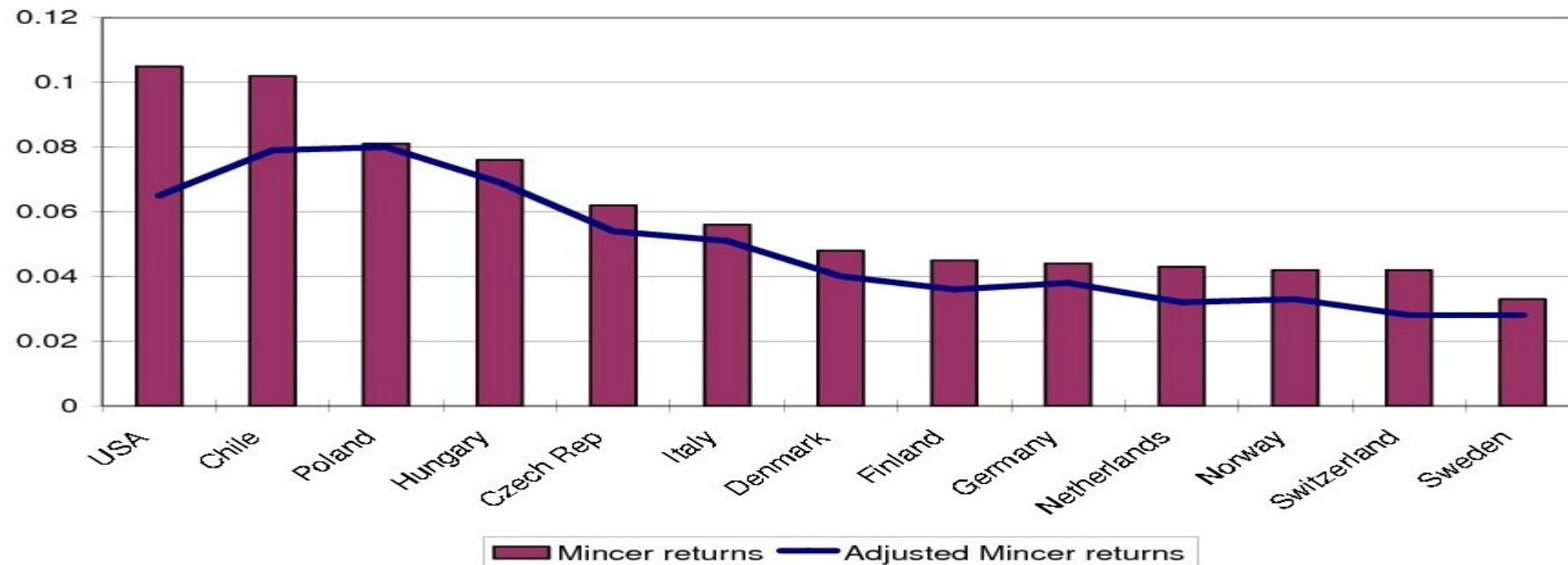
Source: Based on Altonji and Pierret (2001).

One year of education is equal to an increase of almost 12% in earnings in the first year of work. By analyzing work experience, we may see this result only after thirteen years of work experience on a one standard deviation of academic achievement.

- Analyzing the impact of educational quality on individual incomes in developing countries, we can say that estimates appear sensitive to the estimation methodology itself and to the techniques employed in uncovering the fundamental parameter for cognitive skills.
- Nonetheless estimates suggest strong economic returns within developing countries. The typical estimates indicates that educational quality concerns are very real for developing countries and evidence suggest also that educational quality is directly related to school attainment.
- The alternative approach is to analyze data from the IALS, the International Adults Literacy Survey, that is to test a sample of adults and then to relate these measures to labor market experiences.
- Both school attainment and cognitive skills enter into the determination of individual incomes and with the exception of Poland, literacy scores have a consistent positive impact on earnings.



Source: Hanushek and Zhang (2006).



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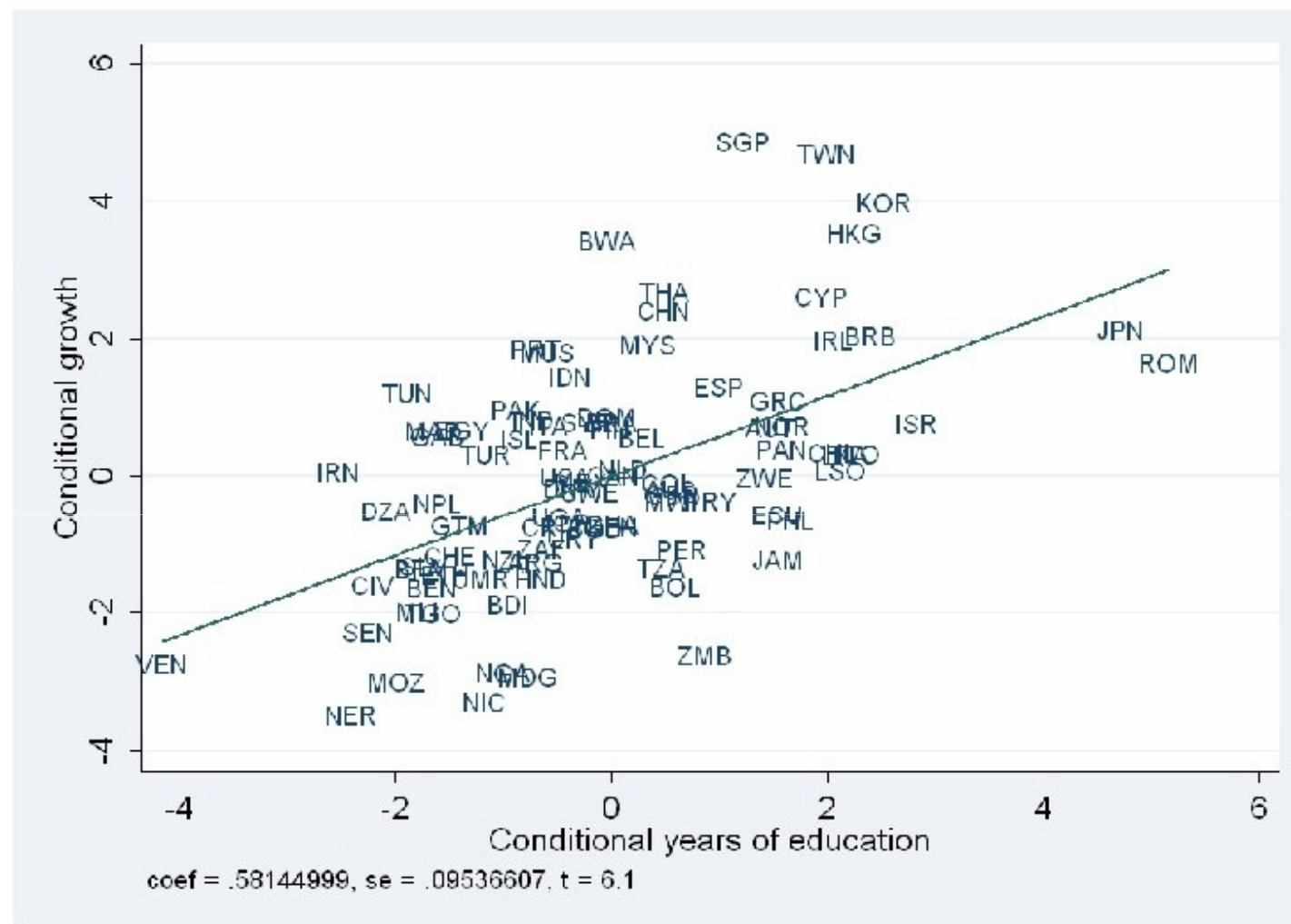
- The literacy test in IALS are designed to measure quite basic skills only, and yet the differences are strongly associated with higher earnings. These results, from a broad large spectrum across a number of countries, reinforce the importance of quality.
- Unfortunately it contains only one developing country, Chile, the returns both to quantity of schooling and quality exceed those found across the countries with the exception of the United States.
- It's noticeable that in the three transitions economies, Czech Republic, Hungary e Poland, the return to school attainment are also near the top of the sample, but the returns to educational quality are noticeable lower.

- The most important issue is the source of any test score differences. It is natural to believe that schools have an influence on tests, but clearly other factors also enter. The extensive investigations of the determinants of achievement differences indicate that parents, peers, neighborhoods, and other factors enter along with school factors in determining achievement. It is inappropriate to interpret test scores as simply reflecting school quality or school policy.
- Using just quantity of schooling in the earnings analyses assumes that formal schooling is the only source of skill development, but if a variety of other inputs is also important in the formation of human capital, simple years of schooling is subject to this additional source of systematic measurement error.
- One implication of the impact of cognitive skills on individual earnings is that the distribution of those skills in the economy will have a direct effect on the distribution of income. Thos don't determine the full distribution but the importance of skills is becoming increasingly evident.
- Nickell in 2004 studied how differences in distribution of income across countries are affected by the distribution of skills and by institutional factors including unionization and minimum wage. While the union coverage is statistically significant, he concludes that "the bulk of the variation in earnings dispersion is generated by skill dispersion".
- These studies do not attempted to describe the causal structure , so it is inappropriate to attribute the variance in earnings simply to differences in quantity or quality of schooling. **Nonetheless, because these contribute to variations in cognitive skills, we may conclude that policies aimed at improving school quality will have direct impact on the income distribution.**

Quantity of schooling and economic growth

- Here the view is extended to the macroeconomic perspective of long-run economic growth of countries. From a theoretical point of view there are at least three mechanisms through which education may affect economic growth:
 - Education increases the human capital inherent in the labor force, which increases productivity and thus transitional growth towards a higher equilibrium level of output.
 - Education may increase the innovative capacity of the economy and the new knowledge on new technologies, products and processes promotes growth.
 - Education may facilitate the diffusion and transmissions of knowledge needed to understand and process new information and to successfully implement new technologies devised by others, which again promotes economic growth.
- In several studies aren't taken into account the differences among the different schooling systems, i.e. a year of school in Indonesia was compared to a year of school in Japan, that's because was important only the number of years of schooling instead the quality insight in an year of school.
- The standard method to estimate the effect of education on economic growth is to estimate cross-country growth regression has tended to find significant positive association between quantitative measures of schooling and economic growth.
- From an analysis by Sala-i-Martin, Doppelhofer and Miller in 2004, among 67 explanatory variables in growth regression on a sample of 88 countries, primary schooling turns out to be the most robust influence factor on growth in GDP per capita in 1960-1996.

Figure 3.1: Added-variable Plot of Growth and Years of Schooling without Test-score Controls



Notes: Added-variable plot of a regression of the average annual rate of growth (in percent) of real GDP per capita in 1960-2000 on average years of schooling in 1960 and the initial level of real GDP per capita in 1960. Own calculations.

- The previous figure plots the average annual rate of growth GDP per capita over the 40 year period against years of schooling at the beginning of the period for a sample of 92 countries. Both growth and education are expressed conditional on the initial level of output, to account for the significant conditional convergence effect. The regression imply that each year of schooling is statistically significantly associated with long-run growth rate that is 0.58 percentage points higher.
- The positive association is substantially higher in the non-OECD countries (0.56 vs 0.26 for OECD countries), which is in line with the pattern of larger returns to education in developing countries told before.
- However, controlling for the influence of openness and security of property right, the association becomes substantially smaller and turns insignificant, and it is close to zero when the total fertility rate is controlled for.
- So it is sensitive to model specifications!!
- Is it the level of years of schooling, or the change in years of schooling which is the more important driver of economic growth? Some studies have found positive effect of educational levels but not of changes in education. Both levels of and change in years of schooling may show a positive association with growth.
- Several recent studies suggest that education is important both as an investment in human capital and in facilitating research and development and the diffusion of technologies
- The composition of human capital between basic and higher education may be important with initial phases of education being more important for imitation and higher education being more important for innovation.
- **This things may suggest that a focus on basic skills seems warranted for developing countries.**

Quality of education and economic growth

“It is beyond doubt that one year of schooling does not create the same amount of acquired knowledge regardless the quality of the education system in which it takes place, but delivers different increases in skills depending on the efficiency of the education system, the quality of teaching, the educational infrastructure, or the curriculum.....it seems crucial to focus on how much students have learned while in school when estimating the effect of education on economic growth” (Hanushek and Wößmann, 2007)

But a variety of factors outside school have a direct and powerful influence on knowledge development and cognitive skills.

When using the data from the international students achievement test through the 1991 to build a measure of educational quality, Hanushek and Kimko find a statistically and economically significant positive effect of the quality of education on economic growth in 1960-1990 that dwarfs the association between quantity of education and growth. Their estimates suggest that one country-level standard deviation higher test performance would yield around one percentage point higher annual growth rates.

Hanushek and Kimko, in 200, find that adding educational quality to a base specification including only initial income and educational quantity boosts the variance GDP per capita among the 31 countries in their sample that can be explained by the model from 33 to 73 percent.

Both also find that educational quality strongly dominates any effect of educational quantity on growth, so the existing evidence suggests that the quality of education, measured by the knowledge that students gain as depicted in tests of cognitive skills, is substantially more important for economic growth than the mere quantity of education.

Do the identified factors represent truly causal influence or mere associations that will not affect growth if altered policy?

Hanushek and Kimko concluded that causation concerns are very different in the case of quality than quantity, being much less of an issue in interpreting the results.

To measure the quality of the education they used an average of mathematics and sciences scores overall the international tests, and use these data not only to cover the cognitive skills but also the educational performance of the labor force. This encompasses not only cognitive skills acquired at school but in all the life.

The test scores measures a statistically significant effect on the growth of real GDP per capita in 1960-2000, after controlling for the initial level of GDP per capita and for years of schooling.

An important issue is whether the role of educational quality in the process of economic development differs between developing and developed countries. The authors found that the mere statistical effect about quality of education is higher in non-OECD countries rather than the OECD, but when these data are regressed on the institutional framework of the non-OECD countries.

Once there is high quality school system, it pays to keep children longer in school, but it does not if the school does not produce skills.

Test scores exert a positive effect on growth even dividing the period in two sub-periods, while years of schooling remain insignificant in both sub-periods. In addition all results remain qualitatively the same when we use test scores in math and sciences separately.

In order to figure out the distribution of educational quality and economic growth, it is important to know whether part of the distribution of education affect growth differently. It is only the few most brilliant that are needed to spur the growth, or education for all? Does educational performance at different points in the distribution of the population have separate effects on economic growth?

In order to answer to these questions, the authors studied the share of students in each countries that reaches a certain threshold, minimum 400 maximum over 600, of basic literacy at the international scale. A level of 400 means a performance at one standard deviation under the OECD mean. The threshold of 600 points capture the notion of very high performers , performing at more than one standard deviation above the OECD mean.

Entering the share of students above the two thresholds, both turn out to be separately significant to economic growth, that is both education for all and the share of absolutely top performers seem to exert separately identifiable effects on economic growth.

Even using only math or science tests, both subject-specific test scores are significantly associated with growth when entered separately or jointly. But overall performance in math or science carry separate weight for economic growth.

In sum, different dimensions of the quality of education seem to have independent positive effects on economic growth, this is true both for basic and top dimensions of educational performance and for math and science dimensions of performance.

What affect the quality of the education, and even the economic growth are even endogenous factors which can be identified in the institutions. In fact the institutions decide above the schooling policies and the grade of openness of the markets.

Hanushek and Wößmann tried to make a regression above the weight of the institutions in the quality of the education. They found that the quality of institutions directly affect the quality of education. In fact the openness to international trade and the protection against expropriation are significant to economic growth.

The results showed that, on average, the quality of education exerts a positive effect on economic growth independent of these measures of the quality of institutions.

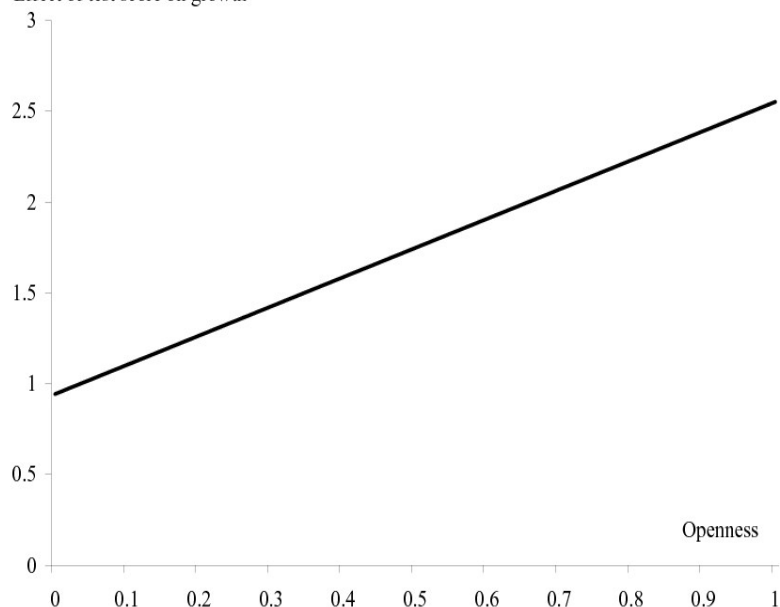
Still the effect of educational quality on economic growth may differ depending on the economic institutions of a country.

	(9)	(10)
GDP per capita 1960	-0.287 (5.12)	-0.297 (5.64)
Years of schooling 1960	0.022 (0.28)	-0.031 (0.41)
Share of students above threshold of 400	2.732 (3.61)	
Share of students above threshold of 600	12.880 (4.35)	
Test score (mean)		0.942 (2.30)
Openness		0.732 (2.13)
Test score * openness		1.609 (2.34)
Constant	1.335 (2.97)	3.814 (11.24)
N	50	47
R ² (adj.)	0.719	0.785

Dependent variable: average annual growth rate in GDP per capita, 1960-2000. *t*-statistics in parentheses

The result of the regression suggest that openness to international trade and educational quality not only have significant individual effects on economic growth, but also a significant positive interaction. The effect of educational quality on economic growth is indeed significantly higher in countries that have been fully open to international trade than in countries fully closed. Even taking into account protection against expropriations rather than openness to trade as measure of quality institutions there a similarly positive interaction term with educational quality, although it lacks of statistical significance.

Effect of test score on growth



The graph aside shows how openness to the market increase the effect tests scores on growth. When the openness is greater we assist to an increase of the test score of about the 2.3%, instead when the market is fully closed, the test score increase only of about 0.8%

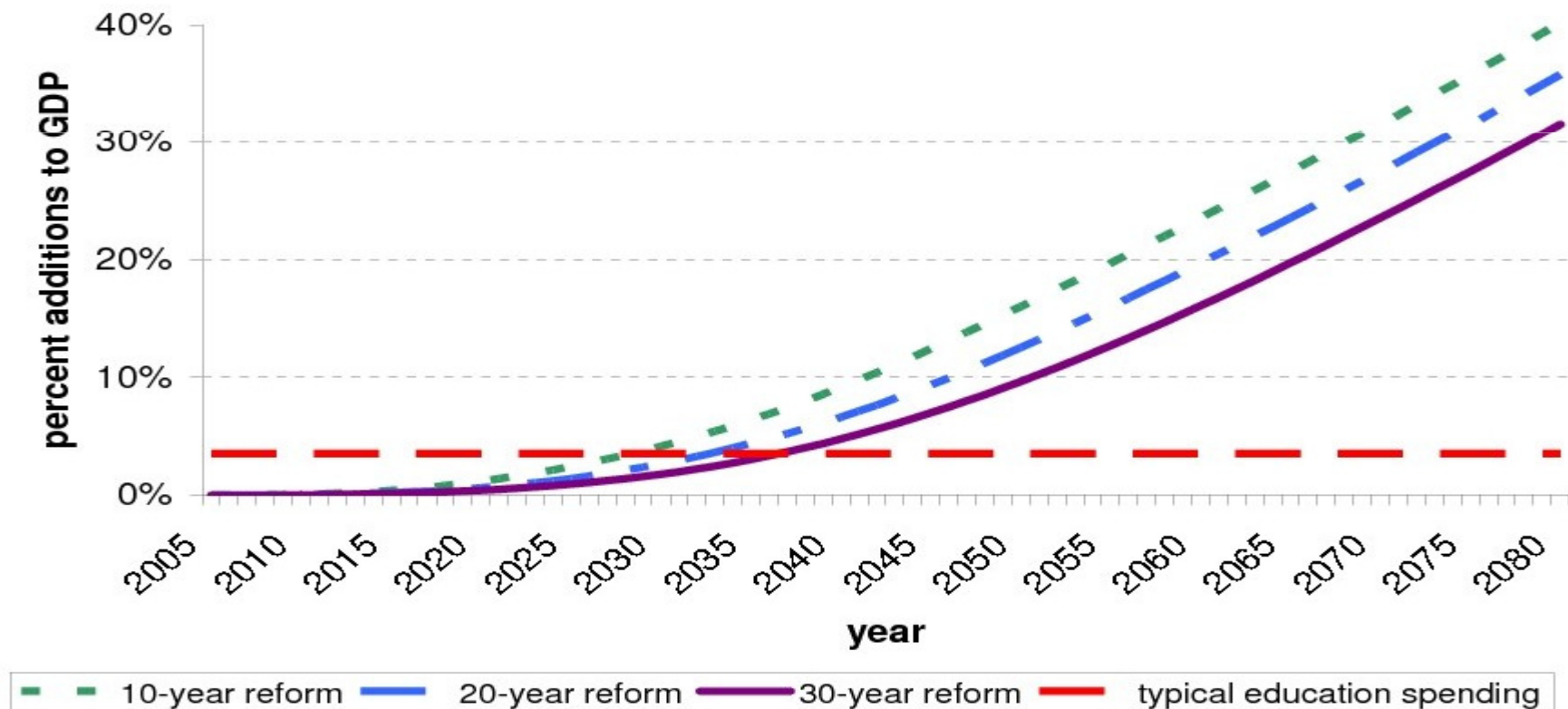
Notes: Estimated effect of average achievement test scores on the average annual rate of growth of real GDP per capita in 1960-2000, depending on the degree of openness to international trade of a country. Author calculations; see Table 4.3, column (10).

What is really important is to understand the implications of policies designed to improve educational outcomes.

Two aspects of any educational reform plan are important: what is the magnitude of the reform that is accomplished and how fast does any reform achieve its results.

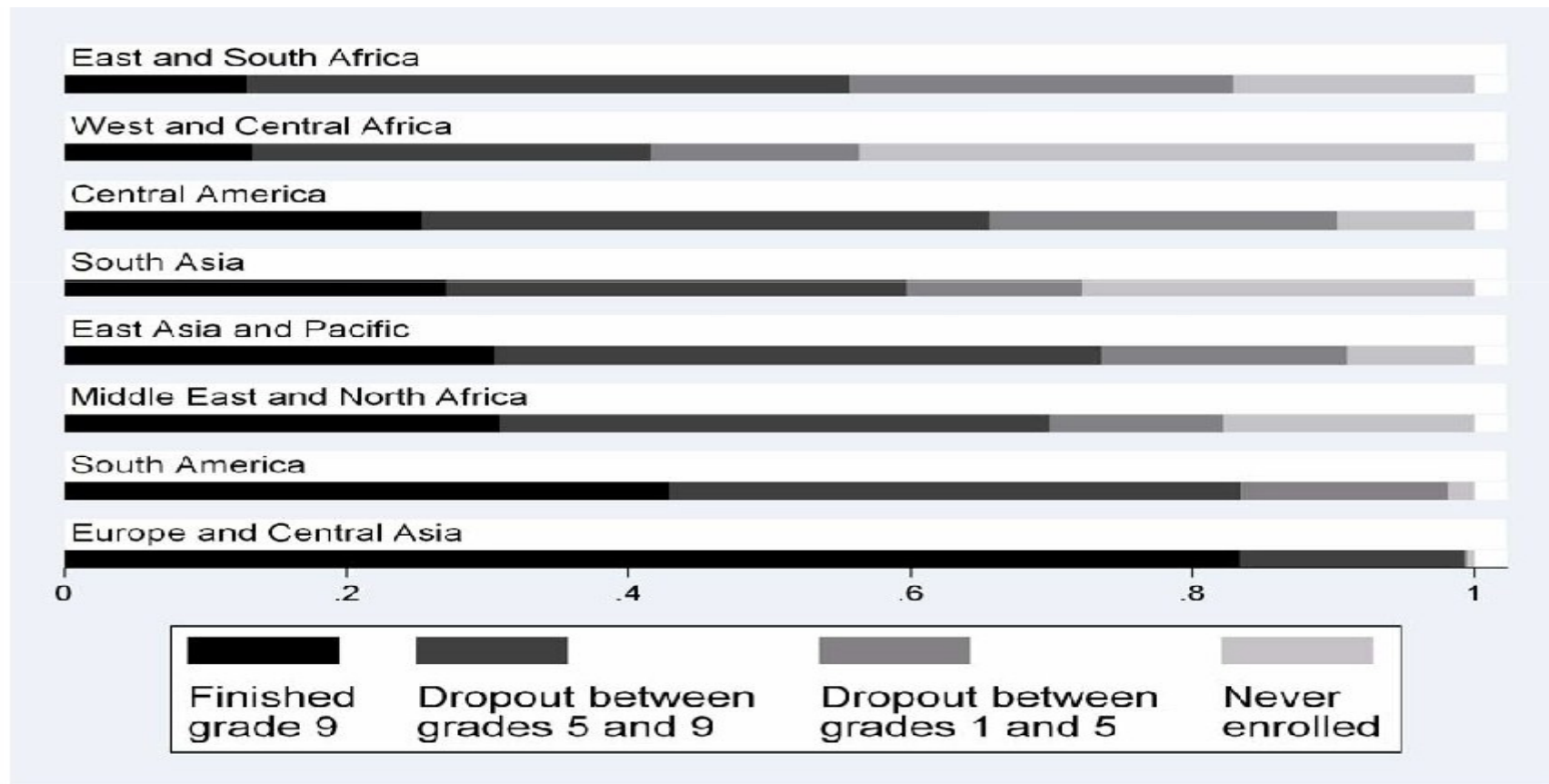
The authors simply investigated the economic results that might anticipated on the assumption that some set of schooling reforms actually leads to substantial achievement gains over an identified time period.

An aggressive reform plan would be to close half the gap with the average OECD student, which would relate to a half standard deviation.



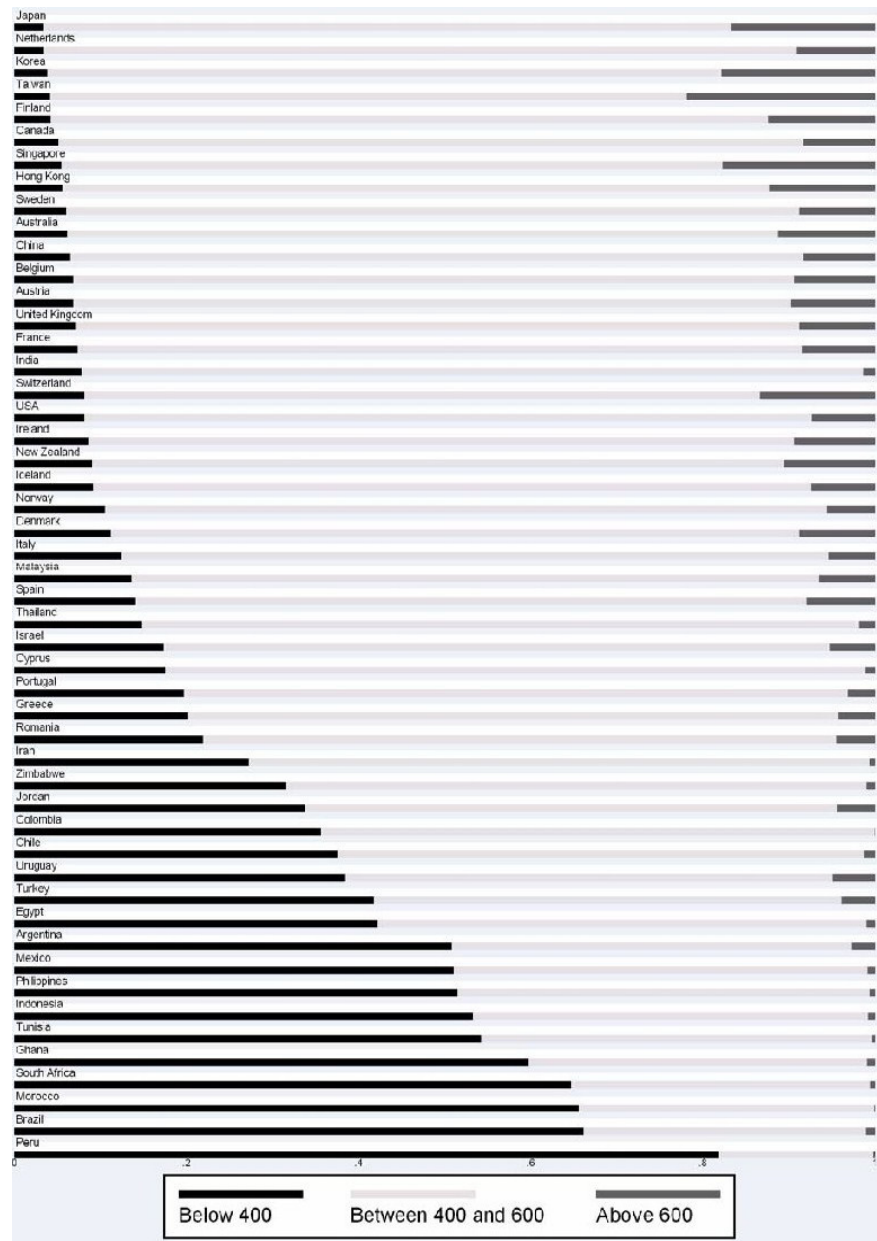
Where does the developing World stand?

The table below shows the lack of school quantity in developing countries.



Note: Based on Pritchett (2004).

Share of student below 400 (“illiterate”), between 400 and 600 and above 600 in the international test scores



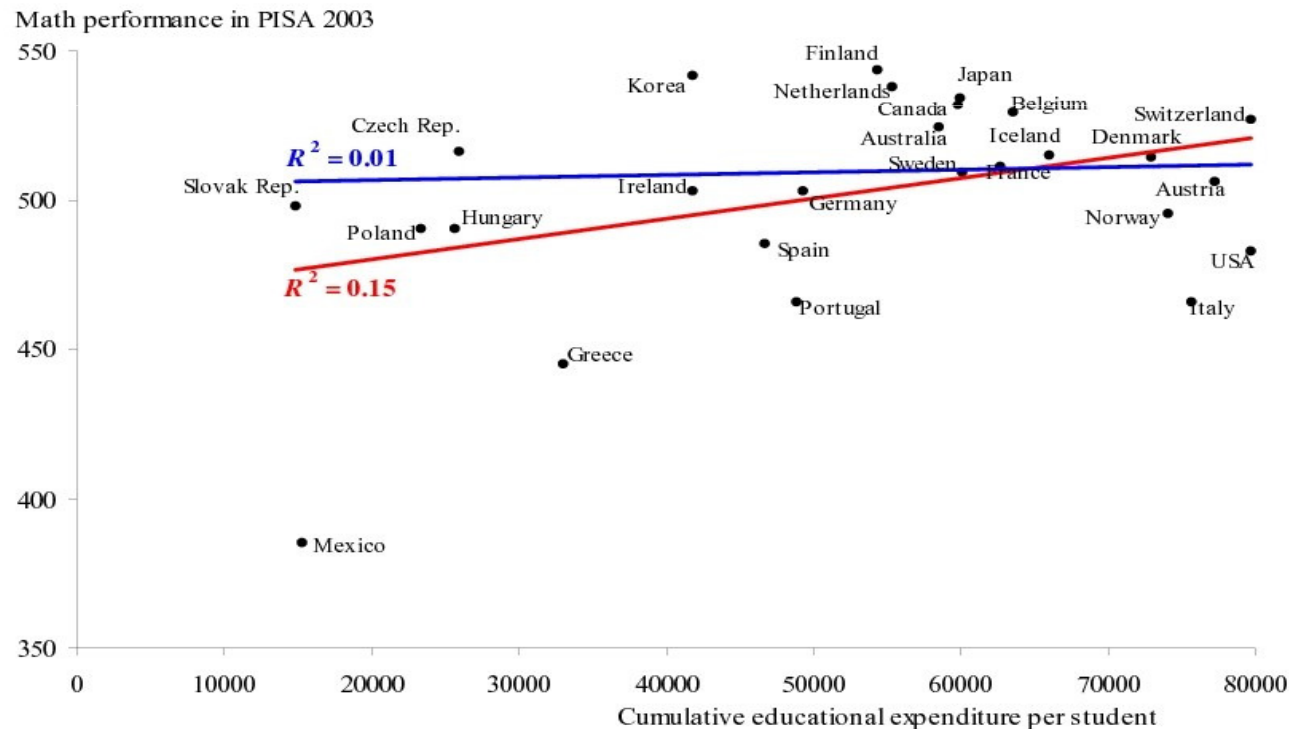
Source: Hanushek and Wößmann (in process), based on several international tests; see text for details.

Educational spending and student outcome

By virtually any standard, the evidence indicates a strong causal impact of skills on individual earnings, income distribution and economic growth. But knowing that skill differences are important, this does not provide a guide to policies that might promote more skills.

The most important generally available evidence relates to the effect of resources.

Association between average math performance in PISA 2003 and cumulative expenditure on educational institutions per student between age 6 and 15, in US dollars, converted by purchasing power parities.



Source: Organisation for Economic Co-operation and Development (2004), pp. 102 and 358; Wößmann (forthcoming-a).

Countries with high educational expenditure perform at the same level as countries with low educational expenditure, so spending alone is not associated with student performance.

Based upon the “Coleman Report” which introduced the idea of using statistical analysis to relate various inputs of schools to student outcomes, the two factors that more frequently appear to positively influence student outcomes are teacher experience and measure of teacher achievement tests.

Nonetheless the reduction of class size, even if sometimes appears to be an appropriate way to follow in order to improve skills attainment of students, don't appear to be worth their expense in terms of student outcomes.

These statements does not say that money are not important and cannot matter in the policy decisions, but that there are many other factors that may reduce their effect and that may increase the students outcomes that are not strictly related to them.

Schooling institutions and educational quality

The authors divided this topic into three different issues that affects the students outcomes:

- Choice and competition: in developed countries there a lot of competition between public and private schools. In fact allowing private schools will increase the competition, particularly in those countries, regions or cities where public school is doing very badly. Even in developing countries there a great evidence of how the choice among private, voucher private or public school will increase student outcomes and skills. The major issue in competition and choice is the limited experience.
- Decentralization and autonomy of schools: several studies in developed (particularly U.S.) and developing countries, like Philippines, Argentine, El Salvador, and so forth, proved that having school personnel in individual schools and districts heavily involved in decision making, would raise the general level of students outcomes. Students tend to perform better in schools that have autonomy in day-to-day decisions in particular when there is accountability.
- School accountability: the UK elaborated a system of “league tables designed to give parents full information about the performance of local schools, the US legislated a federal law that all the states develop an accountability system that meets certain general guidelines and sanctions whether a school fails to bring sufficient numbers of students up to proficiency in core subjects. These measures are coupled with an external exit exams system that tend to outperform students in countries with such systems. In developing countries we can see the same measures in Mexico being effective. The international evidence suggest that school autonomy is only effective in schools that have external exams in place.

Conclusions

- *Educational quality – measured by what people know – has powerful effects on individual earnings, on the distribution of income, and on economic growth.*
- *The current situation in developing countries is much worse than generally pictured on the basis just of school enrollment and attainment.*
- *Just providing added resources to schools is unlikely to be successful; improving the quality of schools will take structural changes in institutions.*