Background Paper for FTI Replenishment Exercise: Estimate of Costs and Benefits

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1. Introduction

This note provides some discussion on background assumptions and estimates for the 2011 FTI replenishment exercise. It is a companion piece to the FTI publication "The Case for Investment (2011-2014)." The note proceeds in two big steps: first we determine what can reasonably be expected, in terms of education outputs and outcomes (e.g., completion rate improvements), from a certain amount of funding; second, we determine what the education outputs and outcomes are likely to generate in terms of impacts on other sectors or in terms of broader social impact (e.g., reduced child mortality). The first part states the costs and the most proximate outputs, the second part states the benefits. This is preceded by a statement of philosophical or methodological principles.

2. Methodological aspects

The approach taken is purposefully not mechanistic, in various respects. It is important to list these out as assumptions or pre-conditions, so that the FTI replenishment exercise not be seen as based on naïve assumptions that are not defensible based on empirical evidence.

First, we do not attempt to list every single impact educational improvement might have on other sectors, so as to total up all the benefits; instead we list some exemplary impacts.

Second, we do not pretend that education is a sort of panacea that will, single-handedly, improve other social sectors. We have made estimates that, as much as possible, "control" for the fact that educational investment and subsequent development do not happen in isolation from other forms of investment and development. However, perfect "controls" of this kind are not possible, as it is not possible to experiment by providing a society with education investments but not health investments, or health investments and no education investments. Thus, while our estimates of impact are as honest as possible by controlling to the degree possible for side-conditions and simultaneity of investments, we also realize that, since such controls are not perfect, and since in any case all reasonable societies follow balanced patterns of investment, we have to assume that education improvement will take place in the context of other sorts of improvements, and are mostly making a *contribution*, rather than trying to function as a single-cause panacea. (Nevertheless, we emphasize that our estimates are as honest as possible in trying to control for these factors.)

Finally, and most importantly, we do not assume that educational investments, particularly those made by an agency such as FTI, "buy" inputs in some simple-minded way, and these inputs then guarantee certain educational outputs or outcomes, again in a simple linear manner, and these outputs then also guarantee broader social impact. It is worthwhile to pause and explore the reasons for being non-mechanistic about this last issue. There are four reasons for this.

Firstly, because of aid effectiveness principles. The Paris aid effectiveness principles suggest that foreign donors act in synergy and in harmony with national plans and with each other, and that various sources of aid and domestic spending leverage each other. Furthermore, many donors—even those who do not pool their funds or participate in budget support—have traditionally operated at least part of their

assistance in ways that leverage domestic policy change, through policy advisory approaches and technical assistance, as opposed to engaging only in bricks-and-mortar projects. Most donors have subscribed to either or both of these approaches, at least for part of their funding, for sound reasons: it is the only way to proceed in a demand-led way that encourages ownership and sustainability. But a consequence of either of these approaches is that direct attributability is somewhat attenuated. In the end, one has to choose, one cannot really have it both ways: if it was the whole LEG that motivated a policy change, and this policy change led to certain improvements in outputs, it is hard, if not impossible, to say which particular action it was that generated the policy change.

Secondly, because, regardless of the Paris principles, FTI has attempted, throughout its history, to subscribe to this approach. It will continue to do so. However, more specifically, FTI's philosophy, from the outset, was to stick to the basic idea that countries with good planning processes would tend to receive more funding. While it has not always been possible to deliver as much funding as countries with good plans may be able to use, the idea of providing greater support (all other things being equal) to countries that are already "on the move" has certainly been an important guiding principle. Thus, there is selectivity in FTI funding: countries with good plans, and a pre-disposition to performance, have generally been favored. In that sense, FTI's philosophy is not to "buy" the inputs that are in a plan or that are needed to deliver on particular aspects of a plan, but mostly to support countries with good plans. Of course, in practice, a certain amount of funding is indeed tied to specific inputs, for various complex reasons having to do with accountability for funding and the need for fiduciary controls. But, philosophically, there certainly has been an attempt, and a good degree of success, in consciously applying leverage and synergy. In this sense a virtuous circle ensues which, while "virtuous," is also indeed a circle and therefore somewhat difficult to disentangle in terms of causality and in terms of picking a simple starting point. Are countries performing better because of the funding? Did they get more funding because they were pre-disposed to perform well and were in fact already a little better than others? Or, most likely, was there a complex causality where countries that were pre-disposed to perform well were promised funding, which galvanized attention and tended to result in more careful planning, which tended to encourage the funding to materialize, which then tended to demand more careful monitoring and execution but also allowed more inputs to be bought and thus more outputs to be generated? Most likely the more complex latter story is the closest to the truth. Not only is it likely that this story is closest to the truth, but there is even a conscious attempt on the part of donors to capitalize on this story! Thus, for instance, FTI funding, especially in the 2011 round, rewards performance: the funding formula for distributing the replenishment specifically gives more money to countries making more progress on the completion rate, or to countries making more of their own fiscal effort for the sake of education. This is seen by donors and FTI Board members as a very good thing indeed. But this very good thing also means that it is inherently and deeply problematic to try to specifically separate the FTI funding from a proclivity to perform well and to ascribe the better performance to specific inputs that were bought with the funding: funding and performance are endogenous to each other, and are *meant* to be so. The same funding, in countries without an equal and equally proven proclivity to perform well, would not have produced the same results. Thus, it is incorrect to reason, too narrowly, as if the funding somehow could guarantee inputs and the inputs in turn could guarantee performance. The story is much more complicated than that. Difficulty in causality attribution is, partly, a direct result of the synergy that has been valued. One good thing (synergy) does tend to make another good thing (easy attributability) more difficult, and this is inevitable; there is really no way to get around it, even in theory, and much less in practice.

The empirical evidence that FTI countries have performed better than others (taking all low-income and lower-middle-income countries into account) is clear:

- Primary enrollment in FTI countries grew at a median rate of about 3.7% per year, at essentially 0% per year in non-FTI countries in the last decade.[1]

- The primary completion rate has grown at a median rate 100% (2 percentage points per year) higher in FTI countries than in non-FTI countries (1 percentage point per year) in the last decade.

- FTI countries are good users of funds, in the sense that their median cost of primary education, as a share of GDP per capita, is not any higher than non-FTI countries, yet their enrollment and completion expanded much faster than that of non-FTI countries. In that sense, FTI countries have been relatively efficient users of funding; they are relatively efficient at turning funding (as a share of GDP per capita) into growth in enrollment and completion.

- Important evidence that not all of an FTI effect is simply the buying of inputs is the rapid decline in repetition rates in FTI countries. Repetition is an extremely serious inefficiency problem in countries that start rapid enrollment expansion. These countries often have 50% more children in grade 1 than there are in the population. This, it is often thought, is due to a problem of the system reaching out to portions of the population that were previously un-enrolled. But the data suggest that at least for the countries with the worst grade 1 over-enrollment problems this cannot be the case, since the over-enrollment in grade 1 had often been going on for many years until countries enter into policy dialogue, address the issue, and decide to gradually eliminate the problem. FTI countries typically had somewhat higher repetition rates than non-FTI countries (around 12% as opposed to 7%, or about 75% higher, on average during the last decade), but most importantly FTI countries saw their repetition rates decline by, on average, 5 percentage points over the decade, while non-FTI countries reduced their repetition rates by only 1.3 percentage points over the decade. This represents an enormous savings that could even be said to have bought much of the enrollment. It also highlights the importance of policy change and efficiency enhancement, not just funds and inputs, as part of the improved planning associated with FTI.

It bears repeating that all this should not necessarily be taken to be causally related to FTI in a mechanistic sense. FTI funding and better performance are *mutually* caused, and dependence on this mutual causality has in fact been an integral part of the FTI approach.

Thirdly, in some sense it is simply, actually, *inefficient* for donors overly to focus on the specific ties between funding and inputs, inputs and educational outputs or outcomes, and educational outcomes and social impacts. Donors (and countries), after all, should simply seek to produce as much output and outcome as possible and the focus should be on the outcomes, not on the inside of the "black box" that produces them. A simple but powerful example will drive the point home. We know that, specifically in the countries eligible for further FTI work, there is a powerful association between primary school completion and the secondary gross enrollment ratio. The correlation is 0.84 (meaning high *reliability* of impact), and the impact is essentially 1 (meaning large *size* of impact). This means that for every 1 percentage point increase in the completion rate, there is a more or less "automatic" or "expected" 1 percentage point increase in the secondary gross enrollment ratio. We know that this relationship operates essentially independent of FTI because FTI in fact has not been investing in secondary education, and because FTI has been operating in only 2/3 of the countries that are eligible starting in 2011. In that sense, we have clear proof that donors can take advantage of this known and highly

[1] Medians rather than means are used to control for the fact that the data on these issues contain extremes and are in any case not available for the same set of countries for the same variables for every time period.

predictable relationship to "leverage" secondary enrollment without necessarily worrying too much about precisely where the funding goes or worrying that one must specifically fund secondary education expansion or else it might not happen. The evidence is that if donors fund primary enrollment, this will tend to "cause" a growth in secondary enrollment. One could claim it is "unfair" in some sense to leverage countries into investing in secondary education by providing funding "only" for primary education. But this is a naïve view of the world. In the end, money is fungible, and it is quite possible that countries re-prioritize their own funding to meet the social demand for secondary education created by success in primary education; indeed, it is sensible for them to do so, and, in fact, it is quite in accordance with what the donors say they want, if they are true to the Paris principles: mutual leverage and synergy. FTI can even be a catalyst in countries seeking IDB, WB, AfDB, or ADB funding for secondary education, for instance. The story with repetition is the same. As noted above, FTI countries have lowered repetition much faster than non-FTI countries. While the infusion of FTI funding does serve a purpose, clearly, and does buy inputs, it is also the galvanizing impact of the funds on policy dialogue around key issues, such as the efficiency of the sector, that perhaps has the greatest impact. In that respect, one need only consider the fact that in a few FTI and non-FTI countries the enrollment in the first few grades is somewhere between 30% to 70% higher than the population of appropriately-aged children. One could argue, for the sake of illustration, that if a country has 50% over-enrollment in grade 1, and a 5-grade primary school system, then resolving this over-enrollment will, almost by itself, push through a 10% improvement in completion, by righting an enrolment pyramid that now has a very wide base, without actually having to have more enrollment. Thus, in our claims about likely impacts of FTI, we do not believe it is necessary to specifically say that FTI will "buy" inputs that specifically "buy" places in secondary schools, or that specifically "buy" completion: we can very confidently forecast that secondary enrollment will increase anyway, if completion improves (and that repetition will decline as a result of policy dialogue and improved policy, planning, and supervision) and that what is important is to inject funding into country situations where this can be expected to happen with most confidence, i.e., the countries with best plans, and thus the countries most likely to increase completion and enrollment in response to funding. In fact, the FTI Needs and Performance Framework (NPF) does precisely this, and does it to a significant degree at Board members' behest. We can similarly argue that if the FTI has the desired effect on policy dialogue and policy setting, and results in appropriate reductions in repetition, then a good portion of the increase in completion will be achieved via a reduction in repetition.

Finally, because while there is strong evidence that education has an impact on development, the evidence is also clear that the association between educational spending and outcomes is hardly automatic. This aspect is discussed at length in section 4.10.

3. What FTI replenishment funding can buy

All of the above being said, however, it is important to double check that the donor funding can at least *make possible* a certain level of input purchase and hence a certain level of enrollment and completion growth. This situation happens for three reasons. First, in spite of the adherence to Paris principles, donors do have a reasonable expectation to know what inputs are being bought with their funding, or at least what inputs are being made possible with their funding (since one is not making a replenishment case based on detailed input plans aggregated over a whole set of countries). Second, countries, and FTI itself, also have a reasonable expectation that they ought not to commit to targets that are not doable, in terms of the possibility that funding could lead to certain outputs. Third, for the sake of rigor and consistency, it is important to look at the possible results from both sides, as it were: a demand-led side based on historical patterns and that are not input-focused, and a supply-push side that is more input-

focused. It will be more reassuring if these are broadly consistent with each other, in spite of the fact that one cannot simply aggregate detailed input plans (that at this stage do not exist, in any case).

Thus, while we argue for a broader and non-mechanical approach to the relationship between funding and outcomes, and outcomes and impacts, we also believe it is important to double-check on the "input" cost aspects.

The rest of this part lays out both sides of the "what funding buys" argument.

On the input side, our calculations make the following assumptions, which are derived both from analysis of the EdStats database and/or UIS data as processed by the Educational Policy and Data Center (all figures are rounded to the nearest reasonable number of significant digits, for the sake of clarity of presentation):

1. Average per pupil teacher cost at primary and secondary levels is $90. However, FTI is not assumed to pay salary for recurrent costs in most cases. It is assumed that FTI leverages 80% of salary recurrent cost in all cases on average, or, alternatively, that in 20% of the cases 100% of the salary cost is met by FTI funds but that in the other 80% of the cases no salary costs are paid by FTI. Teachers are assumed to cost $3500 per year.

2. It is assumed that FTI will pay for the in-service training of all teachers that have to be added to the teaching force, to the tune of $40 per teacher. (Driven by the assumption that trainers cost $500 per month and can train and coach 15 groups of 20 teachers per year, and that salary costs are 50% of in-service training costs.) Thus, teachers can, reasonably generously, receive 2 weeks of training and/or on-site coaching. Teachers are assumed not to be re-trained each year; they are trained once in the FTI funding cycle, when they come on-stream.

3. No provision is made for pre-service training. It is assumed either that teachers are already trained, or that their training will be in-service or provided via other means. This does not mean that programmatically the funding cannot be used for this purpose; it is simply a numerical assumption.

4. It is assumed that classroom costs are at $10,000 per classroom and hold on average 50 children, but that classrooms last for 15 years and thus that this cost is amortized over 15 years. This is a simplified way of driving the assumption that the enrollment made possible by the surge in funding actually spreads out over 15 years, and thus that the real cost of the surge in enrollment should all not be attributed to the year in which it takes place. An alternative and arithmetically equivalent assumption is that the classrooms are amortized very quickly, in just three years, but that FTI directly pays for only 1/5 of them. In any case, it is important to recall that not all new enrollment has to be bought with inputs: FTI countries reduced repetition by 5 percentage points over the decade, which represents a large savings. (This reduction in repetition "bought," we calculate, some 4 million spaces for enrollment.) Some of the FTI and FTI-eligible countries need to improve even more, and have a lot of scope to so, because they have much repetition that is not even officially understood. (It is reported as new enrollment.) Note that eliminating the repetition would not necessarily save enrollment; it might just cause that enrollment to be formally recognized as, say, pre-primary enrollment. But it does increase the through-put or measured efficiency of the sector, and thus does buy more grade-wise progression at very low cost (whether it be through completion or more pre-school enrollment).

5. The assumption is that countries ramp up their use of FTI funds, or their improvement, over three years, rather than enrollment increasing suddenly in the first year of the effort and then staying level thereafter. It is assumed also that countries then either get replenished or themselves sustain the funding needed to continue with enrollment and completion levels that peaked at the 3rd year of the boost in enrollment. This is important, because in translating the number of "student-years" purchased (total funding/cost per student), if one spreads the total number of student-years evenly through the three years, the enrollment (or completion) achieved in the last year (and hence to be sustained) is lower than if one ramps up. Ramping up allows a higher level to be reached and then sustained. The 3rd year level of enrollment or completion will be 25% higher than otherwise would have been the case, if there is a linear, 3-year ramp-up. This behavior makes sense because the larger impact of FTI funding would be felt in the areas where the potential for enrollment growth is higher—i.e., rural areas. Consistent with the experience with cash transfers, once the children are in school in any given year, the probability that they will be in school the next year goes up.

6. Books are assumed to cost $4, each child gets 2, and they last 3 years.

7. It is assumed and, to some degree, set as a policy target, that only 1/10th of current enrollment is in the last year of the primary cycle, due to internal inefficiencies (repetition and dropout). In reality it is a little lower, but we assume this will improve on the basis of planning and dialogue (as indeed it has improved much more in FTI countries than in non-FTI countries, in the past).

8. It is also assumed that, regardless of whether FTI directly pays for it or not, and on the basis of good historical evidence, there is a 1 for 1 expansion in the gross enrollment ratio at the secondary level in response to the expansion in the primary completion rate. However, it is assumed that 20% of the enrollment expansion financed by FTI does take place at the secondary level. This assumption is fully consistent with historical experience; in fact, it is based on an equation estimated using historical data.

9. Using all those assumptions, it is possible to "buy" some 74 million student-years. However, note that these are student-years, not actual children. This amount of enrollment then produces an additional 2.4 million completers per year (actual children). This, in turn, is equivalent to an increase in the completion rate of 7.6 percentage points, from a current level of approximately 64%, thus to arrive at 72% as a possible feasible goal.

All these numbers check, approximately (and for all the various reasons noted, the comparison can only be approximate) from the "demand" side or the historical achievement side, in the following manner. FTI has disbursed approximately US$1 Billion, but to a smaller set of countries than are now in the "eligible" list, and to countries that are smaller on average. The now-eligible countries are 60% larger, on average. At the same time, we are expecting, or setting as a policy target, that completion should improve 25% faster. The most important tracking indicator here is the completion rate. FTI countries improved, on average, 2 percentage points per year in the previous decade. We are now assuming, or setting as a policy target, an improvement of 7.5 percentage points over the next planning period (at least 3 years, more likely five), or 2.5 percentage points per year. Finally, one could set, as a target, to increase the number of FTI countries by 25%. This yields a total achievement (1.6*1.25*1.25-1) of 150% more than in the past, and the $US2.5 Bn is 150% more funding than was disbursed in the past. So, the numbers match, if one makes a reasonable set of assumptions.

4. Benefits or social impacts

This second substantive part discusses the likely impacts of educational outputs on other social indicators and economic growth.

4.1. Introduction: A Dangerous Myth

A common mythological belief seems to have arisen: that economists (and by extension Ministries of Finance, heads of development agencies who listen to their Chief Economists, etc.) don't understand that education is an investment, or that there is a relationship (partly but not wholly causal) between educational achievement and socio-economic development. It is difficult to know where or how this belief arose—economists are not always very articulate, and are often unjustifiably arrogant, so misunderstandings are to be expected. The prevalence of this belief is all the more puzzling in that there is a fairly extensive literature on this subject. This note will argue that this belief is mostly wrong, and dangerous, because it does not focus the debate on what economists and Ministries of Finance mostly *actually* believe. Thus, educators often waste their time trying to fight fights that (mostly) need not be fought (economists don't understand education is an actual investment), and tend to ignore the serious issues (economists think they have evidence that Ministries of Education do not manage the money well). The note will also provide some simple numerical estimates of how much social and economic development educational achievement "buys," though subject to caveats noted. The readers who prefer a more scholarly approach can refer to the most comprehensive recent treatment of all these issues, Walt McMahon's **Recent Advances in Measuring the Social and Individual Benefits of Education**. The literature on this issue has been summarized many, many times, and the bibliographies are vast. Rather than attempting to reproduce that literature, this note develops some original estimates typical of the literature, usable for policy dialogue, and puts it into some context. We skip bibliographical references because one single paper, such as the one noted by McMahon, can simply be tapped for its bibliography. If explicit references are needed to back up the claims, they can be provided. All the *numerical* claims made in this note are backed by a reference or by original data analysis done for the note.[2]

4.2. A personal anecdote: "Go Tell"

Upon starting my career as an education economist (whatever that is), I was often told by Ministers of Education (or 2nd or 3rd level officials): "Luis, you are an economist, can't you please go argue with those guys at the Ministry of Finance (or of Planning or the Treasury) that education is an investment and we need more money to invest? Don't they get that?" I would dutifully, if naively, do precisely that, maybe having produced a nifty Powerpoint (Harvard Graphics in those days) showing the relationships we all knew about, from the literature or from our own data analysis. I was then told by the Minister of Finance (or 2nd or 3rd – level officials): "But, Luis, we know the literature, and we also talk to good economists. Of course education is an investment and we know it. The real problem is that we just don't

[2] A note on data sources: a special data set constructed from publicly available World Bank data was created. Specifically, http://databank.worldbank.org/ddp/home.do?Step=2&id=4&DisplayAggregation=N&SdmxSupported=Y&CNO=2&SET_BRANDING=YES and http://databank.worldbank.org/ddp/home.do?Step=2&id=4&DisplayAggregation=N&SdmxSupported=N&CNO=1159&SET_BRANDING=YES. In addition the data set on human capital created by Altinook and Murseli (http://halshs.archives-ouvertes.fr/docs/00/09/70/99/PDF/06037.pdf) was used and merged with other World Bank data sources. The data set can be shared upon request.

trust the Ministry of Education as an investment *manager*. We don't want to be mean, but those fellows just don't know what they're doing as *managers*." That does, just about, encapsulate what there is to say. Now let's spend a few pages saying it.

4.3. From the beginning…

Arguably, economics, as science, started with the publication, in 1776, of Adam Smith's **The Wealth of Nations**, a ponderous tome most economists should read, many wish they had, and a few (including this one), actually have read. It is worth pausing to see what Adam Smith had to say about education, as things really have not changed that much in 250 years. Smith (as most economists since) clearly recognized not only the private value of education (in that skills acquired can result in higher wages) but its public value. (In the latter case, Smith's argument was largely about the role of education in making what we now call "good governance" more likely—the essence of how education can be a public good. Modern economists recognize the same public spillover in terms of, say, public health, epidemic control, environmental amenities, reductions in costs imposed on society due to obesity, etc.)

Smith's language completely anticipated the term "human capital"—insights which many believe developed only in the 1950s and 1960s, but which have been around at least since the late 18th Century:

> "The acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship, always costs a real expense, which is a capital fixed and realized, as it were, in his person. Those talents, as they make a part of his fortune, so do they likewise that of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which, though it costs a certain expense, repays that expense with a profit."

Smith further believed that because not all of the benefits of education accrue to the individual, public investment in education, to the point where it becomes free to those who cannot afford it, is justified:

> "When the institutions, or public works, which are beneficial to the whole society, either cannot be maintained altogether, or are not maintained altogether, by the contribution of such particular members of the society as are most immediately benefited by them; the deficiency must, in most cases, be made up by the general contribution of the whole society… The expense of the institutions for education and religious instruction, is likewise, no doubt, beneficial to the whole society, and may, therefore, without injustice, be defrayed by the general contribution of the whole society… For a very small expense, the public can facilitate, can encourage and can even impose upon almost the whole body of the people, the necessity of acquiring those most essential parts of education."

At the same time, Smith was profoundly skeptical about the impact of the lack of accountability of educational institutions (not, therefore, a new theme):

> "The discipline of colleges and universities is in general contrived, not for the benefit of the students, but for the interest, or, more properly speaking, for the ease of the masters… Those parts of education, it is to be observed, for the teaching of which there are no public institutions, are generally the best taught. When a young man goes to a fencing or a dancing school, he does not, indeed, always learn to fence or to dance very well; but he seldom fails of learning to fence or to dance."

(The quotations are from various places in The Wealth of Nations, assembled by us for effect; not to be found together in the book.) It would not be exaggerated to say that the views of (many?—there are always exceptions) economists have not changed that much since Adam Smith, not because economists are stupid or impervious to evidence, but because there is not much evidence to suggest a change of

mind. If anything, economists have become even friendlier to the notion that education is an investment, but they remain (mostly) skeptical about the efficiency of educational bureaucracies.

4.4. What can we say? A summary of key facts

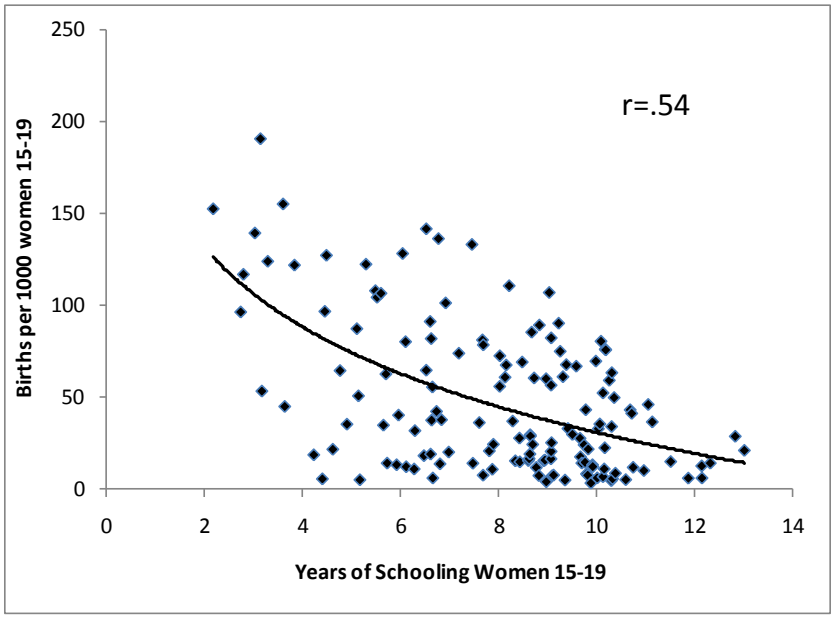
Here then are some useful factoids on the impact of education. The next section issues some caveats and explains how these were "found."

1. Education, particularly that of girls, strongly helps reduce teenage births. Since teenage pregnancies are a risk factor for child mortality, education also helps reduce child mortality. And since teenage pregnancies increase the total fertility rate, and a high fertility rate lowers the investment parents make in each individual child, girls' education has a strong knock-on effect on the *quality* of education of the subsequent generation. Indeed, one of the best predictors of today's learning outcomes is the previous generation's achieved fertility rate. Figure 1 shows the relationship between education and teenage birth rates. A few factoids should be noted. First, the relationship can be considered strong. The "effect size" (denoted by "r" in the figure) is 0.54, which in this kind of social science can be considered high. Even when one controls for overall development (since other factors may be affecting the rate of teenage births), ***every extra year of education reduces teenage births by 6.4 or so per 1000 girls***.[3] Another important fact to note is that the strength of the relationship is equal across the spectrum of development. If anything, as denoted by the fact that the best line that fits through the points is a curve, the relationship is stronger amongst the poorer countries: the impact of girls' education on teen births seems to have an extra "kick" with the first few years of female education. (A sort of law of diminishing returns.)[4]

[3] To "anchor" this improvement of 6.4, note that the rate in Bangladesh is around 65, and the rate in Australia is around 12. The relationship is highly statistically significant. An effect size of 0.81 is highly unusual in this type of analysis.

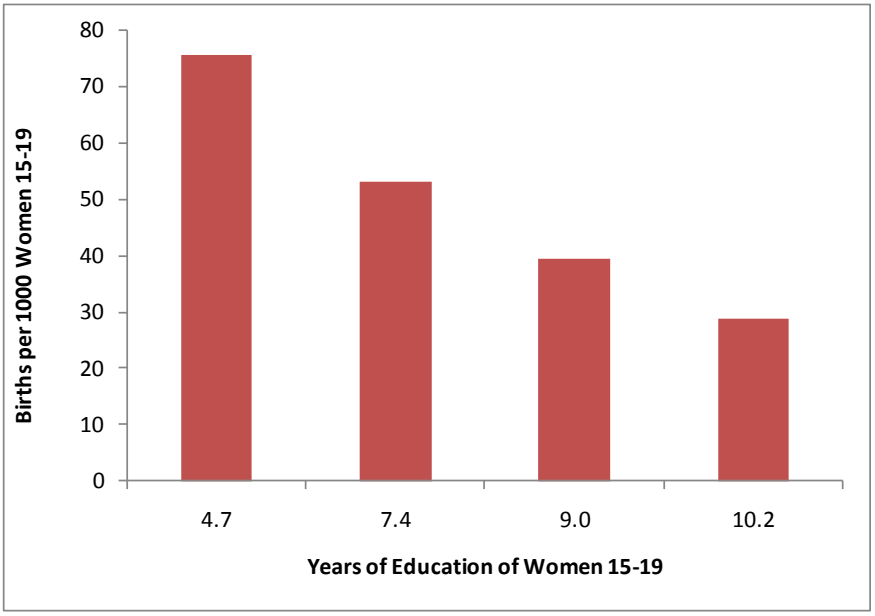
[4] Note that while the statistical significance of all the relationships depicted in the graphics has been tested and have been found to be highly significant, using at least one control (GDP per capita) and first-differencing the data, the graphics used present only the straight correlations, as is customary.

Figure 1. Schooling and teenage births



Source: calculated from datasets as per footnote 2

Figure 2. Relationship between education and teenage births



Source: calculated from datasets as per footnote 2

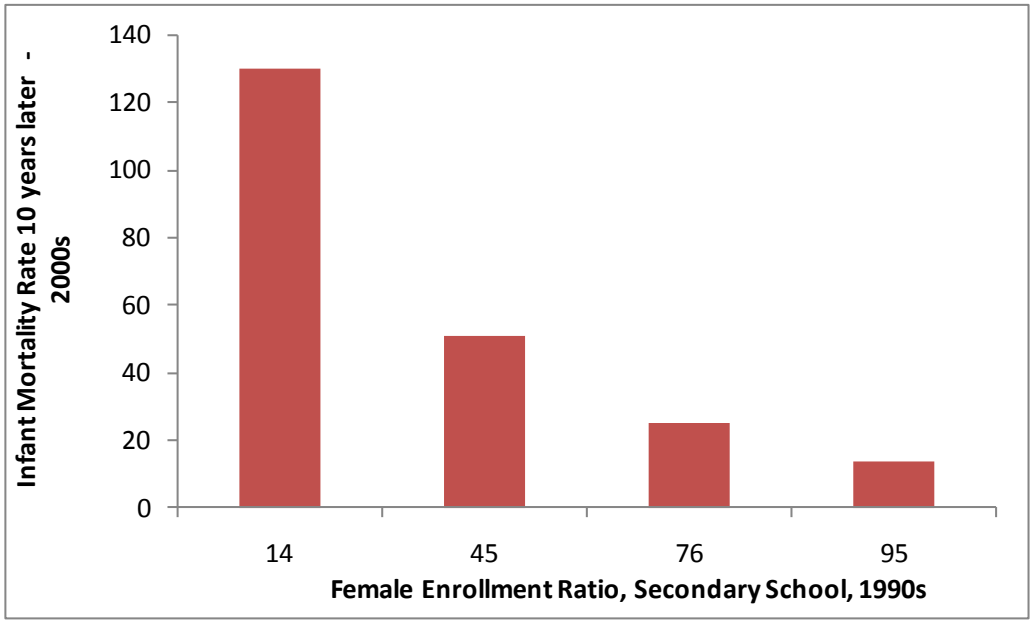
Figure 2 shows the same data as Figure 1, but in summarized form. To produce the data, countries were sorted into 4 groups of equal sizes, and the values on the horizontal axis are the averages for each group. Thus, the 4.7 is the average for the group of some 40 countries with the lowest number of years of schooling, and so forth. The first column is thus the educationally-least-developed quartile of countries, and the last one represents the

educationally-most-developed quartile of countries. (This is why the values are not equally spaced.)

2. Education, again particularly girls' education, helps reduce child mortality. The "effect size" controlling for overall development is a very high 0.81. ***Every 10-point increase in the female gross enrollment ratio in secondary school reduces child mortality by 13*** some ten to twenty years later (13 deaths out of 1,000 births).[5] Achieving a 10 point improvement in the secondary gross enrollment rate in 10 years is not difficult: 38% of countries improved at least 10 points in the period 1990 to 2000, with a subsequent impact on child mortality for the next decade or two. A 50-point improvement in enrollment, over time, would be associated with approximately a 65 point improvement in child mortality, which is essentially the difference between a lower-middle income country and an upper-middle income one.

[5] To "anchor" this improvement of 13, note that the child mortality rate in Burundi is 170, and in Mexico it is 19. The relationship is highly statistically significant.

Figure 3. Education and subsequent infant mortality



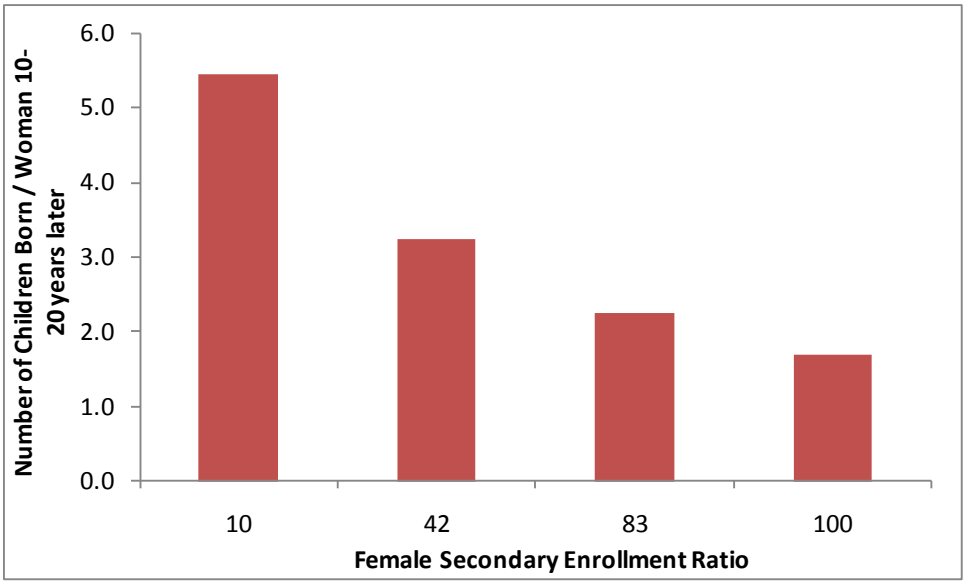
Source: calculated from datasets as per footnote 2

Figure 3 shows the relationship graphically. As before, the country groupings are in quartiles: the left-most column being the average of the least developed and the right-most column being the average of the most countries. Though this procedure results in non-equal spacing of the numbers on the horizontal axis, it is evident that the biggest "kick" in reducing infant mortality comes at first (e.g., in going from 14% enrollment to 45%). Thus, there is a huge premium on focusing on girls' education in the poorest countries.

3. Education affects the Total Fertility Rate (the number of children born to women over their reproductive lifetimes), yet another key social outcome. The "effect size" is a respectable 0.30. ***Every 10-point increase in the female gross enrollment ratio in secondary school reduces fertility by about 0.17 to 0.33.***[6] The relationship is depicted in Figure 4.

[6] The relationship is highly statistically significant, even controlling for GDP growth as a proxy for overall development. The difference between 0.33 and 0.17 in impact depends on whether one uses a level method or a first-difference method. The latter is more conservative.

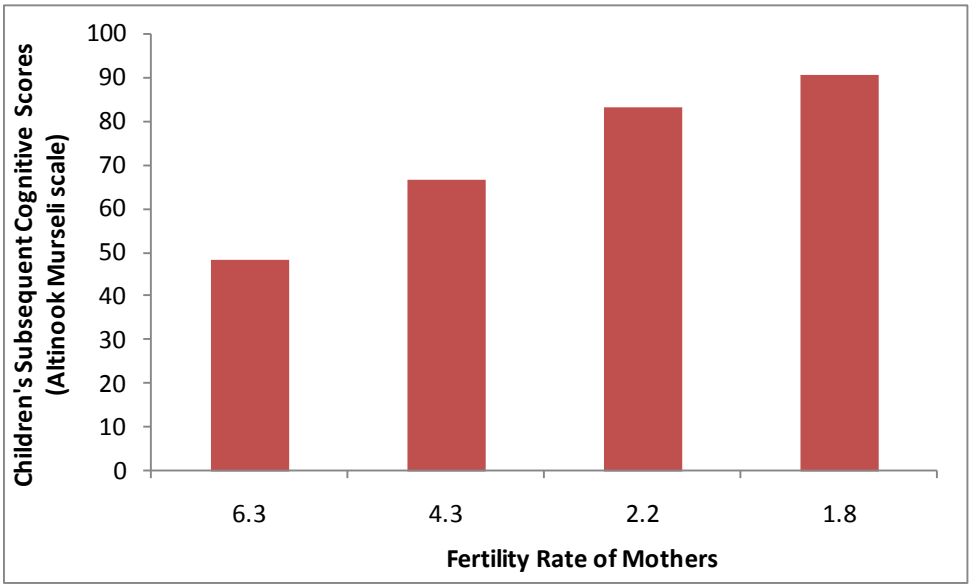
Figure 4. Relationship between schooling and total fertility



Source: calculated from datasets as per footnote 2

This relationship is particularly important because the more children women have, the less families tend to invest in each child, and therefore, the lower the quality of education of the children. And it is the quality of education that seems to impact economic growth the most. Thus, the Fertility Rate plays a particularly important role in the "virtuous cycle" aspects of development in which education is intimately involved. The correlation between the fertility rate 10-20 years ago, and the learning outcomes of children today, is a very high 0.88. Even controlling for the overall level of socio-economic development, as proxied by the GDP per capita, ***lagged fertility has a large impact on children's achievement: the effect size is 0.74, very unusual in this kind of research, and every drop of 1 child in the fertility rate improves performance on test scores by 6 points*** on a scale of 23 to 96. Thus, education impacts on fertility and fertility impacts again on education. ***This is why concerted efforts in human capital investments, along with solid macroeconomic and microeconomic management, can break the cycle of poverty in two generations***. The feedback from fertility back to education is shown in Figure 5.

Figure 5. Feedback from fertility to education



Source: calculated from datasets as per footnote 2

4.5. Education and economic growth

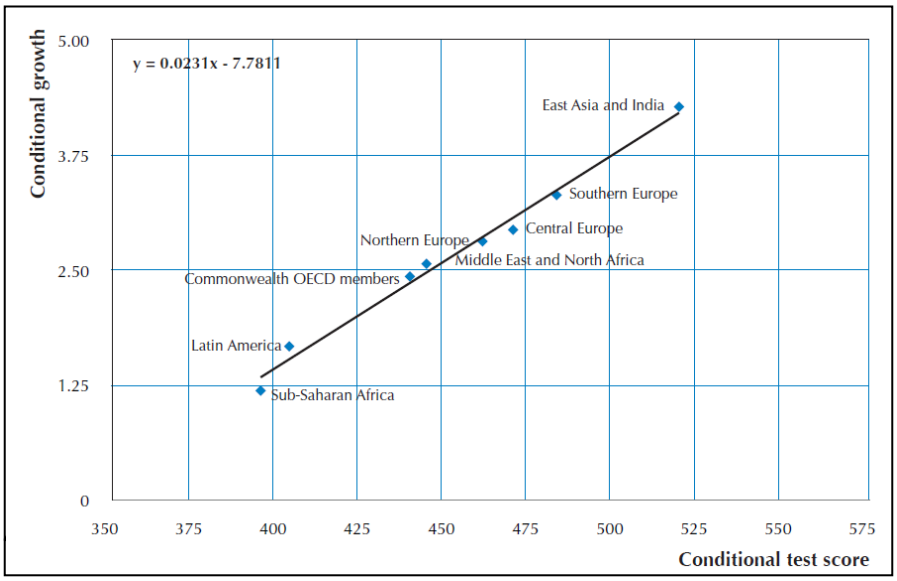
Exploring the link between education and economic growth is a somewhat more complicated issue than exploring the link to health and other outcomes. It is also less necessary given that there is a simple, canonical reference on this issue, these days, namely the work of economists Erik Hanushek and Ludger Woessman, which is conveniently summarized even in web sites and blogs.[7] In this note it is worthwhile to point out the basic results and how they were achieved, as well as to note that while this is the most recent round of evidence, it is by no means all that exists.

Economists have been finding evidence of the link between education *quantity* and growth for decades, using simple years of schooling and sometimes even just lagged gross enrollment rates (as a proxy for the quality of today's labor force). The more recent evidence, however, suggests that when quality (learning outcomes) and quantity (years of schooling or gross enrolment ratios) are considered together, the former seems to overwhelm the latter. Since the two are highly correlated, however, it is not at all easy (short of an experimental set-up) to disentangle the effect of quality from that of quantity. (In section 4.9 this correlation is discussed.)

What is innovative is the link that more recent studies have found between educational outcomes and economic growth, work associated with Hanushek and Woessman and also with the OECD's PISA program. These kinds of outcomes are based on "causal" analyses similar to those explained in other sections of this paper. A dramatic graphic is reproduced as Figure 6. The meaning of the word "conditional" in this graphic is that the impact already controls for the influence of other factors.

[7] E.g., http://www.voxeu.org/index.php?q=node/3869, accessed 20 August 2011.

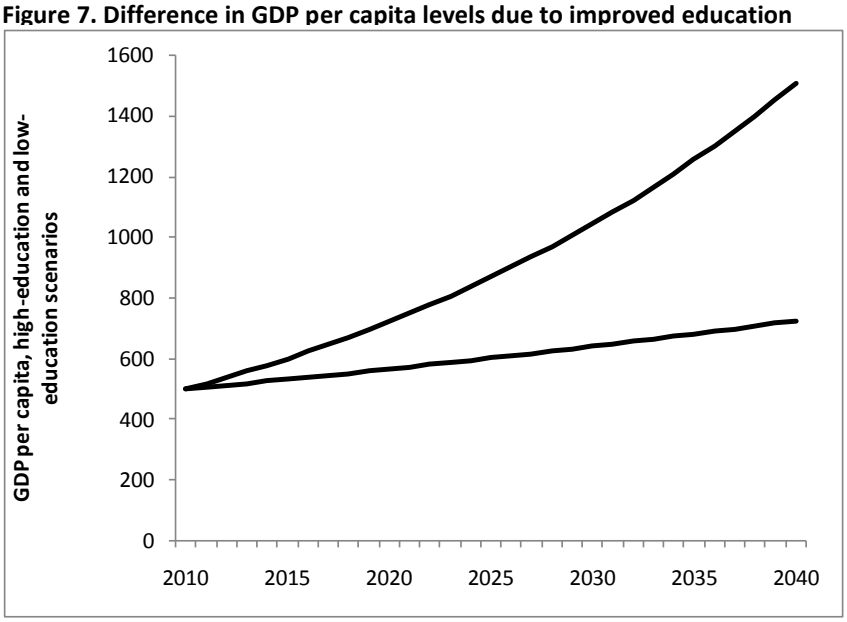
Figure 6. Relationship education outcomes and economic growth



Source: OECD 2010, "The High Cost of Low Educational Performance," p. 17.

The difference between learning outcomes in Sub-Saharan Africa or Latin America and the fast-growing economies is about 100 points (or more, really, because the poorest countries in Sub-Saharan Africa have not participated in the learning outcomes assessments included here, and other research shows that the results in these poorer countries are worse than those for the countries that have participated in the assessments on which this graphic is based). This is associated with a difference in growth rates of 2.5 percentage points, or 1.25 versus 3.75. This may not seem like much, but, for a country starting out at an income level of $500 per capita today (approximately the level of Eritrea in the late 2000s, say), it means *tripling* per capita income over a period of 30 years, versus simply increasing it by 40%. The impact is depicted in Figure 7. We emphasize that while these results apply mostly to quality differences, quality differences are closely correlated to access or years-of-schooling differences, though this does not mean that improving access will automatically lead to better outcomes, or that spending will automatically lead to either, as discussed in section 4.9 and section 4.10.

Figure 7. Difference in GDP per capita levels due to improved education



Source: calculated based on rates in previous graphic.

4.6. A detailed look at education and maternal mortality

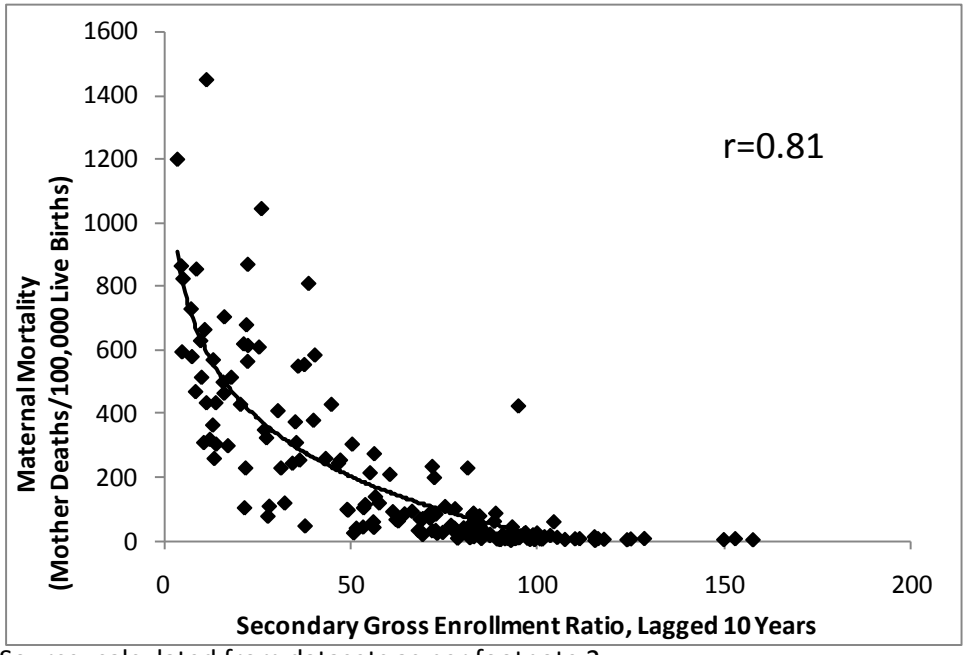
To explore all of the above in more detail, and to take a deeper look at how education impacts health outcomes, we decided to take a look at maternal mortality. This is the MDG on which progress seems slowest, as compared to other key MDGs. Progress on poverty, nutrition, school enrollment, and even other health indicators, such as infant mortality, has been much faster, in the sense that the percentage gap between where the world is in the period 2005-2010 (data are not always available for 2010 itself) and where the world would like to be in 2015 (that is, the MDG for 2015) is the highest for maternal mortality. Now, some of this is definitional: the goal for maternal mortality was extremely ambitious, namely to cut it by ¾ (from what it was in 1990). Other goals were to halve poverty (since 1990), to reduce child mortality by 2/3 (since 1990), and the increase in enrollment, as a world average, needed a boost of only about 30% (since 1999). So it is almost definitional that maternal mortality goals would be hard to achieve.

Nonetheless, it is useful to take a look at the role education could play in driving this lagging MDG. The story one can tell is that the role of education at first appears large and significant. If one then scratches a little below the surface, the role of education weakens, but if one digs one more layer, the role of education re-appears and seems as perhaps the strongest of many factors, though it operates on the maternal mortality ratio via indirect (but very powerful) channels. The story is as follows.

The relationship between education and maternal mortality is an extremely strong one. ***Figure 8 shows that the correlation between education and maternal mortality is 0.81, which (in this case) is the same thing as an effect size of 0.81—very high, as noted. For every 10 points improvement in the female***

gross enrollment ratio, maternal mortality drops 55 points.[8] It should be noted that, as is common in many of these relationships, education has more of an impact at first: going from 0% enrollment to 50% "buys" a country most of the impact on maternal mortality.

Figure 8. Female education and maternal mortality

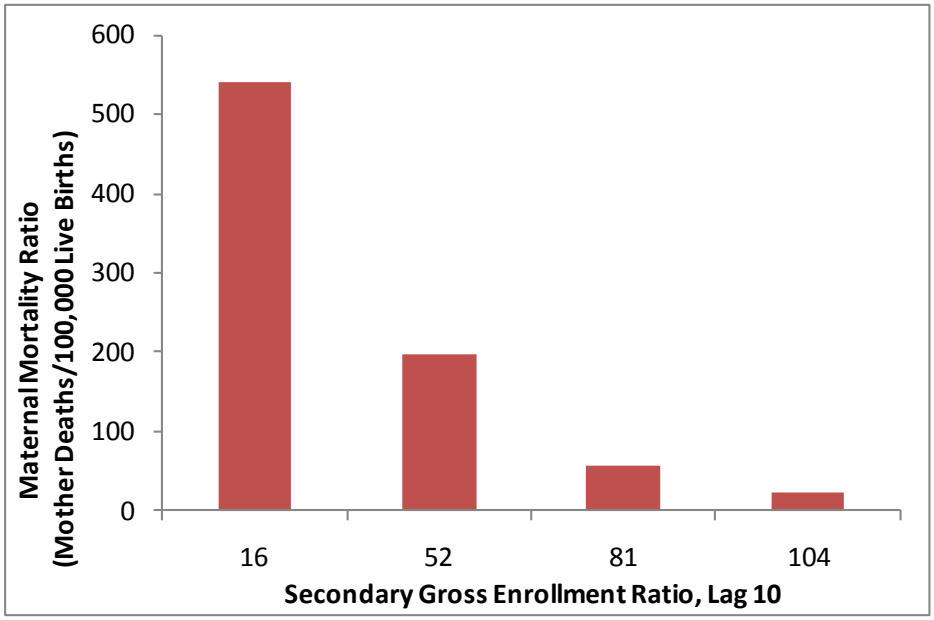


Source: calculated from datasets as per footnote 2

Figure 9 shows the same thing, grouping all countries into four quartiles and showing the average maternal mortality for each group.

[8] To anchor the number 51, note that the maternal mortality ratio in the Congo Republic is around 550, and in Mexico it is 86.

Figure 9. Female education and maternal mortality



Source: calculated from datasets as per footnote 2

Thus, at first blush the relationship appears extremely strong. But if one asks how the relationship operates, in a causal sense, one has to admit that there must some more "proximate" variables that determine maternal mortality. In particular, recall that the definition of maternal mortality is mother deaths for every 100,000 live births. Thus, it would seem that a key risk factor would be the total fertility rate itself (number of children born per woman), in particular because higher fertility rates are associated with more at-risk births in the early and late age groups, and less time for women to recover between births. But to the degree that births are mediated by relatively good health care, the risk is reduced. Thus, one would expect that a second "proximate" determinant would be the percentage of births attended by trained personnel. This is indeed the case: both of these factors have a large and statistically highly significant effect on maternal mortality. If one then considers the impact of education on maternal mortality *controlling* for total fertility and proportion of births attended by trained personnel, and one also controls for a general development factor (income per capita or its opposite, income poverty) as well as health expenditure as a share of GDP, then the *apparent* impact of education vanishes. (Though there are good reasons to think that it is not just the apparent but some of the real impact that vanishes. Poor people tend to have worse health results, even if they are as well educated as richer people.) In fact, the impacts of the fertility rate and the proportion of births attended by trained personnel are so powerful that the effects of other factors, such as income per capita and health expenditure, also vanish from sight. The fertility rate and the proportion of births attended by trained personnel have an effect size of 0.67 and -0.36 (it is negative because the more trained the personnel, the lower the mortality) respectively. The *apparent* or superficial direct impact of education, in face of these stronger direct determinants, vanishes.

But that is not the end of the story. If one digs further down the causal chain, what one then discovers is that education is enormously powerful, but *indirectly* so. Recall that the two main determinants of maternal mortality turn out to be the total fertility rate and the proportion of births that are professionally attended.

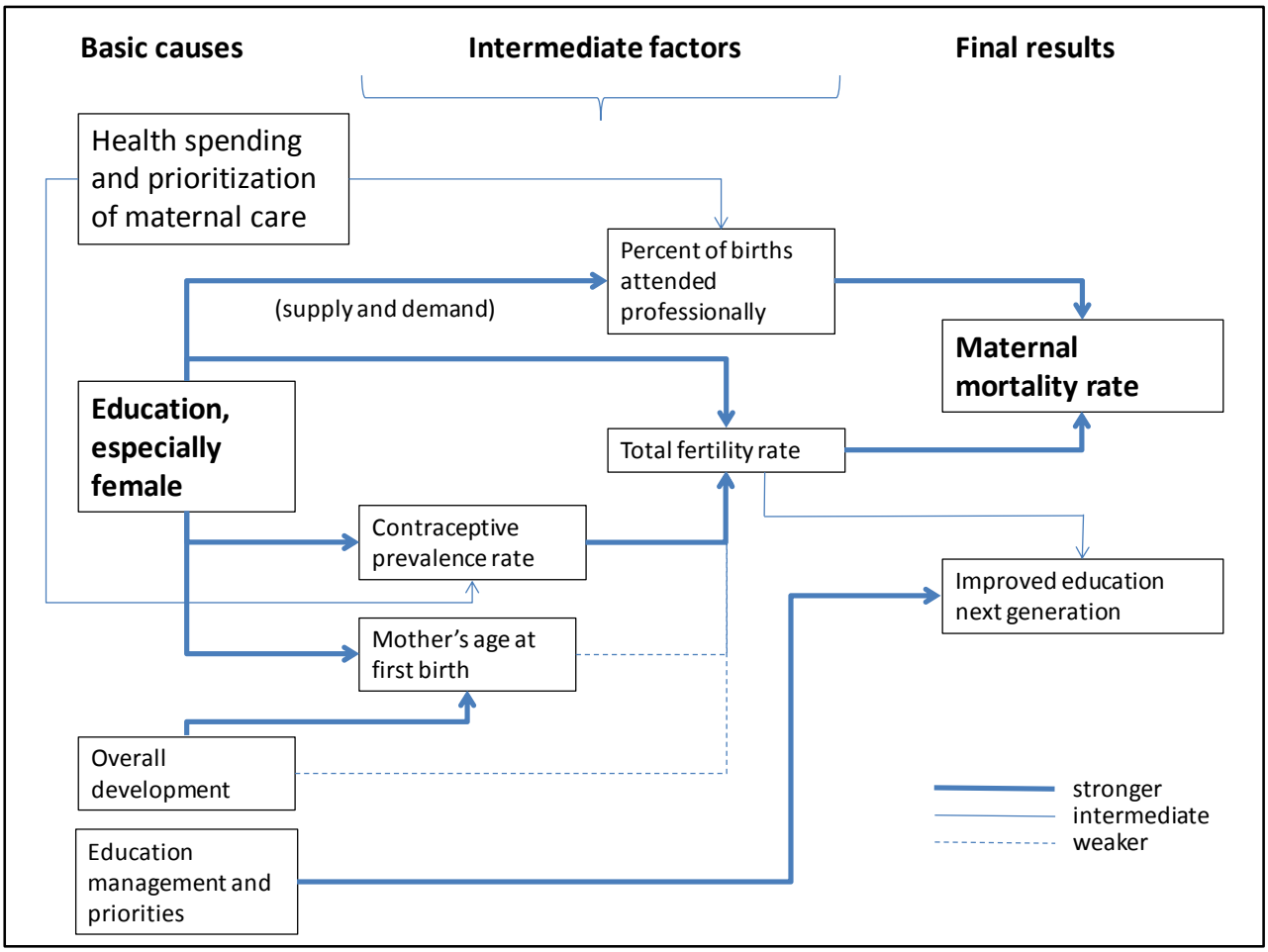
But what then determines the total fertility rate? Three factors do: female education, impacting directly with an effect size of -0.32, the contraceptive prevalence rate, with an effect size of -0.57, and the level of per capita income, with a relatively low effect size of 0.21. But the chain or reasoning does not stop there. If one then ascertains the determinants of the contraceptive prevalence rate, it turns out that education is the main determinant. Thus, education has a direct impact (by delaying marriage and altering the demand for children) *and* an indirect impact on the fertility rate, through the contraceptive prevalence rate, and the fertility rate then impacts the maternal mortality rate, in part because it is the higher-order births that tend to put mothers more at risk.

What of the proportion of births attended by professionals? The biggest impact comes from lagged female secondary education, because lagged female education increases the pool of trainable professionals down the road, and because female education increases the propensity of women to use trained professionals for their childbirth.

Thus, education is at the heart of a set of factors that determine fertility (demand for children, acceptability of contraception, and delayed age of marriage), and that determine the probability that births will be professionally attended (by increasing the pool of trainable professionals and increasing the acceptability or propensity to use trained professionals for births). These two factors then drive the maternal mortality rate. Education appears to at the heart of it, when one digs deep. Other factors such as the general level of development, as proxied by income per capita, or raw health expenditure, as proxied by total health expenditure as a share of GDP, are relatively minor factors. Aside from education, a policy-supply factor that proxies for the relative priority given by countries to safe births, is the proportion of births attended by professionals. All these factors together seem to powerfully determine the maternal mortality rate.

All this can be captured graphically. **Figure 10** is self-explanatory if one has read the rest of the text in this section of the paper and studies the figure briefly.

Figure 10. Net efffects of education on maternal mortality



Source: calculated from datasets as per footnote 2

What is more, one can then quantify the indirect effects of education on maternal mortality by running all of the equations that embody the graphical relationships above. If one does so then one can state a numerical measure of the importance of education: ***for every 10 point improvement in the female secondary enrollment rate, the maternal mortality rate drops 51 points, and the effect size of education on maternal mortality is 0.61, a high value.***[9] Note that, ironically enough, even though the most proximate determinants of maternal mortality include education only in a weak way, when one takes into account the effect of education on the proximate determinants that really count in driving maternal mortality (the fertility rate and the proportion of births professionally attended), then the total but indirect impact of education turns out to be as strong as the initial, "naïve" estimate we started out with at the beginning of this section. Finally, it is also important to note that though the effect of education is working through these more proximate determinants, nonetheless, by running simulations

[9] To anchor the number 51, note that the maternal mortality ratio in the Congo Republic is around 550, and in Mexico it is 86. Increasing secondary female education by 50 points accounts for 250 points of the maternal mortality difference between countries such as the Congo and Mexico.

one can measure that indirect effect of education as a real and very high effect size of 0.61. It turns out that this effect is as high as the measured direct effects of fertility (0.61 also, it turns out) and proportion of births attended professionally (-0.36).

Finally, recall that fertility reductions in turn increase the learning outcomes of children, as families invest more per child (choosing quality over quantity) and as public resources also go further. All these issues, namely female education (and education in general), fertility reduction, maternal mortality, and the levels of achievement of the next generation, are intimately and powerfully connected, and need to be the subject of improved and more efficient investment in *all* human capital.

4.7. How can we say all this?

Much of this analysis is based on varyingly sophisticated forms of correlational analysis. The analysis used above is two "steps" in sophistication above mere correlation.[10]

One critique of correlational analysis is that there are always unobserved factors that could be influencing both educational change and the change in the "target" or dependent variable (fertility, productivity, infant mortality), or indeed that these factors affect each other. Education may have improved over time, and so may have economic growth, but perhaps this was due to the fact that, at the same as time countries were investing in human capital, they were also carrying out economic reforms. Or, education may have improved, which improves fertility, which in turn makes education easier. The attempt to look for whatever else may have been changing via "controls," it is sometimes argued, is of limited value, because the other things that may have been changing could well have been unobserved or even profoundly unobservable. (How does one quantify changes in cultural attitudes towards contractual arrangements and respect for economic predictability, for example, which may explain a lot of economic growth, and increases in which tend to coincide with overall development?) Recently a fashion has set in for saying that one should conclude there is causality between, say, education and health results, *only* if the relationship can be established via processes where randomization removes the impact of any unobservable factors that may be causing a spurious relationship. And some papers have been produced that attempt precisely this, and do raise challenges for the conventional literature (e.g., specifically on the good-governance-inducing effects of education). But this critique, when applied wholesale to policy issues such as those we are concerned with here, is a bit misplaced, for several reasons.

First, one is not recommending investment in education here as a sure-fire, single-agent "fix" for poverty and development. It is to be assumed that processes of social dialogue, in which investment decisions will be contested, will tend to produce relatively balanced patterns of investment in countries, where education is unlikely to get too far ahead of health, of infrastructure, of agricultural research and development, and so forth, and of economic reform in general. That is, for example, one should in fact assume that educational improvement is taking place in a context where other variables are in fact also improving: female education predisposes families to want fewer children, but this has to be mediated via the availability of family planning services. Lower accomplished fertility then enables more investment in children and a better education. Thus, in practice, even if the notion could be "sold," it is unlikely that education would be seriously treated as a *panacea*. On the contrary, education is part and parcel of a set of investments all of which need to take place for the cycle of poverty to be broken. So there is no real point in trying to isolate the solitary value of a pretended education "lever" or panacea.

[10] Controls for overall development are used; and a first-differences approach is generally used.

Second, while it is true that in these sorts of partial analyses there could be third factors that are causing the economy or health outcomes to improve at the same time as education, and thus leading to a spurious correlation, it is also the case that education has other direct and indirect impacts. Thus, if it is economic reform that is helping economic growth, and not just education, then it is a reasonable supposition that education creates climates of opinion that make economic reform more likely, and hence that part of the effect of reform on growth is also an indirect effect of education. (Indeed, recall that Adam Smith's main argument for why education is partially a public good is the hypothesized effect that education may have on the possibility of calm critical discourse on policy issues.) Finally, it seems somewhat unsatisfactory to attempt to rely only on experimental evidence to validate important social policies, when the experimental evidence tends to arise from experiments with individuals or small communities, but most of the effects we are after are collective effects, highly mediated by very wide externalities. All this is not an argument against experimentation. On the contrary, more experimentation should be carried out before specific reforms are adopted. It is, however, to argue for a not-excessively-narrow approach to social policy, where the causal probability analysis should be based on factors similar to those used in epidemiology.[11]

4.8. Other corroborating evidence

Aside from the sorts of evidence noted above, there are whole set of streams of literature that corroborate these findings. As usual with academic debates, there are always doubters, and for every article that claims to find something, there are some that doubt the findings, and then others that re-confirm the original findings. Nonetheless, the weight of the evidence is strong that education really matters, and matters causally. There are at least three streams of literature: a) the growth-accounting and endogenous growth literature, b) the rates-of-return literature, including those based on twin studies and natural randomization, and c) literature that shows positive non-economic effects in a huge variety of areas.

Growth accounting literature starts with the observation that economies in the last century or so have grown by more than it is possible to account for via the accumulation of physical capital and the growth of raw labor, and that there must be something to the growing skill of the labor force, or factors related to organization and efficiency, that account for differences in growth over time and over countries. At the same time, attempts to explain differences in wealth or income between countries find that looking at, again, physical capital, natural capital (agricultural land improved and unimproved, mineral wealth, and raw labor), find that these explanations are insufficient, and that taking into account the skills of the labor force contributes to the explanation. This does not mean that skills and organizational improvements are produced only by education systems. Some of these take place through the spread of efficiency-enhancing discoveries and on-the-job training (and the spread of such skills) that takes place within firms themselves. The fact that skills are important does not translate into an automatic support

[11] E.g., criteria such as the Bradford-Hill criteria or those discussed by Julian Simon, for situations where experimental proof is not possible, such as: a) strength of correlation and multiplicity of correlational findings across a variety of settings, b) fewness of side conditions or conditioning factors ("specificity" in the epidemiological literature: one cause to one effect, one effect per cause), d) temporality (at least for certain things, the effect cannot precede the cause, stronger relationships when appropriate lags are used), e) logical non-spuriousness assessed in a variety of ways, f) consistency with a body of theory and what might be called a "physical" or "molecular" causal chain, g) consistency with what could be called a forensic model of causality (the way it is judged whether someone is guilty or not in a crime), h) dose-response, and i) consistency of response in time and over cases.

for boosting the expenditure of educational bureaucracies—that would require another step in the logic, one where there is more dissent in the profession.

Rates of return to education have been established based on individual earnings and other forms of output. The insight that education is capital and that increases in wages are a form of return to investment has been formalized. Economists calculate the difference in earnings accruing to those with, say, one more year of education, compare that to the cost (both the cash cost and the opportunity cost of not working for a year), and conclude that education has a fairly high rate of return both to individuals and society—somewhere in the range of 10% to 20% in latest estimates. Employers realize that more educated people are more productive, so they pay more. There is a vast literature in this area, some of which is critical of the notion that these represent real returns. Some allege, for instance, that education is just a selection process, that those who are more inherently talented or had more education-oriented and wealthier parents will both have more education and will have higher earnings, and that the association between higher earnings and higher levels of education is correlation rather than causality. Other critics say that diplomas and high marks are just a signaling device that allows employers to see which potential employees are patient, disciplined, and/or analytically talented, and so they are more willing to employ the more-educated, or to pay them more, but that it is not what the potential employees actually learnt in school that really matters. But other studies use various forms of natural randomization, such as changes in the length of years for compulsory education or twin studies, to demonstrate that at least a significant portion of the apparent returns to education are real enough. It is also clear that extra years of education prior to a diploma, not just the obtaining of diplomas per se, make a difference. These rate-of-return studies are often confirmed by measures of direct physical productivity, not just earnings. Thus, for instance, it has been observed and documented that educated farmers tend to be able to produce higher crop yields (weight for area) and use inputs more appropriately, and that education makes farmers more appropriately risk-taking and innovative, and so on.

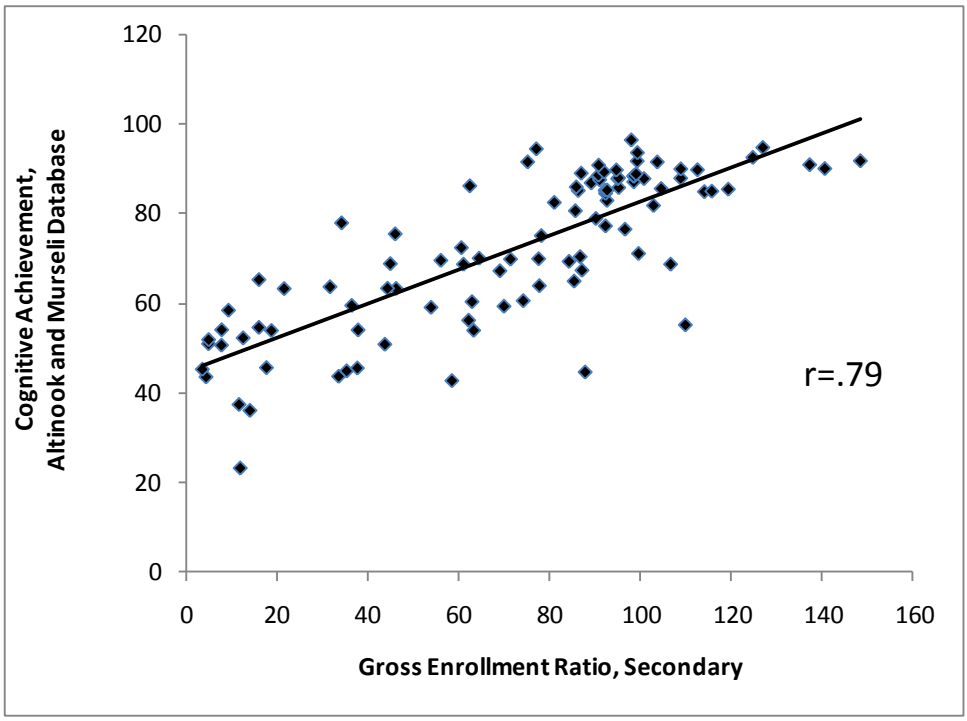
Non-economic impact studies have systematically looked at the association between education levels and a truly broad set of social results. These studies are ultimately correlational rather than truly causal (see above). Nonetheless, there are credible studies that associate improvements in education with: 1) educational achievement of the children of educated parents, 2) obesity control, 3) substance abuse control, 4) overall health, 5) efficiency of consumer choice, 6) efficiency of labor-market searching, 7) criminality behavior and impulse control, 8) respect for the environment and public goods, 9) propensity to vote and a critical attitude towards politicians, 10) social cohesiveness and participation (clubs, PTAs, trust in others, etc.), as well as tolerance and at the same time patriotism. For each one of these, several peer-reviewed journal articles could be found and cited. All this is summarized in the McMahon book noted above.

4.9. Quality and quantity

The most recent evidence on the link between economic growth and education suggests that it is the quality of education, or more precisely, the level of learning outcomes, that seems to have most impact on economic growth. The link of economic growth to mere years of schooling has now been shown to be weaker than the link to quality. However, in past decades economists had indeed found links between various measures of years of schooling and growth. The problem is that, as more data on learning outcomes become available, and then one tries to consider both quantity and quality in a model of economic growth, the quality effects swamp the quantity effects to the point where the quantity effects appear to become statistically insignificant. But this is not as simple as it seems. Since the two (quantity

and quality) are correlated, the more powerful determinant tends to statistically mask any influence of the less powerful determinant, but that happens *precisely* because quality and quantity are rather correlated, historically. (If they were uncorrelated, their individual effects would show up, or not show up, on their own merit, as it were.) In particular, at present, measures of quality are correlated with measures of access to secondary education, because access to the latter has not become universalized.

Figure 11. Relationship between secondary school enrollment and learning outcomes



Source: calculated from datasets as per footnote 2

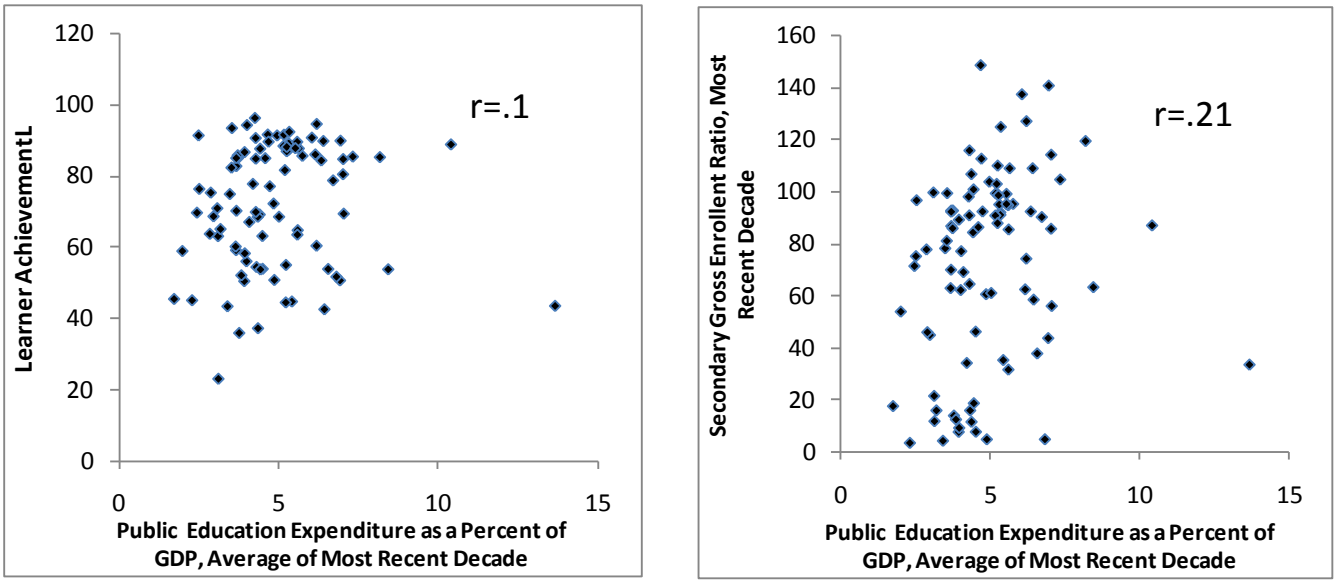
The fact that quality and quantity (access) have historically moved more or less together, however, should not be taken to imply that they will continue to expand together if quantity increases at rates that are historically unprecedented. Research that takes into account the expansion of primary education together with secondary education does show that *some* countries have systematically over-emphasized quantity at the expense of quality, and that therefore it is indeed possible to over-do it on the quantity side by failing to pay concomitant attention to the quality side. The fact that historically these factors go together is not an accident but is the result of purposeful policy changes that take place in countries, in the normal course of historical development. But it is possible to break that historical link of the pressure on quantity is unprecedented, and indeed in some cases it has happened. As the EFA FTI process does put unprecedented historical pressure on increasing access, it is vital to maintain a similar pressure on the quality aspects.

Thus, the basic arguments here (and in the section on economic growth) is that: quality is the factor that matters the most, that nonetheless quantity is not entirely irrelevant, that historically they tend to go together, but that countries need to be careful about purposefully improving quality at the same time as quality.

4.10. What can't we say? Facts about non-effects

While most economists agree that educational achievement has an impact on social and economic outcomes, there is at best weak evidence that one can use (public) educational expenditure as a "push" factor to leverage educational achievement, in the absence of other efficiency measures. These arguments are mostly summarized by the work of Lant Pritchett, an influential economist who has been quite skeptical, and rightly so, about the impact of educational spending on either educational or broader social outcomes, in the absence of accountability and efficiency-enhancing structures in countries. In fact, it is precisely because economists do think that the effects (e.g., education and health) discussed above are so potentially powerful that the lack of appropriate efficiency in how education sectors are managed tends to concern them. Figure 12 shows the relationships between public education expenditure as a share of GDP, averaged over the most recent decade, and the most recent world-wide set of both learning outcomes data and (to pick some indicator of enrollment) the secondary gross enrollment ratio. The relationships are dismally weak.[12]

Figure 12. Relationship between education spending and achievement



Source: calculated from datasets as per footnote 2

<u>But there is an important issue of interpretation in all this</u> which is often not remarked upon when economists adduce this sort of evidence. Analyses such as these (and much more sophisticated ones, including analyses of school by school data done by FTI and the World Bank in Africa in Country Status Reports, PETS studies, and Public Expenditure Reviews—but most of them come to more or less the same conclusion) tend to be used as "proof" that one can't really *leverage* success through expenditure.

[12] Some analysts try to argue for a closer link between expenditure and results by correlating educational results with education expenditure per student, in dollar terms. But this is fairly misleading. To the degree that achievement is simply correlated with overall development as proxied by GDP per capita (and it is), and to the degree that per-teacher cost is correlated with GDP per capita (and it is), most of what one is observing, in correlating outcomes to expenditure per student, is the correlation between salary expenditure per student and GDP per capita, and that is a pre-existing or background correlation that produces a somewhat spurious correlation between per capita education spending, in absolute dollar terms, and outcomes.

But that is a very different thing from concluding that, in cases where plans are good and systems are increasingly efficient, one can achieve even more at zero or low cost. In fact, almost by definition one can't. If classrooms are already full and if their construction is fairly efficiently procured, if teachers are truly busy, productive, and well allocated, if there is good supervision, low repetition and wastage, and so forth, then one really cannot expand a system at no cost. The relationship with quality is a different matter. As the data suggest, the correlation between expenditure and achievement is even lower than the correlation between expenditure and enrollment, and this makes sense: quality is to a larger degree a matter of management than enrollment is.

All this is a formalization of the folksy saying that "you can pull on a string, but you can't push on a string." The relationship between expenditure and educational achievement may be like that between a rock and a person trying to move it with a string: one can indeed use a string to pull a rock, but not to push one, and even the pulling can be effective *only if there is no slack in the string.* **This is why the FTI process tries to mobilize funding for countries *with good plans***. That was, and continues to be, the whole idea, and is why examining efficiency parameters (such as the repetition rate) and own effort parameters (such as the percentage of GDP spent on education) in countries' education plans is so crucial. These plans need to emphasize, among other things, the efficiency with which money is to be spent. Similarly, the funding approaches need to formally recognize sectoral efficiency, so that the allocation of funding automatically directs more investment towards countries that are proving to be more efficient. The Needs and Performance Framework (NPF) that FTI uses does this. Other analyses produced for the EFA FTI replenishment show the costs involved in enrolling children in countries where enrollment is low: these are the costs of building classrooms, training and paying teachers, and buying materials. These costs are mostly needed. However, if the FTI process is too lax, and the proposed costs are too easily "recognized" in the planning and plan appraisal process (that is, without questioning the efficiency of the systems—for instance, if a lot of classrooms are already empty, or working hours are low even if pay is relatively good) without examining how efficient they are, then such expenditures could actually entrench inefficiency. This would not do anyone a favor, as it will under-serve children relative to what one could do if one paid more attention to efficiency. Thus, there is a case for investment, but there is also a case for investing, as the EFA FTI paradigm goes, only when countries have good plans and are making their sectors more efficient.