

Delivering Education

A Pragmatic Framework for Improving Education in Low-Income Countries

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Abstract

Even as primary-school enrollments have increased in most low-income countries, levels of learning remain low and highly unequal. Responding to greater parental demand for quality, low-cost private schools have emerged as one of the fastest growing schooling options, challenging the monopoly of state-provided education and broadening the set of educational providers. Historically, the rise of private schooling is always deeply intertwined with debates around who chooses what schooling is about and who represents the interests of children. This time is no different. But rather than first resolve the question of how child welfare is to be adjudicated, this paper argues instead for a 'pragmatic framework'. In this pragmatic

framework, policy takes into account the full schooling environment—which includes public, private and other types of providers—and is actively concerned with first alleviating constraints that prohibit parents and schools from fulfilling their own stated objectives. Using policy actionable experiments as examples, this paper shows that the pragmatic approach can lead to better schooling for children. Alleviating constraints by providing better information, better access to finance or greater access to skilled teachers brings more children into school and increases test-scores in language and mathematics. These areas of improvement are very similar to those where there is already a broad societal consensus that improvement is required.

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I. Introduction

Two decades into the new millennium, when it comes to education, there is much to be optimistic about. Primary school enrollments are up and it is the rare country where more than 10 percent of children in the primary ages are out-of-school (Figure 1). Measurement and learning are squarely on the educational agenda and widely publicized results from international tests like the Trends in International Mathematics and Science frequently crossover into the political debate. An array of educational products and experiments are under development and barely a day goes by without the launch of the next great thing in teaching methods or schooling system reform, a keen reflection of the universal desire to improve.

But there is also much to worry about. Low-income countries that participate in international tests report deficits that put their average child at the bottom 15th percentile of children from richer countries. In countries like India, Ethiopia, Peru and Pakistan, children can barely read as they graduate primary school. Vast differences across children compounds the problem of low average learning, contributing to growing inequality and concentration of incomes: Test results from countries like South Africa and Indian states show that these are among the *most* unequal educational systems in the world—the top 1% do OK, the rest can barely read by the time they finish primary school (Table 1). To the extent that the skills obtained through a good schooling system are critical to a productive adult life, the “escalator to success” is broken.

As countries grope towards potential fixes, high-income countries are increasingly experimenting with policies that cede centralized control of schools to parents and communities. In the United States, charter schools—schools set up and administered by independent groups and parents who receive funding from the state—are the next big thing. In Sweden, parents receive vouchers to send children to schools of their choice. In the Netherlands, parents can set up schools if their proposed schools offer services not available in other schools nearby. In low-income countries however, schooling systems remain centralized with authority divested (in some cases) to sub-national levels such as states or provinces, but rarely to communities and households, except as experiments.

Not surprisingly, parents in these countries are not standing still. With the state not ceding much control over public schooling options, a significant change and natural response is the growth of private schools. In countries like Pakistan, India, Nigeria and Kenya private schools are the fastest “new” source of education provision. These private schools are typically low-cost and fully accountable to parents—if parents do not enroll their children in the school, the school loses its revenue. Of course, even within private schools the battle over autonomy rages deep: BRIDGE schools in Africa try and teach the same thing at the same time in each school with no discretion for different communities or children, much like KIPP schools in the U.S. On the other hand, small low-cost private schools in countries like India and Pakistan are engaged in millions of daily micro-experiments, each evolving a unique style and function depending on the context they are in. Yet there is a worry that such schools are reinventing the wheel and rarely have the capacity or incentives to distill and share their learnings more broadly.

We situate these developments as part of a long trajectory of historical debates surrounding accountability structures around schooling, and in particular the degree to which centralization is a “good” thing. As literature on the history of education shows, debates over the ability/desire or appropriateness of parental versus administrative control over schooling are as old as schooling itself. For instance in ancient Rome, Pliny, while suggesting that he could partially pay for a teacher in the town of Como also insisted that the bulk of teachers’ salaries should be paid for by parents themselves because he worried that if the payment of salaries was delinked from those who the education was provided for, the quality of teaching will suffer.²

Pliny’s argument combines two key concepts: the right to make judgments over child welfare and the mediating effect of the political system in any situation where public financing comes into play. We use this prism to situate the current literature and show that recent innovative research provides much needed evidence on the desires of parents and the ability of the schooling system to cater to these desires, but not each by itself. For instance, if children attending private schools are better at English but worse at Math, it speaks both to the relative desire of parents that their children learn English versus Math *and* the ability of the school to teach the two subjects. Whether or not this is a ‘problem’ can only be ascertained once we are willing to make welfare statements about the relative benefits of English versus Math instruction in the schooling system. But who should make that welfare judgment?

Our stand is that adjudicating between alternate views of what schooling systems should produce has, as demonstrated by 2500 years of debate, no universal solution. Those who argue that parents know best will always have to confront cases of deep parental neglect and even abuse in sub-populations in every country. Alternatively, uncontested state intrusion into family decisions has in many cases led to equally mendacious neglect, abuse and systems that have produced sub-optimal outcomes for too long. The ‘stolen children’ of aboriginal populations in Australia, forcibly removed from their parents under various acts of parliament for child protection, were less likely to have completed secondary schooling, thrice as likely to have an arrest record and twice as likely to have used illicit drugs—all outcomes that the program itself sought to improve.³

We argue instead for what we call a ‘pragmatic’ framework that is theoretically based and empirically driven.⁴ Conceptually, our approach is rooted in the central tenets of economic theory—the First and Second Welfare Theorems—which say that societies can achieve any desired welfare objectives through appropriate redistribution of resources *provided* that market mechanisms are functioning well. We therefore first assess the extent to which market mechanisms function ‘well’ borrowing from an established framework of market failures. Such market failures arise due to constraints that prohibit

² Pliny declared that he was “willing to pay the whole amount required, were he not afraid that an institution thus richly endowed by him might turn out like other foundations of the same kind, to the support of which those for whose advantage they existed were not called on to pay any direct contribution. It appears that many endowments existed in which the teachers received salaries, but that these funds were too frequently diverted to the uses of the relations and dependents or the patrons or the magistracy.” (Lea and Blanchard 1837, Page 387)

³ See Bereson, 1989.

⁴ Our approach is based on the philosophical movement of pragmatism: Where metaphysical controversies are impossible to revolve, the practical consequences of particular positions can be tracked and discussions can be reoriented based on the findings. The practice is not devoid of theory, but theory is realized in the practice. See Dewey (1919) and Dewey (1948).

firms and consumers from reaching their *own* stated objectives and could include, for instance, lack of access to credit, poor information, or the inability of schools to write long-term contracts with teachers.

We then ask whether there are policies that can alleviate such constraints without (a) administrative and centralized decision making over what schooling systems should produce and how they should be funded and (b) an explicit judgment over what a schooling system should produce. Once these constraints are alleviated, we reexamine the new equilibrium to see what has been produced. In our framework, we do not start by assuming that one needs to either try to influence the preferences or motivations of schools and parents or augment the ‘production’ function of schooling through specific inputs. To be sure, if the resulting equilibrium does not get us any closer to desired societal outcomes (or worse, takes us farther away), the premise will need to be re-examined. But in either case, valuable empirically grounded information—both on the outcomes that result when market constraints are eased and what these then reveal on about the underlying preferences, technologies and endowments—will become available to further the debate.

Based on our experience from four recent policy actionable experiments, we are cautiously optimistic that this is a promising approach. Each of these controlled and natural experiments sought to remove constraints in either the market for information, the market for credit in the private and public sector, and/or the labor market for teachers. Every experiment increased efficiency and in doing so improved outcomes in those very arenas where there is broad consensus that improvement is necessary. When we alleviated market failures, we did not find that children went in droves to ultra-religious schools, we did not find that parents held back their kids from schools or that they sent their schools to high levels of corporal punishment. Neither did we find schools were unable to unwilling to deliver quality in an unrelenting quest for higher profits or that public schools remained static in the face of market-induced social pressure. We found instead that parents sent their children to school more, the children had better access to libraries, desks and chairs and that both public and private schools responded in a way that test-scores in English, Mathematics and the vernacular improved.

This debate between central, community or parental control will be familiar to many education scholars and we do not claim to add to that scholarship at a theoretical level. Our major contribution is to apply empirical and theoretical tools derived from the economic analysis of markets to low-income settings, which we believe generates new and valuable evidence to further inform this discussion. Broadening the conversation by combining the economic tools of market analysis with those of comparative education and political theory could yield rapid gains on urgent questions.

The remainder of our note is set out as follows. We start in Section II with a story of a fictional place called Taleem, the site of the “great schooling wars” and use detailed notes to draw links between Taleem’s story and debates in schooling today. This also serves (we hope) as an entertaining selective review of some of the recent literature from economics on schooling in low-income countries. Sections II and IV then use Taleem as an example to uncover the questions that never go away but also expand on a more pragmatic approach drawing heavily on our own and related work. We submit that crucial recent advances will ultimately always have to confront these questions and offer alternatives through the pragmatic approach. Section V concludes with directions for future research. In particular, we return to

potential constraints among households and discuss the extent to which the pragmatic framework can be applied to active policy making for household decision making.

Section II: The Schooling Wars: A (Fictional) Footnote in the Annals of History

In the late 19th century, a dispute rocked the small country of Taleem. The “schooling wars” had their genesis in colonial rule, when Taleem’s tradition of small private schools was largely destroyed after Lord Babbleton famously declared that “all the knowledge of Taleem would not fill a bookshelf in his library”.⁵ The colonial government set up “Government Schools” (GS), claiming that this would bring quality education to the masses. (In reality, the system was largely designed to ensure that a suitable group of “civil” servants were “groomed” to staff the colonial administration—the words “civil” and “groomed” being key to the colonial program).⁶

A hundred years later the citizens of Taleem won their independence. Because they had been told that all good governments provided schooling to the masses (rather than just the civilized elites), they continued and expanded the GS system.⁷ Teachers in the GS were paid a salary raised through general population taxes and provided schooling for free. All inhabitants of Taleem were encouraged to send their children to school and 25 years after independence, any remaining private schools were “nationalized”.⁸

But another 20 years later, the small privately-owned schools started up again, first in urban Taleem but then spreading quickly to the rural areas. They came in a variety of flavors and offered a variety of products (“English” schools were very popular, but so were “Laptop” and “Holistic” schools) at a variety

⁵ Lord Thomas Babington Macaulay in his famous minute argues for the widespread introduction of a schooling system mirroring that in Great Britain, focused around English and the needs of the colonial administration: “*We have a fund to be employed as Government shall direct for the intellectual improvement of the people of this country. The simple question is, what is the most useful way of employing it? (...) I am quite ready to take the oriental learning at the valuation of the orientalist themselves. I have never found one among them who could deny that a single shelf of a good European library was worth the whole native literature of India and Arabia. The intrinsic superiority of the Western literature is indeed fully admitted by those members of the committee who support the oriental plan of education (...) In one point I fully agree with the gentlemen to whose general views I am opposed. I feel with them that it is impossible for us, with our limited means, to attempt to educate the body of the people. We must at present do our best to form a class who may be interpreters between us and the millions whom we govern, –a class of persons Indian in blood and colour, but English in tastes, in opinions, in morals and in intellect.*”

⁶ During the colonial period, India’s primary school enrollment was far below what could be expected for its level of income, and certainly compared to that in European countries—much like in Brazil China and Russia (Chaudhury 2009, Chaudhury 2010 and Chaudhury and others 2012). Nevertheless, over the same time period, secondary enrollments were *higher*, both relative to primary enrollment and relative to the experience of European countries. Further, spending per-enrolled child was extremely high suggesting that schooling was far from universal, but those who entered schooling were well funded, mostly from private expenditures. She argues that this was only in part due to low public funding. Other reasons included an entrenched caste hierarchy with funding decisions made by elite landowners and people from higher castes (the Brahmins) as well as a desire to ensure barriers to entry into lucrative government jobs for the non-elite. Weiner (1990) shows how the historical development of education translated into an elite apathy towards universal education in the post-colonial era.

⁷ Why post-colonial countries all decided to produce state schools has been the subject of much enquiry. One provocative answer is that these states produced schooling not because of an informed decision on the role of the state, but largely because at that time and place, this was what was portrayed as one of the key roles of an advanced state, or a state that was seeking to become one (Meyer, Ramirez and Soysal 1992). Where post-colonial states emphasized education as a top priority, enrollments jumped in the year of independence itself. In Zimbabwe, for instance, transition probabilities from primary to secondary education increased from around 30% to around 85% in the year of independence (Aguero and Bharadwaj 2014).

⁸ The reference here is to Pakistan. In 1972 the Chief Martial Law Administrator issued the new Martial Law Regulation under which all private educational institutions would be taken over by the Federal or Provincial Governments.

of prices. Those who could pay the high prices of Acheson and Lighthouse schools went there; others visited schooling chains and still others went to cutthroat independent schools, usually named after famous people.⁹ Not surprisingly, those who were very poor still went to the GS or did not go to school at all.

Soon enough, two groups emerged—the “right to education” group and the “private sector advocates”. Both argued that citizens of Taleem had a constitutional right to schooling, but disagreed over who should *provide* the schooling.¹⁰ The rights group argued that (a) poor, illiterate people could not discern the quality of schooling and were fooled by “fly-by-night” operators; (b) private schools only *appeared* to produce better test-scores, but this was just because the children who were attending such schools were in any case high performers from richer and more educated families; (c) such unregulated schools could be ideologically driven and become the source of socially destructive ideologies and; (d) private schools (PS) created inequality—for instance, those who schools that taught English were doing a lot better in the labor market. The profit motive, they argued, could not be reconciled with the inalienable rights of the citizens to quality education. The advocates, on the other hand, argued that people should be able to vote with their feet. The reason people did not use GS was because quality was poor. Teachers did not bother to come to work; they treated their children rudely and GS education was low quality.¹¹

(Note that the rights group argued both that PS exacerbated inequality *and* that the people who used PS performed better only because they were higher ability. When pointed out that they could not have their cake and eat it too, they pointed out that there was little point in having a cake, unless you could eat it too. This left the opposition dumbfounded, and they backed down immediately.)

The Evidence-Based Policy Movement

Matters were descending into the usual chaos when the High-Level Political Committee was set up to settle the matter. As is usual, its first task was to set up the “Education Evidentiary Committee”, deputed

⁹ This largely mirrors the private school landscape in low-income countries like India and Pakistan today. There are some elite schools that are typically stand-alone schools like Modern School in Delhi or Aitchison College in Lahore; a number of high fee franchises like the Delhi Public Schools in India or the Beacon House schools in Pakistan followed by many small independent schools whose names invoke the country’s leaders (Jinnah Model School and Gandhi School are popular school names).

¹⁰ Readers will recall that an earlier disagreement over whether governments should even finance schooling had exhausted itself by this time. The battle was fought over the argument that if schooling generates positive returns in the labor market net of costs, appropriately discounted and added-up, income should not matter. Poor people should be able to borrow the money from banks and pay them back with interest since net returns were positive. Studies found that, in fact poor people found it hard to borrow from banks, so that when their income declined, they often went without schooling for long periods of time (Jacoby and Skoufias 1997). By the time we pick up the story, it was the societal consensus that everyone deserved equal access to schooling and when pushed, the reason given was usually credit constraints.

¹¹ This reflects the structure of argumentation for and against public schools in a large number of discussions. For instance, Watkins (2001) argues that there is “*little hard evidence to substantiate the view that private schools systematically outperform public schools with comparable levels of resourcing*”. He then argues that “*Where private schools provide a high-quality service compared to the public sector, they inevitably widen existing disparities related to income and region*”. On the other side, Chaudhury and others (2006) document high absenteeism in public schools and a number of reports and findings on corporal punishment and abuse in public schools (although such punishment and abuse seems to happen in both public and private schools).

to curate the rapidly emerging numbers war. This committee would oversee the systematic production of quantitative facts and the conduct of experimental trials to provide evidence on:¹²

1. Who provided schooling in the entire system
2. Variation in learning and in particular whether PS attendance *really* improved Math and Science scores, or was this all due to “positive selection”, whereby those with higher ability were more likely to attend PS in the first place. Note that the emphasis on Math and Science scores as opposed to (say) non-cognitive outcomes, personality traits or civic values was accomplished as a *fait accompli* by an initial set of studies that focused only on these schooling outcomes.
3. The overall costs of schooling and whether, as had been claimed by the advocates, that schooling costs were lower in PS compared to GS (cost-effectiveness)
4. Whether systems with PS and GS in them exacerbated inequality, as parents who were illiterate and poor would not be able to take advantage of the complex schooling system and would inevitably fall behind.

Four kinds of studies emerged from this unprecedented effort.

Study Type 1: Studies on who provided schooling showed that the typical parent could choose from among many schools. Vastly increased choice was driven by the rapid expansion of PS, and contrary to popular belief, the majority of such schools charged low fees and were used to varying degrees even by the poor. A new nomenclature emerged of elite versus “low cost private schools”; this was useful, since it disabused the elite of the idea that all PS were like the ones that they went to, which was clearly (in their opinion) not good for the illiterate masses in Taleem. Further, unlike what was widely believed in elite circles, Non-Government or NGO schools were only a small fraction of schooling in the country—perhaps less than 2%. Like religious schools (<1%), they were significant only in their absence.¹³

Study Type 2: A second set of studies examined variation in learning achievement. The data showed significant variation across schools in the same village. While some of this was driven by the difference between PS and GS, there were actually significant differences even within GS and PS. However, the debate quickly focused on the narrower question of whether PS attendance produced “better” outcomes”.¹⁴ First generation studies showed that children in PS reported higher Math and Science scores, which remained after controlling for a host of parental and child characteristics such as wealth, education, birth-order, age and sex. Second generation studies were increasingly complicated. They showed that children who *switched* from GS to PS improved their scores more than those who remained

¹² This mirrors a recent Systematic Review, carried out by the aid agency, DFID. See Day (2014) and a response by Tooley and Longfield (2014).

¹³ Dixon and Tooley have advanced our understanding on the presence and use of private schools in several countries around the world. See for instance, Tooley (2013) on Lagos, Tooley and Longfield (2014a and 2014b) on Liberia and Sierra Leone, Ranjaraju, Tooley and Dixon (2012) from Bihar, India and Tooley and Dixon (2006) on comparisons between Sub-Saharan Africa and India. Pakistan, where most of our work is located, has had a census of private schools in 2001 and 2005, and further census of private schools in the province of Punjab in 2011 (Andrabi, Das and Khwaja 2008).

¹⁴ Econometrically, studying the differences within public and private schools has proven much harder. In the United States for instance, there is virtually no difference by school type in richer suburbs but some evidence of better private school performance in inner cities (Neal 1998). While specific geographies as a source of heterogeneity in the public-private school difference are easier to examine, there is little research on how this difference varies with other potential factors.

in GS with the reverse pattern for those who switched from PS to GS. They also showed that people who lived closer to PS were more likely to attend PS and in turn, reported higher scores. As long as those who lived closer to PS were no different in terms of their ability compared to those who lived farther away, the estimates were causal, in that they estimated the local average treatment effect or LATE parameter in an instrumental variables framework.¹⁵

After much commentary, the rights group remained unconvinced. Simple comparisons were obviously biased due to selection; studies that controlled for parental and child characteristics were biased due to selection on unobserved characteristics; studies that looked at child switching were biased due to selection on time-varying unobserved characteristics, and, like always, the exclusion criterion in the instrumental variables framework was suspect. What if parents whose children had higher ability bought houses closer to PS? Or, what if PS located in areas where children were higher ability?¹⁶

By now, the lack of certainty was starting to gnaw at people. Would there ever be a resolution to this question? It was at this point that a study arrived with an experimental design.¹⁷ In this study, a team went to villages and gave money to people who were currently going to GS to go to PS instead. The people who would get this money would be *randomly* selected from the population of those who were currently patronizing GS. This would create two identical groups—in observed and unobserved characteristics—one of whom would receive the money and another who would not. As long as those who received money were more likely to go to PS, researchers could compare the quality of learning across people who received the money and those who did not. After appropriately adjusting for the fact that not all who received the money would go to a PS, one could causally estimate the impact of PS attendance on test-scores.¹⁸

After completing data collection, researchers were surprised to discover that Math and Science test-scores were identical in GS and PS. Puzzled, they decided to investigate further. What they found was that, although, PS did focus on Math and Science, PS overwhelmingly gave consumers what they wanted. In some cases, this coincided with the definition of “better” as improvements in Math and Science scores. In other cases, it did not—PS also taught the vernacular language and other services that the GS did not—and in these things, the PS were uniformly higher quality.

Study Type 3: The third type of study that emerged from this effort was those concerned with the costs of schooling. These studies showed first, that government teachers earned a lot more than private

¹⁵ There are a large number of studies in the first two categories, ranging from Jimenez and Tan (1991) who looked at 5 countries to Bold and others (2011) from Tanzania. Other examples include Andrabi and others (2008b), Wadhwa (2009), Tooley and others (2011), Aslam (2009) and French and Kingdon (2010). Studies based on child-switching require longitudinal data and are rarer; two examples are Singh (forthcoming) who uses data from the Young-Lives data in the Indian state of Andhra Pradesh and finds larger changes in test-scores from private attendance in rural, but not urban areas and Andrabi and others (2011) who find large improvements in Pakistan for children tested in language and Mathematics. Andrabi and others (2014) present an example of an instrumental variables approach, using the distance to the private school conditional on the distance of the family from the center of the village as a source of exogenous variation.

¹⁶ These critiques are based on referee reports for the papers above ☹

¹⁷ See Muralidharan and Sundararaman 2014b.

¹⁸ There was one more twist: because there was also a concern that taking people away from GS to PS would reduce the quality of GS, in another set of villages no one received the money, but people still applied for it. This twist ultimately turned out not to be important, so we leave it out of our description.

teachers—even after controlling for education and training. Second, they showed that the government could hire teachers on temporary contracts, and that these contract teachers although paid much less performed just as well, or even better, than permanent teachers. Finally, decreasing salaries and hiring contract teachers did not worsen the quality of new applicants over time.¹⁹ Looking at the full budget of Taleem, additional studies showed that the fiscal costs of teacher absenteeism amounted to the entire amount of a special tax used to fund Taleem’s universal education program and that the difference in costs between public and private schooling amounted to a significant fraction of the overall budget.²⁰

Study Type 4: The fourth set of studies, on whether PS exacerbated inequality never really took off. While the theoretical arguments were clearer, with the rights group claiming that if the elite left private schools, the children in GS would never have the ability to mobilize and demand higher quality and the incentive among the political elite to provide better schooling for the poor would now decline. The advocates pointed out that if the rich went to PS but still paid education taxes, this would actually increase the cross-subsidy to education from the rich to the poor. Empirically, this turned out to be almost impossible to resolve.

This then, was the state of play at the time of the BIG DECISION.

The Big Decision and Its Aftermath

On December 20th, the Political Committee convened in a standing-room only hall. In a decision that was marked by its seemingly Solomonic flavor, the committee noted the following in its famous report on the provision on schooling in Taleem. It started by noting that quality education was the right of every citizen. It then noted that private schools were creating inequality in the system by allowing only those with money to access such schooling. Then came the recommendations. The first was that all private schools would be required to accommodate at least 25 percent of their enrollment from among the poor and that the government would pay for each such child the equivalent cost of schooling in government schools. The second recommendation started by noting that the evidence on quality was inconclusive. Depending on what point of view one took, and what one thought was important, the

¹⁹ In one study, researchers randomly allocated children to teachers on permanent and temporary contracts and found that those assigned to teachers on temporary contracts reported higher Math and Science scores (Duflo, Dupas and Kremer 2012 and 2014 in Kenya). In a second study, researchers randomly allocated temporary teachers to schools and showed that this increased scores among children attending these schools (Muralidharan and Sundararaman 2013 in the Indian state of Andhra Pradesh). A third study used a “natural experiment” and showed that a policy change that altered hiring from hiring only permanent to hiring only temporary teachers had no negative impact on test scores, and further, did not change quality of those who were applying to become government teachers (Bau and Das 2014a in Pakistan). A fourth study experimentally doubled the wages of permanent teachers and showed that despite the doubling of wages, there was no change in quality (Muralidharan and others, in process, from Indonesia). But in Taleem everything could be, and was contested. One study showed that the program of teachers on temporary contracts led to higher test-scores only when an NGO ran the program. When the government ran the program, test-scores did not increase because in many cases, the government could not get its act together in time for the evaluation, and actually did not manage to hire the temporary teachers (Bold and others 2013).

²⁰ Muralidharan and others (2014a) use a nationwide panel in Indian schools, collected over a decade to show that even as public expenditures for education and school infrastructure increased over this time, teacher absenteeism was slower to decline. They compute the fiscal cost of absence at \$1.5 billion per year, which is 60% of the annual funds raised from India’s special education tax. Pritchett and Aiyar (2014) look at the difference in student costs between public and private schools and show that this difference is `suggests an excess of public of private cost of Rs.50000 crores, which is 0.6% of Indian GDP. Accounting for differences in learning increases the excess cost to Rs.232000 crores, which is 2.8% of GDP, or \$50 billion.

committee claimed that the evidence was contradictory and could not be resolved. Therefore, it recommended that all schools be bound by *input* norms rather than be held accountable to outcomes on which there was considerable debate.²¹ The ruling is worth quoting in full:

“Let it be noted that henceforth, all private schools, since they will receive government monies, are to be regulated as per government norms of salaries and inputs. In particular, all private schools must have 1 desk per child, 1 blackboard per classroom, 1 science Lab, a playground and (the list went on).”

No party was happy, but neither was sufficiently aggrieved to re-litigate the entire process. There were the usual court challenges, evidence was produced, counter-evidence was given, but ultimately, the decision stayed.²² After all, the rights groups were happy that the Right to Education Act (as it was henceforth known) provided a platform to hold the government accountable, and further, the government would now regulate PS to ensure quality. The advocates believed that the decision gave them the much needed platform to bring in public subsidies into PS, particularly for the 99% of PS who would receive a giant subsidy from the government for every poor child who they enrolled. Neither group could completely foresee what was to come.

Soon after the decision, a curious thing started to happen. The government started “enforcement” drives whereby large numbers of low cost PS were closed down on the grounds that they did not meet the input norms of laid down by the Act. In Ward A, news came of 3200 schools being shut in a single month. Ward B fared no better.²³ Those who survived understood what they had to do very quickly. Things that parents and children did not care about (a famous reason for closure was that the staff room did not have a spittoon where teachers could spit after chewing beetle nut, although this tradition had largely eroded by the time the regulation started to be enforced)²⁴ started emerging in schools, as accountability towards parents shifted slowly but surely towards the government.

Some whispered that members of the High-Level Political Committee themselves had purchased private schools and were regulating the rest out of existence. And it was these schools, owned by the Policy Committee members themselves that were seeing dramatic increases in enrollment. So many, in fact,

²¹ We have in mind India’s recently enacted Right to Education Act (2009). The provisions of the Act form the basis of the High-Level Political Committee’s recommendations presented here. Pages 12 and 13 of the Act specify the minimum requirements every school must meet, including part-time instructions for ‘work-education’, a kitchen where mid-day meals are cooked in the school and a library ‘providing newspaper, magazines and books on all subjects, including story-books’. A copy of Act was retrieved from http://librarykvpattom.files.wordpress.com/2010/04/india_education_act_2009.pdf on October 24th 2014.

²²The reference is again, to India’s experience. In 2012, a bench of 3 justices of the Supreme Court allowed the reservation of 25% ‘disadvantaged’ students to remain and did not find this reservation a violation of the constitutional right of private owners to run institutions without government interference.

²³ Truth is stranger than fiction: Within a year of the passage of the Right to Education Act, 2,983 low-cost private schools had been closed down in Indian states, and another 5,097 had been served closure notices. Autar Nehru, Aruna Ravikumar and Nadia Lewis report on these school closures in “SOS: Save 300,000 Budget Private Schools”, retrieved from <http://ccs.in/sos-save-300000-budget-private-schools> on November 4th, 2014.

²⁴ This is (almost) real. Section 20 of the Indian Factories Act says, ‘(i) In every factory there shall be provided a sufficient number of spittoons in convenient places and they shall be maintained in a clean and hygienic condition. (ii) The state government may make rules prescribing the type and the number of spittoons to be provided and their location in any factory and provide for such further matters relating to their maintenance in a clean and hygienic condition. (iii) No person shall spit within the premises of a factory except in the spittoons provided for the purpose and a notice containing this provision and the penalty for its violation shall be prominently displayed at suitable places in the premises.’

that the policy was judged a grand success and the government increased the payment for “poor” children in these schools, and increased the numbers that they would pay for from 25 percent to 50 percent to, eventually, 90%. What was meticulously maintained in these schools was a strict adherence to the input norms. Not only was it impossible to learn English or computers, but even test scores in Math and Science started declining.

An inspector of schools, Arnold, who was out of the district at the time of the Act came back two years later and writes about the *“certain despondency I see in children at these schools. What were earlier dynamic environments have now fallen silent, as the only thing that matters is adherence to the rules and regulations of the government. No school cares anymore about what its customers want. What will become of Taleem?”*²⁵

Taleem, which for a little while had become a dynamic center for innovative schooling for people from a diverse range of incomes, started doing worse and worse. Twelve years after the reform, everyone had had enough. The new government that came to power declared that the “de facto privatization bought on by the Act was an abject failure” and in a sweeping move, nationalized all private schools. Several years after the second nationalization, the leading educator of her time, writes that an alternative history could have been written if only the citizens of Taleem had made up their minds about what kind of system they wanted and invested in it, instead of discarding what they had at the first sign of trouble. But, although the repetition of history, she reminded them, is a tragedy, they must work hard that a second repetition does not render it a farce.

That was the story of the curious incident in Taleem.

Section III: Why We Need a Pragmatic Framework

The story of Taleem mirrors discussions these days about schooling in low-income countries. Private schools are (re)emerging in many low-income countries and the debate around what private schools produce and how they compare to government schools is in full swing. Although we are just starting to grapple with the fact that the objective functions of public and private schooling may be very different, the question of what we mean by educational “outcomes” and who gets to decide whether these outcomes are at an acceptable “level” has deep historical antecedents.²⁶ For instance Coulson (1999) documents several examples, of which we cite three:

²⁵ The reference here is to England’s Payment by Results school reform of 1862. According to the Revised code of the Department of Education in Britain in 1862, capitation grants to schools were reduced and payments were made to school on the basis of students passing on-site examinations given by inspectors in reading, writing and arithmetic. There has been much debate among historians about what the payment for results reform really accomplished. Mitch (2010) looks at educational performance across British counties over the 30 years of the policy and shows that during this time, inequalities across counties declined. But in the absence of data on trends prior to the reform, it is hard to establish whether this was a consequence of the reforms. In contrast, the quote here paraphrases Matthew Arnold, a poet and school inspector who returns from a trip to France and notes: *“I find in English schools.....a deadness, a slackness and a discouragement....This change is certainly to be attributed to the ‘Payment by Results’ school legislation of 1862.”*(Great Britain Privy Council 1868, Page 290).

²⁶ An approach based on first principals could argue that education, much like food is a pure private good, so that the consumption of education by one person affects the welfare of others. If education is a pure private good, we need not worry about the efficiency losses from a population where levels of education are low. We may still worry about the equity losses

1. During the mid-1560s, the town of Heidenheim wrote to their Duke over the closing of a German school: *“Our young people, most of whom have no aptitude for Latin are growing up to be artisans, are better served by a German teacher than a Latin master, for they need to learn writing and reading, which is of great help to them in their work and livelihood.”*
2. The Massachusetts Teacher writes that *“In too many instance, the parents are unfit guardians of their own children...the children must be gathered up and forced into school.”*
3. And, Martin Luther, one of the main backers of state provided education writes that *“It is to you, my lords to take this task (education) in hand, for if we leave it to the parents, we will die a hundred times over before the thing could be done.”*

In each of these cases, there is a policy maker’s definition of welfare and a clashing desire of what parents want from their schooling system. In some cases these clashes can have tragic consequences; for instance during the years of coercive family planning in India, teachers in the public system would threaten to fail students unless they could convince their parents to undergo sterilization (Tarlo 2003). In other cases, such as England’s Payment for Results experiment in the mid-18th Century, school inspectors tested children in reading, writing and arithmetic not because this was ideal but because this is ‘what could be tested’ (Mitch 2010). And in nearly every country, from Canada to Pakistan and India, what languages can, and should be taught in public schools is always a subject of perennial tension placing parents and school administrators on opposite sides of an often violent debate.

In contrast, in a pure private system of schooling, parents become the primary agents to which schools are accountable. If parents want vocational training and can pay for it, that is what schools will provide. Alternatively, if they want their children to learn English, schools will try and teach children English. By looking at parent’s schooling choices among a set of schools with different characteristics, researchers can discern what parents are willing to pay for but there is not necessarily a normative stance associated with such discovery.²⁷

from low education but in that case, the second welfare theorem in economics says that the best way to proceed is for states to assume a purely redistributive role. That is, they should tax the rich and use those taxes to supplement the income of the poor. Of course, the extent to which this additional income is used for education depends on the competing priorities for poor households, all of which may be equally morally compelling. A recent literature indeed looks at such “unconditional cash transfers”, and results generally show that when given cash (a) people do not spend money on alcohol and tobacco—for some reason, this is not assumed to enhance welfare and (b) that they spend the money on wise investments, including education, health, and food. See Blattman and Niehaus (2014) for an accessible summary of this literature. Here, “wise” is defined by researchers and may reflect the preferences of donors or a broader consensus. In this model of the world, there is little role for the state beyond its pure redistributive capacity, and when it moves beyond providing cash to actively allocate consumption, households will try and rebalance expenditures towards other commodities that they need more, by “trading-in” the excess consumption of the state provided commodity. This is indeed what we see with increases in schooling investments that leave open the possibility of household substitution (for instance, schooling materials). The elasticity of household to school expenditure on easily substitutable materials is around 0.8, so that every \$1 of public investment in schooling materials “crowds-out” 80 cents of private expenditures (Das and others 2013). The general principal of public investments in schooling crowding-out private investments has been further validated in studies from Romania (Pop-Eleches and Urquiola 2011) and the United States (Houtenville and Conway 2008).

²⁷ Alderman, Orazem and Paterno (2001) are an early example of using schooling choices to infer preference parameters. Two recent examples of such work from low and middle-income countries are Carniero, Das and Ries (2014) from Pakistan and Gallego and Hernando (2009) from Chile. Both studies demonstrate the importance of distance and prices as negatives for parents and in Pakistan parents appear to value infrastructure and test-scores in English, Mathematics and the vernacular, although the latter result, while very large is imprecisely estimated.

Most advances in the current debate have been in the empirical and econometric tools we use to examine the comparative and cost-effectiveness of public and private schools along selected dimensions, or on the production function of public schooling. This program advances our understanding of how schooling works and what schools do, but is ultimately challenged on two fronts. First, we will eventually have to confront different sets of advantages across types of schools, whether by population sub-groups or by subjects taught in schools and that stage, the old debates will become salient once again. Second, trying to fix schooling by understanding what any given schooling input does to a subset of outcomes (test-scores in some subjects) is a costly endeavor, particularly if the optimal production function varies by population and setting. In fact, the complexities associated with mapping out such production functions, some would submit, led to the ultimate collapse of command economies.

We argue instead for a pragmatic framework. In our framework, we first return to the standard rationale for state intervention: Market failures. Suppose, instead of worrying about test-scores and poor children, we treat educational systems precisely as we would any industry. There is a long tradition in the firm literature of thinking through systemic reasons why firm performance is poor. This tradition has two elements. The first is modelling what firms and consumers do. That is, understanding how they interact with each other to produce a market equilibrium, where a range of market structures can be studied that include variation in the type of product produced and the extent of market power that each firm enjoys. The second is using these models of interactions to enact policies that help firms and consumers improve performance without either taking a stance on what consumer should like, or what these firms should produce (that is, no “picking” technological winners) or how they should produce it.

This literature is less concerned with the production function of firms; the assumption is that there are specific policy levers that can alleviate constraints and provide incentives for firms and consumers to figure out what works best for them by themselves. We then alleviate these constraints and see what happens. If the new equilibrium that arises, in our case driven purely by schools and parents trying to best achieve their own objectives, is “better” along the very dimensions on which there is some societal consensus, the debate over welfare can be sidestepped or at least, for the time being, avoided. To be sure, if the new outcomes were far removed from the societal consensus, other policies including active intrusion into household and school decision making may be discussed—but in either case, the debate could now be informed by key empirical advances.²⁸ Specifically, the resulting equilibrium after alleviating market failures better reflects underlying preferences and endowments of parents and children as well as the technology and objective functions of education providers. These deeper parameters are harder to directly measure but can be inferred from product and production choices when market exchange operates with little friction. This in turn, can help in understanding the implications of directly intervening to change these underlying parameters.²⁹

²⁸ One response to the question of why we need public provision of schooling is that there are externalities such as socialization that are non-contractible. This route to the production of schooling requires most welfare debates to be resolved prior to the production of schooling. The agenda we pursue of looking at market failures that prohibit households and schools from reaching *their own stated objectives* can also be used, ex post, to understand the impact of market failure alleviation policies on these broader societal outcomes.

²⁹ Market failures are key because they allow us to understand the extent to which poor performance reflects institutional deficiencies rather than low-income. When confronted with data that things are poor, one question may be “Are things poor

Section IV: The Pragmatic Approach Applied to Education Policy

When we started working in Pakistan in 2002, the country was regarded as an educational pariah in international circles. Enrollments were low; girls' schooling was particularly poor and it was widely believed that a historic neglect of state education had led children to migrate in droves to religious schools (*madrassas*). The picture on the ground was very different. While educational outcomes were indeed poor in terms of enrollment, the main option to poor state schooling was not religious schooling, which accounted for between 1 and 1.5% of all enrollments, but private schools. In a series of papers, we have documented five main features of the Pakistani education system (see Appendix for further details):³⁰

1. The educational landscape of Pakistan is changing rapidly with the arrival of low-cost private schools, although such schools are not evenly distributed through the country.
2. The system in 2002 was characterized by both low enrollment and low learning. We predicted that while enrollment was likely to increase, learning would be harder to change and would indeed become the key learning issue in years to come. In fact, enrollment has increased quite rapidly since then, while learning levels continue to remain low.
3. Attendance in private schools was associated with higher learning, and to the extent econometric methods could address selection bias in observational data, this learning difference was causal.
4. Per-student costs were lower in private schools. The bulk of these cost differences arose because teachers were paid 5-6 times more in the public sector. Reducing these wages made no difference to educational outcomes.
5. Parents were highly active in the schooling system, spending substantial portions of their budgets on educational expenditures and making active schooling choices.

The critical observation with regard to Pakistan's educational system is that along key dimensions—the low learning, the use of private schools, public teachers' wages and parental involvement—it is very similar to several low and middle-income countries. For instance, Pakistan learning levels are similar to those found in India, Peru and Ethiopia through the Young Lives Project. The contextual factors of increasing private schools, high public teachers' wages leading to lower cost-per-student in private schools, and some private school advantage in test-scores—have been replicated in a number of other settings, from India to Ghana. Of course, this is not to claim that Pakistan looks like all other low-income

because people are poor?" After all, the average spending on a private school is \$3 a month and anywhere in the world it is unlikely that you can provide a world class education at the monthly cost of a cappuccino in an upmarket café. And if the driving force behind poor education is poverty, the main policy conclusion is to make people less poor, rather than a specific focus on education. This can be done either through higher income growth for the poor or through redistributive policies. But in either case, no judgment is required on how the poor should allocate this additional money across equally compelling claims—poor housing, poor health, poor food or poor clothing. Similarly, when confronted with apparent discrimination say towards girl children, one need not immediately assume and attempt to rectify biased parental preferences. Rather, an examination of market failures can reveal situations – such as the inability of parents to write long-term contracts with children – that could produce similarly distorted investments but where the policy response might be to help alleviate these failures rather than attempt to “re-educate” parents about how to value their girls.

³⁰ See Das, Pande and Zajonc (2012), Andrabi, Das, Khwaja and Zajonc (2006, 2011), Andrabi, Das and Khwaja (2008) and Andrabi, Bau, Das and Khwaja (2014b).

countries—its lower primary enrollment, particularly among girls and the significant impact of distance to school on enrollment (Andrabi and others 2007, Burde and Linden 2013, Barrera-Osorio and others 2013) are both particular to the region and the country. Nevertheless, it is plausible that the research findings from this context could yield valuable information about schooling across a number of countries.

What can be done to improve schooling in this environment? If poor learning reflects poverty in general, the best solution is to try and make poor people richer, either through growth or redistribution. But if poor learning reflects systematic constraints that prohibit parents and schools from reaching higher levels, alleviating these constraints should lead to better outcomes. In our pragmatic framework, constraints could be identified from observational data and new equilibria could be evaluated after constraints were alleviated. Several features of this line of research are worth emphasizing.

In terms of applying insights from the theory of firms and industrial organization, the presence of private schools in an unregulated setting where prices are set in market equilibrium is critical for our program. These settings allow us to abstract from worrying about multiple objectives that public schools may try to satisfy at the same time. For instance, public schools may locate in very small and poor villages in order to satisfy an *equity* rationale. Although private school owners may also have a broader societal objective in mind, they also face hard budget constraints and cannot function for long if costs far outstrip revenues. We have showed before that in fact, private schools (a) face little de facto regulation and/or constraints on prices; (b) only a few enjoy revenue sources beyond the fees paid by students and; (c) operate in a fairly competitive setting with average profits similar to the annual wage of a male teacher in the private market. The market structure that has developed in this unregulated setting is one where private schools offer *vertically differentiated* products at varying prices—although fees are low in general (the average fee is \$3 per month in 2011) the same typically have multiple private schools at different quality-price points, with test-scores and infrastructure strongly correlated with prices.

Further, we do not tinker or directly try to affect (or even estimate) the *production function* for education; our assumption (which could well turn out to be false) is that overall improvements in market functioning will alleviate constraints that schools currently face and by doing so, schools and parents can themselves figure out what will make them better. We measure what happens in the new equilibrium after the constraint is alleviated and try and collect information on a broad variety of outcomes.

Finally, we operate in rural settings with *closed* markets. That is, in the villages in our studies, children go to the schools in the villages and the vast majority of enrollment in the village schools is from among the children in the village itself.³¹ This feature of the environment allows us to manipulate a particular feature of the market and study the equilibrium as a whole. In more complex settings (say, urban

³¹ This reflects the importance of distance as a key factor, both in whether to attend school and the choice of which school to attend. Although the “distance penalty” has been well documented in both observational and experimental studies (Andrabi and others 2007, Burde and Linden 2013, Barrera-Osorio and others 2013) there is less research on understanding precisely what the distance penalty means. Jacoby and Mansuri (2011) provide one attempt to do so and argue that this penalty could reflect the aversion to crossing boundaries across settlements in the same village.

locales) the same dynamics may be in play, but identifying and understanding such dynamics would require us to construct and follow schools and parents in clearly delineated markets, which could be very large—and potentially the entire city. In the absence of administrative data (we have to collect all our data ourselves), this requires a far more elaborate structure.

Section IV.1: Informational market failures

Our first example alleviates information constraints for parents and schools (Andrabi, Das and Khwaja 2014). Suppose parents have heterogeneous preferences for school quality. There are multiple schools in the village and parents receive only a noisy signal of quality. If the signal is extremely noisy, parents have no way of telling whether one school is better than the other and consequently, schools have no incentive to produce better quality. Quality differences in the data are fully explained by differences in student characteristics. In models of asymmetric information (schools know their quality, but parents don't, creating an 'asymmetry'), this is known as a 'pooling' equilibrium, since all schools 'pool' to the same place. But when signals become partially informative, it can be shown that schools will vertically differentiate in quality but the *price charged by the better school will be higher than it would be under perfect information*.³² Markets are "separating" since schools offer separate qualities at different prices.

In both pooling and separating equilibria, information will always improve market functioning, but when the market is pooling, it will result in greater quality variation and an increase in price variation. When the market is separating, it could well *decrease* quality variation and it will *always* decrease the price-quality gradient.

To test whether information is a constraint in educational markets and how the provision of information affects market functioning, we first tested every school in 112 villages in the province of Punjab in Pakistan. These 112 villages, in 3 districts of the province, were chosen randomly from among all villages that had at least one private school in them. In a randomly chosen half of the villages, we then distributed report cards to parents of tested children (and to schools). The report cards contained information on the absolute performance of the parent's child and school as well as information on the relative performance of the child (relative to other children in the school and village) and the relative performance of the school (relative to other schools in the village). Figure 2 is a picture of the report card. We then went back and collected data on the schools and children.

One year after the provision of information, we found that in the treatment villages, more children were going to school and test-scores were higher in Mathematics, English and Urdu. These differences were sufficiently large relative to the very low cost of providing information that this is one of the most cost-effective interventions in education, certainly compared to policies like conditional cash transfers. *Prior*

³² A school could charge higher prices and falsely claim to be a high quality school while producing low quality. The advantages of doing so are higher profits at lower cost. The disadvantage is the loss in revenue from parents who realize that the school is actually cheating and therefore remove their child. The size of this revenue loss increases in the price that the school charges and to get the school to produce high quality, it must be that the minimal price equates this loss of revenue from cheating to the gain in profits from cheating. This requires a markup and additional profits over those in competitive markets with perfect information. Further, the market is inefficient—schools would prefer a lower price and greater demand, but it cannot afford to do so since this will destroy its incentives to actually maintain the high quality it promised.

to the intervention, the market was in a separating equilibrium as schools offered a vertically differentiated product at varying prices, and parental beliefs over school quality were strongly correlated with test-scores. Consistent with theories of asymmetric information, when report cards were given, the prices of initially higher quality schools *declined significantly*, with no change in the prices of initially low quality schools. Consequently, the price-quality gradient also went down. Further, among while schools that were initially low quality did not change prices they saw large improvements in quality (as measured by test scores), suggesting that it is harder for high quality schools to increase their quality further without additional technology or resources. Finally, public schools also responded, with a (smaller) increase in test-scores, but the gains were not different by baseline test-scores.

Section IV.2. Labor Market failures: Increasing access to skilled labor

Our second example addresses the problem of teacher shortages. In models with skill shortages, the economy can settle into a low-skill equilibrium because the relative cost of skilled labor is extremely high, and therefore, such skills cannot be transferred to the next generation (Ljungqvist 1993, Banerjee 2004). The theme of teacher shortages recurs again and again in discussions of education provision, particularly with reference to the rural areas of both high and low-income countries.³³ But empirically understanding how important teacher shortages are for local education has been hard to tease out, both because the labor force is mobile and because public schooling does not necessarily respond to market forces, so that an increase in the supply of skilled teachers may or may not have an impact on the supply of schooling. Private schools, on the other hand, fully respond to conditions in the local economy, and if the supply of teachers increases, this should decrease the cost of education and in turn increase the availability of schooling options.

We tested this hypothesis using a province-wide expansion of public secondary schooling for girls in Punjab during the 1980s and 1990s (Andrabi, Das and Khwaja 2013). Our idea was the following: Because women in private schools are typically single, unmarried women and cultural norms limit both the salaried occupations that women can be employed in *and* their ability to travel, an exogenous increase in the supply of skilled women represents a significant shock to the local labor market for teachers. Since private schools respond to market conditions, we should see an increase in the availability of such schools. Further, since teachers need to have at least secondary schooling, expansions of primary schooling should have *no effect* on private school availability. Finally, since men are both more geographically and occupationally mobile, the effects of secondary schooling for boys should be at least lower, if not zero.

Figure 3 shows a simple non-parametric plot of the number of years that different types of schools have existed in villages from Punjab. Boys primary or secondary schools have no effect on private school availability, neither is there an effect from girls primary schools. On the other hand, every year that a village has had a girls' secondary school vastly increases the likelihood of a private school setting up in the village. In Andrabi, Das and Khwaja (2013), we use an instrumental variables strategy to

³³ In the context of Pakistan, an early attempt to set up private schools in rural areas failed precisely because teachers could not be found (Alderman, Kip and Orazem 2003) and it is remarkable that in 1981, the median village had a single woman with secondary education (Andrabi, Das and Khwaja 2013)

demonstrate that this effect is causal. To disentangle demand from supply effects (perhaps mothers with secondary education demand more schooling for their children), we further show that wages are *lower* in villages with girls' secondary schools, consistent with a shock that shifted the supply, rather than demand curve outwards.

The ability of private schools to locate thus responds critically to the availability of skilled labor in the market. But the story does not stop there. In recent work, we compute the productivity of teachers using longitudinal data over four years in private schools (Bau and Das, 2014b). We demonstrate a strong correlation in teachers' wages and teacher value-added in private schools and show that this correlation arises because better teachers move to schools that pay more—there is no variation in wages by teacher value-added within the same school. Consistent with the idea that the schooling market works by allocating scarce, productive teachers across vertically-differentiated schools, we find that high value-added teachers exit low quality schools faster, as do low value-added teachers in high quality schools. The high turnover and attrition could, in turn, create problems in the labor market as it sharply reduces the incentive for school owners to train teachers. Particularly in low quality schools, owners will realize that more training will make it more likely that they will lose their teachers to higher quality schools. The gains to training will be realized by the schools that the teachers eventually move to rather than the schools that trained them. This in turn suggests experiments where such training is subsidized by the government.

Section IV.3 Credit Market Failures: Increasing Access to Finance

Our third experiment tackled constraints arising from a lack of financing for private schools. In the literature on small and medium enterprises, lack of credit has been one of the major barriers to expansion and greater profits. But whether credit can improve the ability of private schools to deliver services so far remains untested.

We constructed an experiment that allowed us to look both at credit constraints and the policy effect of alleviating credit in the market for schools (Andrabi and others 2014c). The experiment was as follows. Starting with a set of villages, we divided the sample into three groups. One group of villages was the "control" group where no school received financial grants. In the second group we randomly chose a single school to receive grants. In the third group *every* private school in the village received grants. The difference between the second and group and the control group is informative of the size of credit constraints (Group 2) and the difference between the third group and the other two provides the policy effect of providing financial assistance to the market. We took a light touch in our financing strategy. Schools were given Rs.50000 (roughly \$500) and asked to submit a plan for how they would use the money to improve their schools. We then checked for gross abuse, but overall the schools could do as they wanted with the funds, even if they used it in ways that were outside their original plan document.

One year later we found that schools in the group where only one school had received grants significantly increased enrollment and revenue, although they had spent no more than half the grant on schooling improvements. In contrast, in the third group, schools had spent *all* the money on schooling improvements, but each had seen smaller enrollment increases. Critically, it was only in this group that

the test-scores of children improved. Thus, schools are credit constrained (otherwise, mimicking the effect of providing grants in only one school, they could borrow money and expand enrollment at the expense of other schools, earning as our schools did, a positive return on the investment over and above the market rate of interest), but “picking” schools to receive credit does not expand the size of the market in terms of quality. When we do try and “pick” schools, by providing credit to a single school, the school expands capacity *knowing that other schools cannot do so due to the lack of access to credit*. When we treat every school in an *ex ante* equal manner it prevents the use of strategies that rely on differential treatment and forces schools to expand the size of the market. In ongoing work, we are now extending these lessons to work with financial service providers and design specific financial products that are better tailored to the investment needs of schools and that can be offered at scale to address the broader credit market failures faced by the sector.

Of course, the lack of access to finance is a problem in public as well as private schools. There is a movement towards financing local bodies and providing them fungible cash to use as they desire in their schools. Between 2003 and 2011, we evaluated precisely such a strategy in the schools in our sample through a government intervention (Andrabi and others 2014d). Specifically, villages were randomly chosen and each public school in such a treatment village received cash from the government to be administered and used by a reformed School Management Committee.

Although the implementation of the program was delayed as is often the case with government programs (it was due to start in 2004, but schools received money only in 2006 and the program started in earnest only in 2007), we were able to track school performance over 7 years with surveys between 2003 and 2007 and then again in 2011 (political events made it difficult to implement field surveys between 2007 and 2011).

When we went back in 2011, we found a fundamentally changed environment in treatment villages. First, the average child in the village—whether in public or private schools—had improved test-scores in English, Mathematics and Urdu. These differences were to the tune of 0.4 standard-deviations in instrumental variables specifications, which is a large increase in the context of educational interventions.³⁴ We then looked differentially at public and private schools and show that the increases accrued to children in *both types of schools*. If this was because private schools had to respond to increases in public school quality, we should also find that responses were higher in private schools that were in greater direct competition with their government counterparts. Again, this is precisely what the data show. We look at differential effects for private schools that were initially closer to public schools and those that were farther away and report higher increases for those that were in close proximity. Alleviating financial constraints in public schools increased the quality of public schooling *and* private schools responded by increasing the quality of their own offerings.³⁵

³⁴ Since every public school in treated villages was allocated to receive funding, we do not know what would happen if only one public school received funding, which is the exact parallel to our private financing experiment.

³⁵ In the case of public schools, this mirrors recent findings from Kenya and India that providing greater incentives to teachers, whether through direct payments conditional on test-score performance or performance-based tenure schemes can increase test-scores. See Muralidharan and Sundararaman (2013) for evidence from an Indian pay-for-performance scheme and Duflo,

In both experiments we made no attempt to either “pick” schools that should receive funding; neither did we dictate what schools should or should not do with these funds. But both experiments validated the pragmatic approach. We alleviated a financial constraint and let schools choose their own actions. When done in a fair and neutral manner, quality improved significantly in both experiments.

Section V.4. Knowledge & Innovation Failures: Increasing access to better schooling services

Our final set of experiments is still underway and relate to the market for inputs into schooling. During the grant experiment, we kept track of the specific schooling investments that owners made with the money. The majority of such investments turned out to be in infrastructure and materials with almost no expenditures on services, such as training, management or curricular design. When asked, school owners would offer detailed rundowns on the costs and advantages of different types of desks and chairs but had not idea at all of the educational support services that were available in the market. Was this because such services did not exist in the market or were too expensive for these schools to use? Or could this be an example of a “thin market” failure, where the lack of coordination means that suppliers and consumers cannot come together even though there are benefits to doing so?

To start testing this hypothesis, we approached several firms engaged in improving schooling services and brought them together with a sample of schools in a *me/la* or fair. The firms set up their stalls and ‘pitched’ their products to schools, and schools could choose from among the providers to receive a subsidized product for a trial period. Again, our approach towards the suppliers tried to maintain neutrality. We made no attempt to ‘test’ a particular product or understand the ‘average’ effect of a product on test-scores. Although this work is in its infancy, it was noteworthy that schools chose different products depending on their circumstances, validating the idea that the idea of the ‘one best input’ does not resonate with the reality of a highly heterogeneous environment. Further, both the suppliers and the schools learnt from their experiences and continued their involvement with the service provider. Some of these schools otherwise operating at very low profit margins were willing to pay for services to pay for quality improvement. Simultaneously, the service provision firms have started altering their offerings as they better understand the market, and schools are updating their beliefs depending on their experiences during the trial period. Like the other interventions described above, we are optimistic that the active market making on our side, this time on the inputs into schooling, can yield significant dividends.

Section IV.5: Extending the pragmatic approach to household decision making

Thus far, our research, with the exception of the first project that sought to resolve informational failures through school report cards, has focused more on schools and the overall market for schooling, with less emphasis on households and the specific constraints that they may face. To be sure, our argument on market failures is symmetric and equally applicable to the demand for education. However, failures of parents to respond to changing market conditions or not educate their children sufficiently does not necessarily imply that parents do not value education and therefore interventions

Dupas and Kremer (forthcoming) for evidence on contract-teacher performance and teacher tenure in Kenya. For a review of the evidence on school based management, see Barrera-Osorio and others, 2009.

are required to actively alter parental choices. In fact, recent research suggests that, like markets and schools, the pragmatic framework has much to offer for household-based policies as well.

This research points to three areas for policy consideration. There is a long tradition in economics, pioneered by Foster and Rosenzweig (1996) showing that the demand for education responds to labor market returns.³⁶ But, market inefficiencies can arise here as well. First, parents may be ill-informed about the *returns* to education. If, for instance, parents base estimates on children who remain in the village instead of migrating, they will selectively underestimate the returns to education and this will in turn depress their incentive to send children to school. If so, providing better estimates of the return to education should increase schooling—and this is precisely what Jensen (2010) finds in an experiment in the Dominican Republic.

Second, parental investments in children may *reinforce* or *compensate* for existing capabilities. In the United States, for instance, schools and parents often spend more time and money on children who have learning difficulties, but in countries like Pakistan, household behavior may be very different. For instance, we find in our data that children who are perceived as “more intelligent” by parents are more likely to go to school, have more money spent on them, and have higher test-scores. This could be because of reinforcing beliefs, but recent work from the U.S. also shows that exogenous increases in the capabilities of children during their early childhood lead to similar reinforcing behavior among poor households (Aizer and Cunha 2012).

Whether or not this is a problem for efficiency and equity requires further research. The issue is one of returns and inter-sibling transfers in adulthood. Specifically, imagine that only those children who pass 10th grade can earn high salaries, perhaps due to eligibility requirements for government jobs. It may be optimal for parents to invest in children who are more likely to pass 10th grade under the premise that they will compensate with greater transfers in adulthood, in essence, maximizing the size of the pot and then sharing the gains. A study of twins in China looks at transfers from parents to twins, one of whom was sent to rural areas during the Cultural Revolution and thus suffered significant deficits, while the other was not. Although parents selected children with lower endowments to be sent down, in adulthood, the twin who was sent down also received greater transfers (Li, Rosenzweig and Zhang 2010).

Third, parents may be ill-informed about the abilities of their children. This issue is at the frontier of our current understanding but there is some evidence. For instance, in Malawi, new information on child ability leads parents to reallocate expenditures to align more closely with their children’s achievements and the misalignment of parental beliefs and child achievements are higher among the poor (Dizon-Ross 2014). In Pakistan, we consistently find that educated mothers allocate more time for their children and ensure that their children spend more time on schoolwork when at home (Andrabi, Das and Khwaja 2012). In addition, informing parents about the high rates of success of girls in higher education increases their educational aspirations for girls, especially for those they think of as ‘high quality’.

³⁶ For some recent examples, see Bryce and Oster (2013) or Heath and Mobarak (2014).

One pragmatic approach to addressing market failures in household decision making is Friedman's original thesis of vouchers, with parents funded by the state to send their child to a school of their choosing (Friedman and Friedman 1990). Such an approach could, in theory, address multiple market failures ranging from credit constraints to (inappropriate) reinforcing behavior.

Vouchers have been the subject of much experimentation and research recently; Musset (2012) provides one summary of school choice programs in OECD countries. Although there are clear successes (see Angrist and others, 2002, for the Colombian example) results have not been uniformly positive. Several themes have emerged. First, the administrative measurement of "outcomes" creeps into virtually every voucher scheme, even though this was not Friedman's original idea. In some countries, the concern is that the vouchers will support participation in schooling that is inimical to the idea of nation-building and shared citizenship. The worst kind of bigotry, from Canada to Britain, has been around the deep worry that such vouchers will be used to send children to Islamic schools.³⁷ In other countries, there is a concern that children will not learn sufficiently in voucher schools and therefore voucher schools need to be carefully monitored. Of course, the monitoring is on those subjects that the administrative bureaucracy deems important. In Pakistan, for instance, schools participating in a voucher program are tested in Mathematics and Language and if children fail the test they are not allowed to participate, although schools can take the test again.³⁸

Further, as has been pointed out previously (Hoxby 2003), voucher design is key. A voucher specifies a price, which is the amount that the school will receive if the voucher is redeemed at that school and a set of schools where the voucher may be redeemed. It also specifies what happens to schools who do not have sufficient enrollment, for instance, whether they are allowed to close down. How to price such vouchers, how to create a set of schools where they may be used, and the rules for school openings and closings are all critical design elements that affect outcomes, but around which is insufficient experimentation to tease out general lessons.³⁹

³⁷ From the Huffington Post, June 7th 2012: "Louisiana Rep. Valarie Hodges, R-Watson, is retracting her support for Gov. Bobby Jindal's voucher program, after realizing the money could be applied to Muslim schools, Livingston Parish News reports. Hodges initially supported the governor's program because she mistakenly equated "religious" with "Christian," according to the report. Jindal's reform package allows state education funds to be used to send students to religious schools. *"Unfortunately it will not be limited to the Founders' religion... We need to insure [sic] that it does not open the door to fund radical Islam schools. There are a thousand Muslim schools that have sprung up recently. I do not support using public funds for teaching Islam anywhere here in Louisiana,"* Hodges was quoted as saying in the Livingston Parish News.

³⁸ Barrera-Osorio and Raju (2010) show that the policy is effective in raising test-scores in the short-run.

³⁹ In India, researchers fixed the voucher price at the 90th percentile of the existing price distribution, providing a subsidy for 90 percent of participating schools (Muralidharan and Sundararaman 2014). From the parent's perspective, voucher schools were now free, and they should evaluate potential schools solely on the basis of quality. From the point of view of schools, ever voucher child represented a significant profit. Since schools no longer need to produce a certain quality to justify their market price, what happens to voucher children becomes a complicated function of the schools ability to separate voucher from fee-paying kids, the fraction of voucher to fee-paying kids in each school and the competitive environment that the school operates in. What the predictions of this design would mean for school performance is unclear. Or, in Spain, voucher schools known as centros concertados have mushroomed in the capital, coinciding with a significant influx of immigrants whose children were performing below grade-level. Two design effects have affected the functioning of concertados. First, the majority of concertados are denominational rather than secular, although over the same time population diversity has increased and religiosity has declined (Shermer 2013). This could reflect the rules for empanelling schools into the voucher network. Second, voucher schools charge a number of fees that are paid for by parents. If parents care only about how schools teach, this should enhance efficiency (otherwise, high quality schools remain out of the program instead of being partly subsidized). But if parents

More perniciously, there is a pervasive danger that once public subsidies are brought into the purely private system, the political economy of countries with poor schooling capacity will generate worse outcomes. In India for instance, there is a long-standing tradition of “grant-in-aid” schools that function with public subsidies, usually on land leases. Performance data tend to show little difference between the functioning of these schools and pure public schools; it’s the private sector that receives zero public subsidies where performance is higher on tested subjects.

How to alleviate constraints among households in practical manner is an exciting ongoing area of research. In the case of vouchers, for instance, critical design elements need to be worked out and political economy constraints need to be seriously examined. But other options—ranging from information to family support—are all possibilities that can and are being looked at in various countries.

Section V: Conclusion

The rise of private schooling is always intertwined with fundamental debates over the rights of children and the need to adjudicate between the state and parents regarding the welfare of the child. These are debates that have been going on for at least 2500 years, and it is difficult to believe that this time will be different. Although there has been significant progress in recent years addressing vexing questions of causality, the program of comparing public and private schools on a limited set of outcomes and of understanding the production function of schooling will ultimately have to face the deeper questions of what parents want from schooling and what society as a whole wants the education system to provide.

We argue instead for a pragmatic approach.

We apply the pragmatic approach in a specific way. Using an established arsenal of theoretical and empirical tools from economics—and particularly, the field of firms and industrial organization—we show that progress can be made by first alleviating the constraints that prevent schools and parents from achieving their *own* stated objectives. Using empirical examples, we show how this can be practically incorporated into policy and how doing so improves educational outcomes for children in Pakistani schools. We further argue that after alleviating such constraints, we can reexamine the new equilibrium to see what was achieved. When we do so, we find considerable improvements along the very dimensions that societal consensus advances as the areas that need improvement—higher enrollment, better test-scores and lower prices for consumers.

We do not claim that this is the *only* approach possible; neither do we wish to be accused of a certain naiveté in our starting assumption that households care optimally for the welfare of their children and will achieve the best possible outcomes, given the chance to do so. Neither do we claim that schools will

also care about peers, richer (Spanish) parents may send their children to concertados and the additional fees may be used to ensure that poorer (immigrant) parents cannot (Jacott and Rico 2006). Prices act as an entry barrier for low-income households, much like in theories of “club goods”. Again, schools cater to parental desires, but quality in this case is “my child being with other children like him/herself”. Bold and others (2011) point to a similar dynamic in Kenya, where abolishing user fees did not increase public school enrollment due to a large exodus of existing richer students to the private sector. Bau’s (2014) work from Pakistan sketches a theoretical model and structurally estimates the adverse impacts of greater information when wealthier students benefit more from a strong match to a school. She shows that an additional private school in the market increases within-school inequality in yearly test score gains by 0.1 standard deviations.

always offer the best possible quality for a given price. We are well aware of the decisions that some households make that take their children far from a better life and that educational providers may well be tempted to take advantage of parents if they can get away with it.

However there are many cases, examples of which we highlighted above, that remain amenable to the pragmatic approach. Further, such an approach helps us better identify and address situations that may require guided resource transfers (such as in conditional cash transfers, where money is given to the household for following a pre-specified action), state intrusion into the household (as is the case for child abuse in many high-income countries) or the regulation of schools. These are difficult issues that can only be resolved on a case-by-case basis. In the meantime, our evidence suggests that the program of creating a better environment for schools and parents to educate their children in can yield rich dividends.

Appendix 1: The Pakistani Education System

Size and Distribution: Figure A1 shows the growth and extent of public, private and religious schooling in Pakistan. Low-cost private schools are the fastest growth sector, both in terms of numbers and enrollment. In 1982, there were 3300 private schools in the country. By 2001, there were 32,000 and by 2005 there were 47,000. For those worried about religious schooling, the proportion of children in madrassas is so small that the usual data sources do not allow for any meaningful analysis to be conducted on them. Decompositions by income deciles show that, while there are some differences across rural and urban areas, between 1995 and 2005, there was growth in private school attendance and a decline in public school attendance for every income decile. Consequently, in contrast to an oft-held mental model of a single public school in a village, many children in rural Pakistan can choose from multiple public and private schools offering a variety of products at different prices (Figure A1). Nevertheless, private schools may be exacerbating inequality within rural areas while decreasing inequalities across rural and urban areas. The location decisions of private schools are closely linked to population and wealth and most growth in private schools adds more schools to the same villages rather than new schools in villages where previously there were none. Since distance to schooling is a strong correlate of school choice in Pakistan, access to private schools is increasing for children in these villages, but remains poor for children in less wealthy and smaller settlements.

Comparative Effectiveness of public and private schools: Figure A2 shows comparative test-score performance in public and private schools. We have completed studies comparing test-score performance with and without family and child adjustments, performance for children who switch from public to private schools and vice-versa and using instrumental variables. Every technique shows that there are significant gains in tested subjects for children who attend private schools and it is highly unlikely that these gains are due to the selective attendance of children who are better performers to begin with. However, these are average differences. It is also noteworthy that there is enormous variation in test-scores within public and within private sector schools.

Cost-Effectiveness of public and private schools: These comparative gains come at lower cost. A point-of-delivery comparison that computes the cost of schooling as the per-student cost of all inputs into the school will be accurate for private schools, but will undercount public school costs by not accounting for the administrative costs of running the schooling system as well as pension and additional benefits that accrue to teachers but are not included in salaries. Even with such a comparison, the cost of educating a child in a public school is twice as high as in a private school.

Figure A3 shows that costs differences across public and private schools arise primarily because teachers in public schools are paid 5 times as much as their private school counterparts, a difference that cannot be attributed to differences in characteristics such as education or training. We make several comments on the difference in teachers' wages, since it comes to the heart of the "cost-effectiveness" advantage of private schooling pointed out by virtually every study.

First, public school teachers earn a lot more than they could in the outside market. Bau and Das (2014) show that there is no link between productivity as measured by teacher value-added and pay in the

public sector. Further, a policy that led to hiring public teachers on temporary contracts at half the wages of permanent teachers had no discernable impact on child test-scores in the short-run, and had no effect on the quality of new teachers in the medium-run. These results are consistent with experimental studies in India and Kenya. Second, these wage differences are not going away. In the initial period of our data collection (2003), the wage differences could have reflected a historical anomaly. But from 2007 to 2011, there was a period of very high inflation in Pakistan, and this high inflation could have been used to erode the wage differences. Instead, by 2011, the wage differences were *even* higher than in 2003. Third, there is no link between pay and productivity in the public sector, with no variation in wages linked to variation in teacher value-added.

Finally, it is not straightforward to link these costs to “efficiency” differences. In the classic model of firms, efficiency can be roughly thought of as the ratio of outputs to inputs: How much “stuff” (labor and capital, for example), do you need to produce widgets. Firms that can produce more widgets with less “stuff” are more efficient. But calculating what “stuff” means is less than obvious, because each element in “stuff” needs to be weighted, and the typical assumption is that firms face the same weights, which are factor prices. In a *competitive market*, firms with higher wages also have more productive workers (the same worker produces more widgets in a given time period). But in markets that are not competitive, one firm may still be more *efficient* than another, but there is no reason why the cost structure will yield information about economic efficiency. When it comes to schooling, there is no doubt that public schools are not *competitive*, in that if they had to compete on price, they would immediately have to close down. Whether or not they are more technically efficient depends on the comparison of schooling produced to inputs used, something on which there is less evidence and will inevitably require a political economy model to be embedded into the production of schooling. See Pritchett and Filmer (1999) for one such example.

What are households doing? Households in the LEAPS sample are active purchasers of education and deeply interested in their children’s schooling. In 2003, households with children enrolled in public schools spent Rs.155 every month and households with children enrolled in private schools spent Rs.231 every month. The median monthly expenditures at the household level are about Rs.4700, which implies that a household with four children enrolled in a private school would be spending close to 20% of its budget on schooling expenditures. It also implies that close to 50% of the total spending on education in public schools is incurred by households as out-of-pocket expenditures.

Richer households and households with educated parents spend significantly more and elder children incur greater educational expenditures. This is not unexpected since educational spending is almost certainly a normal good. What is surprising is the strong effect of child intelligence on educational spending. Figure A4 shows educational expenditures for children disaggregated by parental perception of intelligence (very poor, poor, average, above average and highly above average) and by enrollment in public/private schools. Children perceived as more intelligent are four times more likely to be enrolled in private schools. The differences are much smaller for those enrolled in public schools, but still represent a two-fold increase over the same range. In contrast to this “intelligence” effect, gender discrimination in educational spending is small, accounting for at most a 5 percent difference in spending. Putting the two together, households, on average spend a lot more on girls perceived to be intelligent than on boys

who are not (Rs.224 versus Rs.180 per month). To the extent that parental perceptions of intelligence can be viewed as “objective”, this implies that even at the young ages of 5-15, parents start supporting children who are doing better with more investments, and cutting back on the children they feel are not performing.

The second main pattern in the data, which we see in both the decision to attend a school and the choice of the school to attend, is the impact of distance. Across boys and girls, enrollment declines by 8-10 percentage points for every 500 meters that a school is further from the house, and the relationship is as strong moving from 0 to 100 meters as from 800 to 900 meters. As expected, the relationship is (much) stronger for girls than for boys; in fact, the drop in enrollment as the distance to the closest eligible school increases is 3-4 times as much as that for boys—4 percentage points for every 500 meters for boys and 11-16 percentage points for girls. In a multivariate regression context that controls for age, household expenditures (a measure of income), education and the intelligence of the child, the “distance penalty” for boys is further reduced to 1.5-3 percentage points; for girls, the effect of distance is still large at 9-11 percentage-points for every 500 meters. While household and child characteristics, such as household expenditures and the child’s age, all have independent effects on enrollment they do not alter the size of the basic gender gap of 15-16 percentage points in enrollment in the LEAPS data. In sharp contrast, allowing for the distance-enrollment relationship to differ across boys and girls reduces the pure effect of gender on enrollment to 5 percentage points—a dramatic decline of 60 percent.

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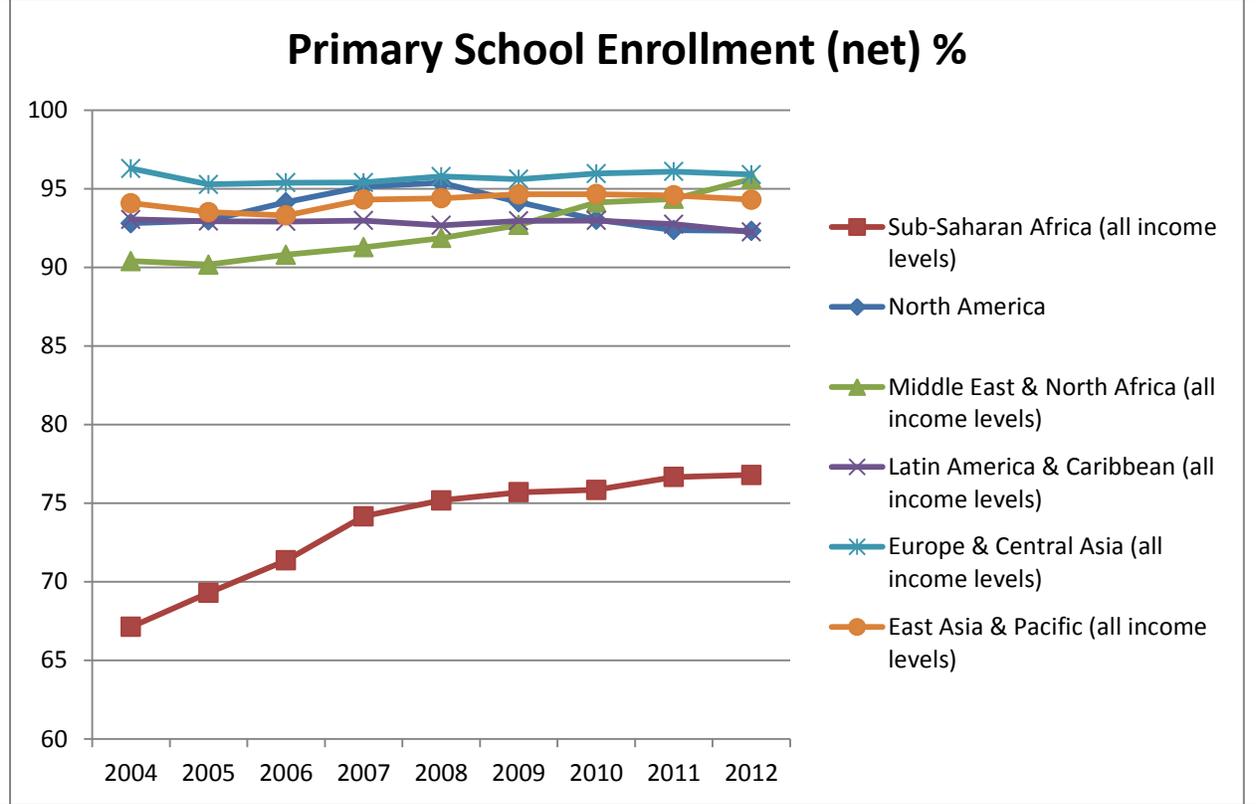
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Figures and Tables

Figure 1: Primary School Enrollments are Rising Rapidly around the world



Source: World Development Indicators Data Bank.

Table 1: Distribution of International Mathematics Achievement 2003

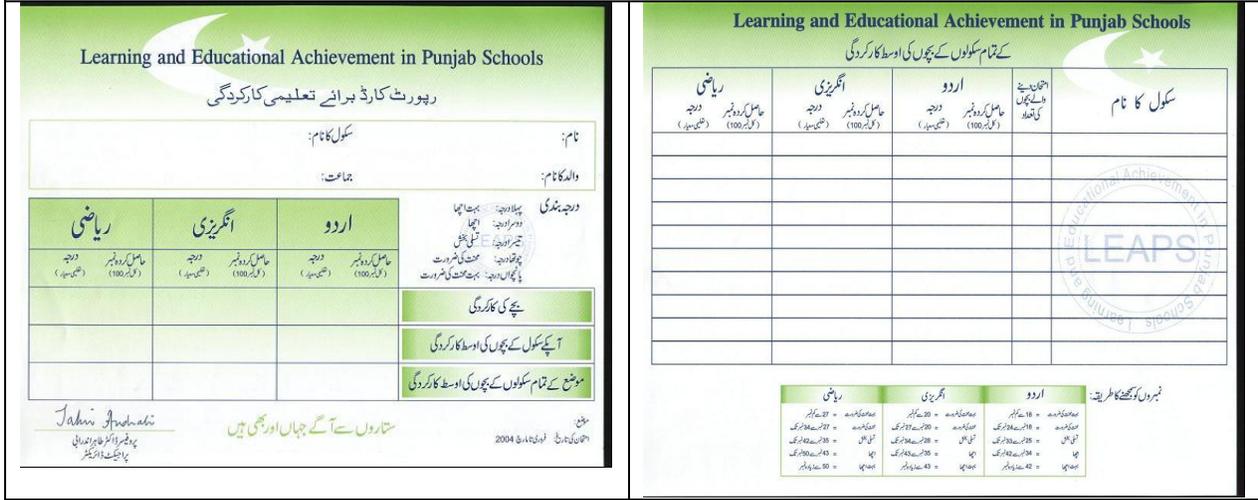
Country	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
Singapore	455(6.6)	556(6.7)	614(4.0)	662(3.5)	723(2.8)
Chinese Taipei	407(6.0)	518(7.0)	596(4.6)	657(5.0)	733(6.0)
Korea, Rep. of	439(3.1)	537(3.2)	596(2.5)	647(2.5)	715(3.0)
Hong Kong, SAR	455(11.9)	546(4.0)	593(3.3)	635(3.0)	691(4.6)
Japan	433(4.4)	519(2.0)	572(2.6)	623(2.2)	697(5.1)
Belgium (Flemish)	398(8.9)	495(3.7)	545(3.1)	588(2.8)	643(3.3)
Netherlands	417(8.4)	488(4.5)	540(5.8)	587(4.8)	644(6.8)
Estonia	416(4.8)	484(3.6)	531(4.0)	577(2.7)	645(4.0)
Hungary	398(8.1)	476(2.9)	531(3.5)	584(4.1)	656(4.2)
Latvia	386(5.2)	458(5.2)	510(2.9)	559(3.5)	625(5.4)
Russian Federation	381(5.5)	456(4.2)	509(4.5)	561(4.0)	632(7.5)
Slovak Republic	371(6.5)	453(4.7)	509(3.9)	564(4.3)	642(4.2)
Malaysia	388(3.7)	455(3.9)	507(5.5)	562(6.1)	630(5.3)
Australia	368(10.4)	450(3.9)	506(3.7)	561(5.8)	634(6.6)
United States	369(4.7)	450(2.9)	505(3.0)	560(3.5)	635(3.8)
Lithuania	370(4.5)	448(2.9)	503(2.4)	557(4.0)	628(2.5)
Scotland	368(8.5)	449(5.0)	501(4.3)	550(3.9)	615(6.0)
Sweden	378(4.0)	452(4.3)	501(2.6)	548(2.9)	614(6.3)
Israel	353(5.9)	438(4.8)	498(5.3)	555(3.5)	630(5.3)
England	373(5.3)	445(5.9)	497(5.9)	552(9.2)	627(5.6)
New Zealand	364(9.9)	441(5.2)	495(5.3)	548(7.1)	623(12.5)
Slovenia	375(9.3)	445(2.4)	492(2.0)	542(1.6)	610(3.7)
Italy	355(6.0)	432(4.0)	486(2.9)	537(3.2)	606(5.0)
Armenia	330(7.5)	423(5.1)	483(3.3)	539(3.2)	605(3.5)
Romania	321(7.8)	413(4.6)	479(4.9)	540(4.9)	619(9.0)
Serbia	326(6.2)	417(4.8)	479(4.0)	540(3.1)	618(4.8)
Bulgaria	333(7.5)	421(5.5)	478(4.6)	535(4.6)	611(6.6)
Norway	340(5.2)	414(2.2)	465(3.3)	511(1.7)	573(2.4)
Moldova, Rep. of	321(5.8)	405(7.3)	464(4.9)	518(4.4)	585(5.1)
Cyprus	321(3.8)	405(3.4)	463(1.8)	518(1.5)	586(1.6)
Macedonia, Rep. of	283(4.8)	376(5.1)	439(2.9)	497(3.4)	574(4.7)
Lebanon	324(3.4)	387(3.9)	432(3.7)	479(4.0)	545(5.8)
Jordan	279(5.3)	362(4.1)	427(4.9)	488(5.0)	567(5.2)
Indonesia	266(11.6)	350(7.9)	411(6.0)	472(4.0)	558(3.6)
Iran, Islamic Rep. of	294(4.8)	360(3.5)	408(3.0)	461(2.4)	537(6.2)
Tunisia	316(2.2)	368(2.4)	407(2.4)	450(2.6)	515(6.2)
Egypt	256(3.0)	341(6.0)	405(4.1)	471(3.7)	560(3.2)
Bahrain	277(3.2)	347(1.5)	402(1.8)	455(2.2)	525(1.4)
Palestinian Nat'l Auth.	241(5.2)	326(3.2)	389(4.1)	455(4.2)	542(5.4)
Morocco	275(4.8)	340(3.0)	387(3.0)	434(3.0)	497(2.8)
Chile	258(4.5)	328(4.8)	382(3.4)	441(4.5)	531(4.9)
Philippines	241(3.6)	316(5.6)	373(6.4)	437(6.5)	527(8.0)
Botswana	251(5.1)	316(3.0)	365(2.5)	415(2.7)	487(5.0)
Orissa	5-258	219-305	356-357	452-480	582-608

Rajasthan	5-259	216-303	339-347	407-429	533-555
Saudi Arabia	204(10.0)	279(6.6)	331(5.1)	385(4.5)	460(5.4)
Ghana	130(5.8)	213(4.3)	274(5.3)	337(7.3)	430(9.1)
South Africa	117(5.2)	191(3.5)	248(4.0)	316(7.5)	484(20.1)

Source: TIMSS Mathematics 2003, Grade 8, Exhibit D.1 and authors' calculations from Rajasthan and Orissa Secondary School Survey, Grade 9, 2005. As discussed in the text, we only provide bounds for the true population distribution, based on the MLE and EAP estimates. This table is taken from Das and Zajonc 2010. Orissa and Rajasthan are equated to the international distribution using Item Response Theory.

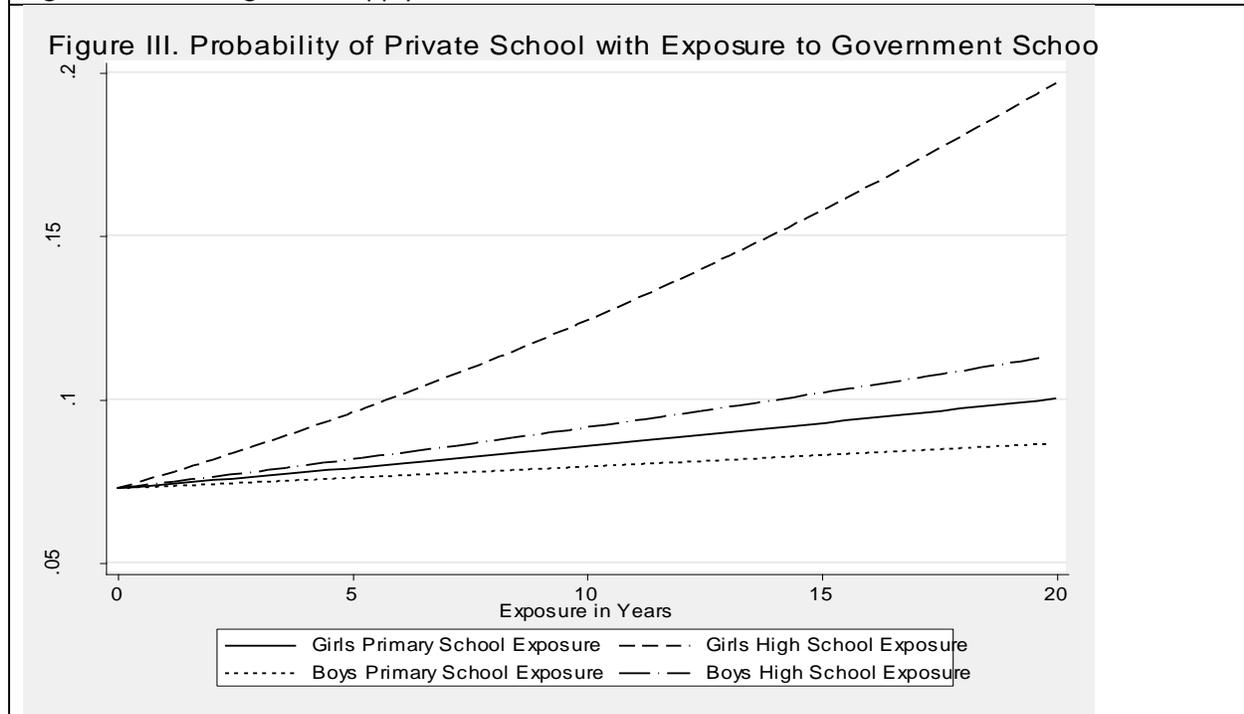
Figure 2

Figure 2: Alleviating information constraints by providing report cards



Note: The figure shows the report card given to parents to augment their information on child and school-level test scores. The front of the report card (left), which provides scores for Urdu (the vernacular), English and Mathematics for the child, the average child in the school and the average child in the village. The back of the report card (right) shows the scores of every school in the village for the tested subjects and the number of children tested. See Andrabi, Das and Khwaja (2014) for further details.

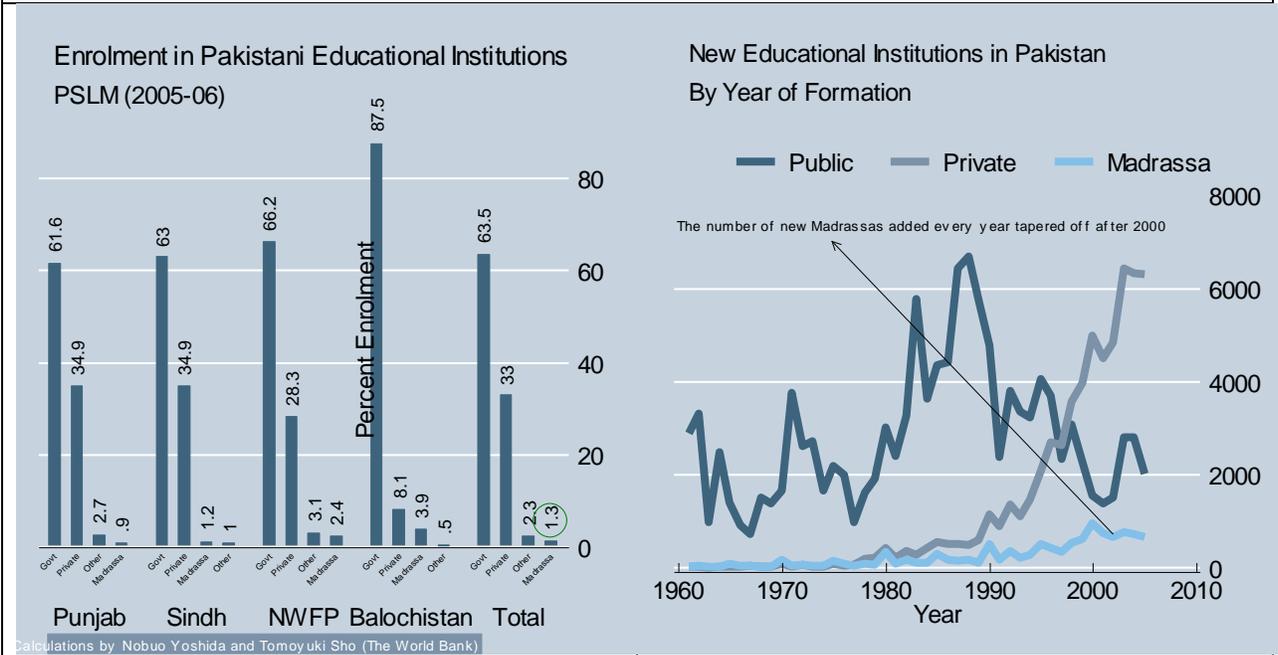
Figure 3: Alleviating Labor Supply Constraints



Note: The figure plots the predicted probability of private school existence against the number of years that different types of schools have existed in the village. The predicted probability is based on a probit regression, with all schools included in a single regression. The data area based on the census of private schools (Federal Bureau of Statistics) matched to public schools (Educational Management Information System for Punjab). See Andrabi, Das and Khwaja 2013 for further details.

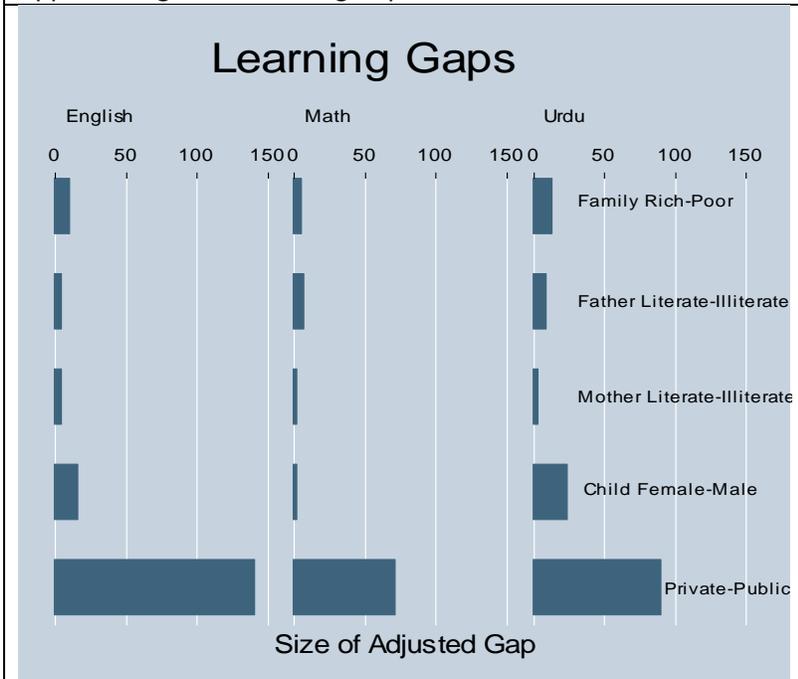
Appendix Figures and Tables

Appendix Figure 1: Enrollment Shares and Growth of Public, Private and Religious Schools in Pakistan



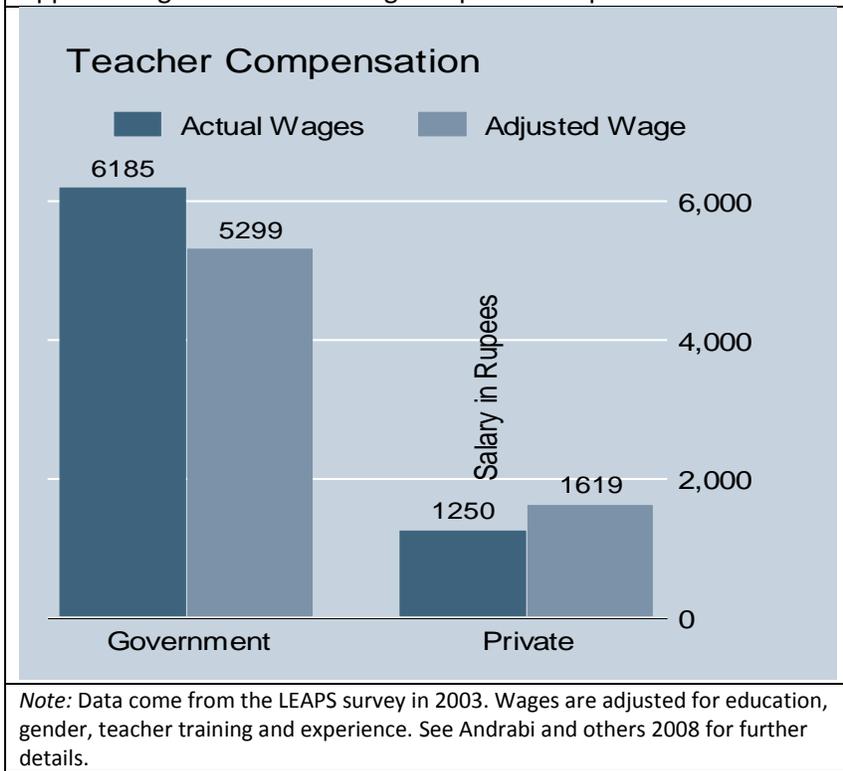
Note: Data come from the PSLM (2005-06), a representative survey of households and various rounds of the schooling census in Pakistan.

Appendix Figure 2: Learning Gaps across households and schools



Note: Data come from the LEAPS survey in 2003. Test-scores are normalized to have a mean of 500 and a standard deviation of 150 using psychometric scoring. See Andrabi and others 2007 for further details.

Appendix Figure 3: Teacher wages in public and private schools



Appendix Figure 4: Learning Gaps across households and schools

