The Quality of Education in Latin America and the Caribbean Region: The Mexican Case[1]

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1. Introduction

This paper analyzes the determinants and factors associated with student achievement in rural areas of Mexico, focusing on individual, household and school related variables. We use two separate but complementary data bases to address these issues, including nationally representative data among 15 year-old students from the international PISA 1993 survey and data deriving from very poor rural areas where the PROGRESA/Oportunidades program first began to operate. The paper emphasizes rural areas in Mexico as that is where historically student achievement has been lower and where school resources and infrastructure have been of lower quality.

In addition to providing data on student achievement through the application of student tests, both the PISA and the PROGRESA/Oportunidades data sets provide school level data, allowing us to examine the relation between some school characteristics and student level achievement. Because we have only cross-sectional data on student achievement, we concentrate on analyzing how the impacts of school characteristics may vary across demographic groups, in particular focusing on gender and indigenous ethnicity. To do so we estimate community fixed effects models, where we interact gender and indigenous status with school level characteristics using the PROGRESA/Oportunidades data.

An advantage of the Oportunidades evaluation data that we use is that achievement tests were applied in the household to youth between the ages of 15 and 21 and so we have information both for youth enrolled in school as well as those not enrolled, unlike the PISA and other traditional school-based samples, where only individuals enrolled in school are captured. While

in a developed country context, most children at age 15 are enrolled in school, this is not the case in Mexico and particularly in rural areas, where only about half of all children at age 15 are enrolled in school. Using the Oportunidades data, we present estimates comparing the determinants of school achievement using only children enrolled in school and using the entire sample of those applied the test. These results clearly show that the determinants and factors associated with achievement look substantially different for the subsample of those enrolled in school than for the entire sample, which in turn raises questions about how to interpret the PISA results.

Section 2 presents a brief review of academic literature on educational quality with a focus on recent studies in Mexico and Section 3 presents a background description of the educational system in Mexico and recent trends in educational policy. Section 4 presents a benchmark analysis of where Mexico stands relative to other countries measured in the international PISA tests as well as descriptive tables of achievement by individual, household level and school characteristics. Section 5 begins our analysis of the PROGRESA/Oportunidades data and analyzes the determinants of achievement for children currently enrolled and currently not enrolled in school. Section 5 also presents an interaction analysis of school characteristics with gender and indigenous status in an effort to study whether some school characterizes appear to be associated with different achievement among demographic groups. Section 6 concludes.

2. Academic literature on educational quality.

We now discuss briefly previous research on how to measure school quality in developing countries, leaving aside the voluminous literature on school quality within the United States (see for instance, the survey by Hanushek (1986) and articles by Card and Krueger (1992a, 1996)).

In the context of developing countries, there is a fairly substantial literature on school quality and achievement, although less on school quality and enrollment (see Ghuman et al. 2006, Behrman 2008). With respect to which inputs seem to matter in developing countries, again debate exists, much of which can be traced to methodological issues. Glewwe (2002) summarizes what has been learned on school quality inputs in the context of developing countries and argues that much of the literature is of limited value because of methodological problems related to whether estimates of the impact of school quality may be biased by omitted variables and/or be endogenous. For instance, wealthier parents may send their children to better schools or choose to live in areas where schools are better, thereby "altering" school quality. Alternatively, areas with better or worse schools may also have other characteristics (for instance easy access) which if not controlled for can bias the estimated coefficients of school quality. Glewwe argues that relatively few studies have been able to overcome these problems, which makes conclusions on which specific inputs of school quality matter most difficult to draw. Although a number of studies seem to show that resources per student are positively related to student outcomes, most studies, in part due to lack of detailed data, cannot provide specific information on which school inputs matter most.

Probably the cleanest form of variation derives from experimental variation in school quality. This genre of studies is small but growing. For instance, Banerjee et al. (2007) study a remedial educational program implemented in several Indian cities where students were randomly assigned to one of two groups: one group received a teacher-aid (balsakhi) for poorer students in one grade and the other in the other grade. The program improved overall test scores by 0.14 standard deviations in the first year, and 0.25 standard deviations in the second year. In other recent work, Duflo and Hanna (2005) have shown in a context of very high teacher absenteeism,

giving teachers a bonus for attendance significantly reduced teacher absenteeism and resulted in a significant increase in students' test scores (0.17 standard deviations after one year). In another randomized evaluation of a computer assisted learning program in India by Banerjee et al (2007), with children working on computers for two hours per week, the math scores of children who participated in the CAL program improved by 0.31 standard deviations. In contrast, Glewwe, Kremer and Moulin (2007) report that a program that provided official textbooks to randomly selected rural Kenyan primary schools did not increase test scores for the average student (though test scores were increased for students with high and the probability that students who had made it to the selective final year of primary school would go on to secondary school was increased). This is in contrast to one of the most robust associations – between textbooks and performance – reported in the non-experimental literature.

This small, but growing literature on experimental variation in school quality then, while not large enough to provide a consensus on those inputs that matter most or on what dimensions of the context the effectiveness of inputs matter, is suggestive that some dimensions of school quality do appear to improve child learning in developing country contexts, though not all of those that have been advocated in the literature (with textbooks being an important example).

In the Mexican context, there are relatively few published studies on the impact of school quality on learning and to our knowledge, no studies with experimental variation in school quality. A recent review from the World Bank (2005) summarizes available studies for Mexico on learning and schools as well as carries out new research on the effects of school quality using the PISA data. The study argues that students studying in states with access to higher quality schools as measured by student-teacher ratios and teacher schooling tend to have higher earnings, implying

that school quality leads to higher returns to schooling as in other contexts. Among school characteristics that appear to affect achievement in the Mexican context are: 1) tele-secondary schools, where students appear to have much lower achievement than students in other types of secondary schools, 2) student-teacher ratios, 3) teacher-related factors including morale and relationship with students. The study is carried out only at an aggregate level and does not differentiate between urban and rural contexts.

In the next section, we discuss Mexican educational policy as well as some evaluations of some specific programs in Mexico.

3. Educational policy in Mexico since 1990

Mexico recently has had rapidly increasing schooling levels, although continued low levels by international standards. In 2005, the average level of schooling for men and women aged 15 and over was 8.4 grades and 7.9 grades respectively, up from 7.7 and 7.1 grades in the year 2000. There are large inequalities among the population; for instance, by states the average level of schooling for adults in 2005 varied between Chiapas at 6 grades of schooling to Mexico City at 10.2 grades of schooling.

The 1990's in Mexico were notable for several fundamental changes in educational policy, the decentralization of administration and resources from the Federal Government to the state government (1992) and the incorporation of secondary education as part of the system of obligatory education (1993), both during the time in which Ernesto Zedillo, the next President,

was head of the Ministry of Public Education (SEP).[2] Compensatory programs (CONAFE), a branch of SEP which provides educational services to the population in extreme poverty were started. And finally, the PROGRESA conditional cash transfer program also began in 1997, during the Zedillo presidency.

In this section, we will provide a brief description of each of these polices/programs and describe some of the existing evidence on their impacts.

Primary schools increased by about a fifth between 1990 and 2006, with particularly large increases in the number of "comunitaria" (small schools in isolated regions where regularly more than one grade is taught per classroom) schools (75.4%) and in indigenous schools (43.3%), though most of these increases occurred in the 1990s (Table 1). During the same time period the overall number of primary students hardly changed (1% increase), though the numbers of students in indigenous and comunitaria schools over the 1990-2006 period increased over 40% despite declines in recent years. The average number of students per primary school, thus, decreased overall and particularly in the comunitaria schools though it remained about the same in indigenous schools. This probably reflects a relatively large expansion of primary schools in rural communities with small populations.

Secondary school (seventh through ninth grades) became obligatory in Mexico in 1993. A large effort to construct secondary schools began at this time and concentrated particular attention on building tele-secondary schools. Tele-secondary schools are part of a satellite system that

2 The Carrera Magisterial was also created during this time period. This program was designed to provide monetary incentives for teachers to continually invest in training and formation as well as provide incentives by linking teacher performance and training to increases in salary levels. The RAND corporation has carried out an evaluation of the Carrera Magisterial Program (Santibanez et al., 2007); after a number of years of the program, no significant effects on student achievement have been detected.

supplies secondary school classes to remote areas, motivated by the lack of specialized teaching personnel in remote areas. The first tele-secundary schools were constructed beginning in 1968; however, very few were built until the early 1990's. Table 2 shows the increases in secondary school construction since 1990 and shows that over a period of 15 years the number of secondary schools increased by about 50 percent, with most of the increase being due to a large expansion in the number of telesecundary schools being constructed. Table 3 presents data on construction of high schools, which over the same period show very high growth rates, with particularly high growth rates for tele-bachilleratos (tele-high schools), which are similar in operation to tele-secundaria schools.

What do we know about the impact of secundaria obligatoria on schooling attainment? There seems to have been following this policy change, a very large increase in the construction of lower secondary schools, the majority of which were of the tele-secondary school type, which is a mode of secondary school provided only in rural areas. Thus the main impact of the change in the law and the consequent large construction in schools should appear in rural areas. In preliminary work, Behrman, Parker and Todd (2007) have used the Mexican Family Life Survey 2002 to construct a schooling history and residence/migration history and link the MxFLS to state level data on tele-secondary school construction from 1990 to 2003, interacted with whether an individual lived in rural areas at the age of 12 as a variable affecting completed schooling in 2002. That is, variation derives from differences in secondary schools available in one's state of residence at age 12 interacted by residing in rural areas (where most of the impact of school construction should have been found). Since the reform and associated school construction are relatively recent, this study only focuses on individuals aged 16 to 24 in 2002. They find statistically significant impacts of this interaction on grades of school attained primarily for girls,

with lower impacts for boys. Thus, the increase in school construction motivated by the change in the education law resulted in a significant increase in schooling attainment.

A second question relates to the relative quality of tele-secondary schools versus other modes of secondary schools. A number of previous studies have shown that test scores tend to be lower in tele-secondary schools than in other secondary schools, which might suggest that tele-secondary schools are of worse quality. But the evaluation of tele-secondary schools versus other secondary schools is complicated by the problem of endogenous program placement, e.g. that tele-secondary schools are placed precisely in areas that historically have had low schooling attainments, so that simply comparing schooling levels in areas with tele-secondary schools versus general secondaries is likely to bias the estimated impact of tele-secondaries downward relative to other types of schools. We have been unable to find published or unpublished studies of the impacts of tele-secundary schools versus general tele-secundary schools that control for such factors.

Because decentralization was a nationwide policy carried out in all states more or less simultaneously, it is difficult to carry out a rigorous evaluation of its impacts. Nevertheless, there are several evaluations of CONAFE programs at the local level. Gertler, Patrinos and Rubio (2006) have evaluated the AGE program (*Apoyo a la Gestión Escolar)*, which provides monetary incentives to improve parental involvement in school management, a form of school-based management. The authors use the phasing-in of the AGEs intervention over time in schools to identify difference-in difference program estimates, using administrative school level data. An empirical difficulty is that the PROGRESA program coincides with the specific dates

of the evaluation (1998-2003), the authors use as a control variable the proportion of PROGRESA beneficiaries in each school in an attempt to control for the potential impacts of the PROGRESA program, assuming that PROGRESA is exogenous to the implementation of the AGE program. The authors estimate a reduction of 4.4 percent in the proportion of students failing or repeating a grade in the school when a school is an AGE school.

Shapiro and Skoufias (2006) have evaluated the Escuelas de Calidad (PEC) program, which provides public schools with funds (about $US15,000) for five year improvement plans that the school's staff and community design. Using school level administrative information and carrying out difference and difference matching estimates (e.g. carrying out matching by school), they find some evidence for small impacts of the PEC program in reducing failure and grade repetition. Similarly to Gertler, Patrinos and Rubio, 2006 they control for the PROGRESA program through a control variable measuring the proportion of beneficiaries across schools.

A major educational policy, although not directly belonging to the Ministry of Education, is the PROGRESA program, begun in 1997 after several years of pilots and preparation, and now called Oportunidades. PROGRESA, one of the first of the now well known genre of conditional cash transfer programs, provides monetary transfers to poor families in exchange for regular school attendance by children and regular health clinic attendance by family members. The program in 2005 served over 5 million Mexican families, about a quarter of the population. As shown by independent evaluations, the program has increased school enrollment and progression rates and schooling attainment (Schultz, 2004, Behrman, Sengupta and Todd, 2005). The increase in enrollment has been primarily at the secondary level and above as most children even

pre-program enrolled and completed primary school, although there have been some impacts on reducing grade failure in primary school (Behman, Sengupta and Todd, 2005).

An important question since PROGRESA began has been the coordination between the demand oriented program of PROGRESA and the supply and quality programs of SEP. In particular, given that PROGRESA has increased the number of students enrolled and desiring of enrolling in school, there would also seem to need to be some expansion on the supply side in order to avoid crowding.

Behrman, Parker, Todd and Gandini (2006) have studied the response of the SEP to the increased demands on the school system by analyzing changes in school characteristics including the student teacher ratio and the quality of teachers as measured by their schooling levels. They find little evidence of an obvious deterioration in school characteristics due to crowding. Their analysis is consistent with the SEP increasing resources in schools experiencing large increases in enrollments. Additionally, they study how the impacts of the PROGRESA program vary by available school quality, generally finding that when available schools are higher quality, program impacts on enrollment appear to be somewhat higher. The topic of PROGRESA impacts, and school quality remains nevertheless an open one and further research is needed.

As is the case in many countries, the teacher's union in Mexico plays a central role in determining educational policy. Evaluating the impact of the teacher's union is difficult

empirically, but a couple of recent studies have attempted to use variation in the strength of unions by state to estimate impacts of unions on educational indicators. In particular, Alvarez et al. (2007) use two indicators of union strength across states, the level of the union influence on teacher appointments and the level of conflict between the government and the teacher's union to attempt to estimate the impact of the union on student test scores, using the PISA 2003 data. They do not attempt to explain why the power of unions differs across states to begin with, which may reflect other state policies or other unmeasured variables. Their results show no relation between union influence over teacher selection and test scores, but show a correlation between the level of conflict between the union and state government, implying that states with lower levels of conflict have students with higher test scores.

While standardized tests have been regularly applied by SEP to a large sample of students for a number of years, it is only recently that results of some evaluations, including those of the PISA, have become publicly available. The new ENLACE tests, first applied nationwide in the spring 2006 and reapplied in the spring of 2007 to all students in the third, sixth and ninth grades, are the first tests for which parents have been informed of the results of their children and results of school level performance have been published. These ENLACE tests thus may provide a new source of evaluation, particularly if children can be followed over time, which has not generally been possible or at least been carried out in any previous evaluations of SEP. The contents of the tests are also publicly available, enabling an "evaluation" of the quality of the tests themselves to be carried out, e.g. how well do the tests reflect the curriculum/or what children of certain grades should be learning. Note, however, that ENLACE tests have yet to be applied above the 9th grade level.

Finally, we briefly mention policy related to indigenous education. The SEP operates both Spanish immersion schools and bilingual schools at the primary level in rural areas, as of 1996. Currently, bilingual schools are available at the pre-primary and primary levels. Classes are carried out both in the native language and in Spanish. The proportion of classes in Spanish increases with the grade level. Schools are supplied with textbooks in Spanish and in the native language, although it appears that not all bilingual schools receive textbooks in the indigenous language. Parker, Rubalcava and Teruel (2005) provide an analysis of the impacts of bilingual education on language barriers and schooling. With large household data sets from poor rural communities in Mexico, they find that parental language (failure to speak Spanish) represents an important barrier to the schooling of indigenous children. Using double difference estimators with community fixed effects to address endogenous program placement, they demonstrate that schools with bilingual education narrow the gap in the educational performance of children with monolingual mothers versus bilingual indigenous and non-indigenous mothers.

4. School achievement in Mexico: Evidence from the PISA.

In this section, we provide an overview of school achievement in Mexico compared with other OECD countries using the PISA data files from 2003. The PISA 2003 data are representative for 15 year-old students attending school. The student-answered questionnaires provide some information on individual- and household-level socio-economic characteristics, including schooling of the parents, durable goods of the family, languages spoken at home. There is also information on some aspects of school quality, answered by the school director for the schools in which achievement tests were applied, including infrastructure, size of the school, morale, and

computer usage. We first provide a description of the performance of Mexico relative to other countries and then provide descriptive evidence on how student achievement test scores within Mexico vary with socio-economic factors and school level variables.

Table 4 provides a summary of the level of scores on the three achievement tests for all countries taking the PISA tests indexed to (divided by) the Mexican score for easier comparison. It is notable that Mexico in all three tests ranks near the bottom of all countries surveyed and does better only than Brazil, Indonesia and Tunisia[3]. This remains the case when tests scores are analyzed by gender and rural versus urban residence (Table 5 and Table 6). Of course many factors may explain the poor performance of Mexico within this group of countries, including a lower level of economic development, lower income, less investment in schools, and lower school quality in many dimensions.

These results showing Mexico does quite poorly when compared to a large number of primarily developed countries are probably not surprising. However, the reality may be even worse than the evidence shown here. The PISA only carries out tests for children enrolled in school and in attendance the day of the test. While in more developed countries, this would include the vast majority of all 15 year olds, this is not the case in Mexico, particularly in rural areas where only about half of 15 years old in the time period studied were enrolled in school. If those who drop out earlier are those with lower achievement (presumably likely), then the results on achievement for the average 15 year old are likely even worse than the sample taking the PISA test show.

3 The variance in Mexican test scores is also quite high, for instance only two countries, Brazil and Turkey, have higher variances in the reading test score than Mexico. This suggests relatively high variation in family background and school quality in Mexico.

A related issue is that even for those 15 year olds enrolled in school, many may not be in the grade they "should" be in due to late entry and grade failure/repetition. Students aged fifteen should presumably be in either 9th or 10th grade. If they are enrolled in lower grades, they are likely to have lower levels of achievement as measured by the PISA tests. So part of the large differences in educational achievement as measured by the PISA tests may be due to this higher grade repetition/late entry to school. Table 7 shows the level of score on the PISA by enrolled grade in Mexico, and shows steadily increasing achievement test scores by an average of almost 10% of the mean for every additional grade enrolled (this will be corroborated in the multi-variate analysis below). Identifying to what extent this association means that students are learning versus that the better students are in higher grades at a given age is not possible with the available data. But this pattern does imply that if there are greater lags in grade progression in Mexico than in most of the other countries in the PISA sample, then Mexicans who are in age-appropriate grades are somewhat less behind the students in the same grades than are all Mexicans who took the tests.

Table 8 shows the proportion of students in at least ninth grade and in at least 10th grade by country. Note that for Mexico, only about 85 percent of students taking the PISA tests are in at least ninth grade, lower than most countries participating in PISA, although perhaps not as low as expected given high rates of grade repetition in primary school in Mexico. By ninth grade, it is possible that selection results in most of those who have repeated grades have already dropped out, although the same should be true of a country with similar economic conditions, Brazil where the percentage of 15 year olds taking the PISA in grades below nine is almost 40 percent.

In any case, to analyze whether Mexico improves in standing once one conditions on the sample of youth in at least ninth grade, Table 9 repeats Table 4 focusing on 1) youth in at least ninth grade and 2) youth in at least tenth grade. Comparing Tables 4 and 9, the distance between Mexico and other countries is significantly reduced by on average 0.9 to 4.1 points. Nevertheless, Mexico continues to perform quite poorly, still ranking among the lowest countries of those applied the PISA.

Table 10 shows Mexico scores by gender and by urban/rural areas. Students in rural areas show notably lower scores than in urban areas, averaging scores about 20 percent lower than their urban counterparts, both for boys and girls. Even in rural areas with such low test scores, the pattern of girls doing significantly better on Spanish tests with boys doing significantly better on math and science continues to appear.

Table 11 presents a decomposition exercise, analyzing the differences in achievement between schools versus within schools. For each of the three PISA tests, within school variance explains just over half of the variance in achievement scores, both overall and for subgroups by gender and zone of residence. Therefore variations in family background and perhaps classroom conditions and teacher skills within schools appears quite important in addition to variations in average school quality across schools.

The preceding descriptive evidence documents that Mexico does quite poorly in terms of student achievement and there are reasons to suspect that even the low achievement documented here is an overestimate of the achievement of the average fifteen year old in Mexico. We now turn to

evidence of the PISA by individual, household level and school level characteristics to begin to analyze the variables which correlate with youth achievement.

PISA and school characteristics

Note that analyzing the impact of school quality on achievement with the PISA is complicated given that only achievement tests on students currently in school are available and a large proportion of 15 year olds, particularly in rural areas, do not attend school. For those who are in school, the school quality information is that for the school actually currently attended, rather than a plausibly more exogenous measure, for instance, of characteristics of potential schools that might have been attended throughout their schooling experience. Among the individual and household level variables available, we focus on the following: gender, mother and father education, whether lives with both parents, and a number of household wealth variables related to educational investments, including books in the house, access to a computer, a place to study, dictionary.

With respect to school level variables, we focus on a limited number of school level variables deriving from the school level questionnaire that we argue to be as exogenous as possible. Many variables in the PISA, while very interesting in and of themselves, are concerned with aspirations and opinions, and it is not quite clear how to treat them in terms of their relationship with student achievement, for instance the director's opinion on whether children enjoy being in school or do their best to learn.

A limitation of the school level data is that there are a surprising number of missing variables, particularly at the school level. An additional limitation is that the PISA data files for Mexico do not report the number of teachers nor do they report the teacher's level of schooling, which also implies that student/teacher ratios cannot be constructed. [4] Finally, the variables for mother's and father's schooling (answered by the student) show some strange patterns, including a very high proportion of students reporting their parent has completed master's or doctorate programs, even in rural areas. Our prior is that many students may have mistakenly confused this category with teaching or technical programs that are largely at the high school level. For this reason, we combine high school, college and advanced degrees into one category.

The school level variables we focus on are the following:

1. Size of the school, measured by number of students
2. Access to computers
3. Level of teacher absenteeism is a problem (as reported by director)
4. Student/teacher ratio is a problem (as reported by the director)
5. Hours of instruction per week
6. Weeks of instruction per year
7. Autonomy of school over salaries and hiring
8. Frequency of standardized tests applied

4 It is not clear to us why these variables were apparently deleted from the public version of the data. Note that the World Bank study (2005) makes use of this information. It would be very useful if the IDB could obtain an unedited version of these data. An alternative would be obtaining the school level CCT code which would allow us to merge administrative SEP level information.

3.2 Results

Tables 12 and 13 present means and standard deviations of the student level and school level characteristics used in the analysis. These tables make clear the limited level of resources present in the families of the students in rural areas. Almost half of mothers and fathers have a primary school level education or less. Almost 40 percent of students report that there are less than 10 books at in their home and only about one third report having a computer at home. Schools attended have about 750 students on average. Overall hours of instruction per week is 24 and weeks of instruction per year are about 24, which seems substantially lower than the required 200 days of school by the SEP. Directors report that the learning of students is hindered by teacher absenteeism and a high student teacher ratio in about a quarter of schools. Only about a quarter report that standardized tests are not usually applied over the duration of a school year.

Tables 14 and 15 present student and school level characteristics by test scores in math, reading and science. Boys attain slightly higher scores in science and math, while girls obtain higher scores in reading. Compared with average scores for boys and girls, indigenous students do significantly worse in all three subjects.

As might be expected, students with more books in their households obtain higher test scores. Similarly, students with educational resources at home, including computers, a desk, the Internet obtain higher scores than average. In general, the higher the parental schooling level, the higher

the score obtained. The type of living arrangements does not appear to be significantly related to test scores.

With respect to school characteristics, small schools have overall lower test scores. Schools with fewer computers also have lower test scores. The hours of instruction per week and weeks do not show obvious patterns related to student achievement, nor do the variables measuring the frequency of standardized tests, teacher absenteeism, and the degree of decision making authority at the school level over hiring, salaries and setting budgets.

We now turn to the multi-variate regression analysis, where we examine in more detail these relationships. Table 16 presents simple regression estimates of the relationship of student, household and school level characteristics to student level achievement, for both urban and rural areas. Overall, expected relationships emerge with maternal schooling having a positive impact on achievement and investments in education within the household having strong and significant impacts. An exception is father schooling where the impact of schooling is not continually positive, although this may reflect problems with university coding described above. With respect to school level characteristics, there are apparent positive associations between learning and the size of school and number of computers. Schools with high level of teacher absence have lower overall achievement scores (particularly in urban areas), consistent with Duflo and Hanna (2005) showing lower teacher absence positively affects achievement test scores. Hours of instruction per week are positively associated with achievement. Accountability and decision making of the school do not show strong correlations overall with learning.

This descriptive analysis suggests the importance of some individual and household level variables towards achievement, notably parental schooling. With respect to school characteristics, the estimated association between school characteristics and achievement in Table 16 may suffer from endogeneity biases. For instance, school characteristics may reflect parental choices of school and thus capture unobserved aspects of child achievement.
It is noteworthy however in this descriptive evidence the lack of obvious correlations between the indicators of school quality we have examined and achievement. In the next section, we will examine the potential relationship between student achievement and school characteristics in more detail.

5. School quality and achievement in poor areas of Mexico: Evidence from Oportunidades

5a. Introduction

In this section, we turn to information from the PROGRESA/Oportunidades evaluation to study the factors associated with student achievement in poor rural areas. PROGRESA/Oportunidades is a large-scale Mexican anti-poverty program and one of the first in the new generation of conditional cash transfer programs. PROGRESA/Oportunidades conditions cash transfers on children's enrollment and regular school attendance as well as health clinic attendance. Conditional cash transfer programs now represent a major instrument for combating poverty in Latin America, an area noted for high inequality and high rates of extreme poverty. PROGRESA/Oportunidades has served as a model for the implementation of conditional programs in other countries including Colombia, Nicaragua, Honduras, and Jamaica and outside

the region including, for example, Indonesia, Malawi, Turkey and even a pilot program in New York City.

Besides its design the program has become noteworthy because it was subject to a large scale rigorous evaluation effort in rural areas which included an experimental design. While experimental designs to evaluate social programs are relatively common within the United States, they are still relatively rare within Latin America. In the evaluation design of PROGRESA, beginning in 1998 a subset of eligible communities in seven states where the Program began (Puebla, Veracruz, Queretaro, Guerrero, Morelos, Hidalgo and Michoacan) was randomly assigned to a treatment (320 communities) or control (186 communities) group to receive benefits about 18 months later at the beginning of 2000.. Follow up surveys (PROGRESA Evaluation Surveys or ENCEL) were carried out between 1998 and 2000. In 2003, a new follow up round of data and a new comparison group, consisting of communities where PROGRESA/Oportunidades had yet to be received and chosen through propensity score matching, was brought into the evaluation.

In this paper, we focus primarily on the 2003 data round. The Woodcock Johnson achievement tests were applied as part of the Oportunidades (ENCEL) fieldwork carried out in 2003 to the entire sample (original experimental evaluation and new comparison groups) and thus provide information on all households in 657 communities in the seven states of the evaluation. [5]

5 The ENCEL sample was designed to measure the impacts of Oportunidades although we do not use the information on program receipt in this paper. Note, however, that Behrman, Parker and Todd do not find significant estimates of Oportunidades on achievement tests, in spite of strong evidence of children spending more time in school. Additionally, Behrman et al. (2006) construct measures of the changes in school characteristics between 1997 and 2003 and regress these as a function of treatment status and initial school characteristics in 1997. The evidence is suggestive of very limited changes in school characteristics as a result of the Oportunidades program.

5b. Data description

About 7000 youth overall between the ages of 15 and 21 were applied the Woodcock Johnson tests in the areas of reading, writing, and mathematics in the household in the Oportunidades fieldwork of 2003. The tests are a Spanish version of Woodcock Johnson tests, which are commonly applied in the United States to measure academic achievement. Figures 1a through 1c show density histograms of reading, math and writing. [6]

Note that the scores of the tests cannot be compared with the levels of achievement of Mexican children outside of the ENCEL sample where they were applied, because these tests have not been more broadly utilized in Mexico. They can, however, be roughly compared with the average levels of attainment of children in the United States or in other Latin American countries where the tests have been utilized. Here, the results compare very poorly. The average youth (between the age of 15 and 21) taking the test achieves a level of performance in mathematics similar to a U.S. child with 4.4 grades of schooling and a performance in writing similar to a U.S. child with 5 grades of completed schooling.

The use of the Woodcock Johnson tests and the Oportunidades data allows us to resolve some of the limitations of the PISA data for studying the effects of school quality. One major advantage of the Woodcock Johnson tests and Oportunidades data is that the achievement tests were applied in the households, not in schools. Thus we have information for both youth enrolled and those not enrolled in school, unlike achievement tests applied directly in the school. Another

[6] The graph of reading scores shows many test takers are bunched at the right tail of the distribution, implying that they scored near the maximum raw score. This is problematic as the distribution is effectively censored. In this paper, we restrict attention to math and writing tests that show much greater dispersion and do not suggest the right-censoring suggested by the reading tests.

advantage is that the sampling frame of the school quality questionnaire allows us to construct measures of available supply quality for youth, rather than relying only on the particular characteristics of a school a child (or his/her parents) decided to attend, as in the PISA data.

As part of the ENCEl2003 fieldwork, a survey on numerous dimensions of school quality was included. The sample was designed to cover a majority of secondary and high schools that Oportunidades students attended. The sample was selected by constructing a radius (3km for primary, 5km for junior high and 10km for high school) around the communities of the evaluation sample and selecting a weighted (by number of Oportunidades students receiving grants) sample of schools within this radius.

We now turn to the coverage of school quality information for children taking the Woodcock Johnson test. The Oportunidades household survey collected information on the school attended in the Oportunidades 2003 household survey. In Mexico, each school has a particular code, called the CCT code that uniquely identifies the school and is reported on school correspondence, grade sheets etc. The CCT code was captured on the household Oportunidades 2003 survey for those students enrolled in school. Merging the individual information with the school-level information allows us to identify for many enrolled children, the school currently attended. In order to construct an indicator of potential supply of schools, we use this information and assume that individuals living in the same community but who did not provide information on school attended (either because they are not currently enrolled or because they did not report the CCT) are likely to have had access to the same schools that others in their

same community of residence attended. In this way, we construct an indicator of "potential supply" of schools in 2003 for students living in a particular community.

We also have access to information on schools from SEP, which has the advantage of providing pre-program (1997) information on some dimensions of schools. Note that an issue is the extent to which available schools and their characteristics may have been modified by the Oportunidades program. To test this, Behrman et al. (2006) construct measures of the changes in school characteristics between 1997 and 2003 and regress these as a function of treatment status and initial school characteristics in 1997. Overall, the evidence is suggestive of limited changes in school characteristics as a result of the Oportunidades program. The CCT code allows us also to merge the individual Oportunidades 2003 information with administrative pre-program census school-level information in 1997. That is, we can construct the characteristics of available schools both in 1997 (using administrative information) and in 2003 (using the more detailed Oportunidades 2003 information). An additional advantage of this administrative information is that it is a census, so that we are able to construct measures of coverage larger than those restricted to the sample of schools carried out in the Oportunidades 2003 data collection. The disadvantage of the SEP information is that it is not as extensive as the Oportunidades 2003 school questionnaire and so does not permit as many dimensions of schools to be analyzed.

Table 17 shows the proportion of youth for whom we can construct indicators of available schools in 1997 and in 2003.[7] In 1997, we are able to construct a measure of pre-program potential supply for nearly 100 percent of students at the primary and secondary level, and about

7 A small number of schools did not exist in 1997, e.g. they were built post-program, although this construction does not appear to be systematically related to the program. These schools are thus not considered as available supply in 1997.

80 percent at the high school level, for all three evaluation groups.[8] With respect to 2003 and the more detailed Oportunidades data, the table shows that we can measure secondary schools available to students in the T1998 and T2000 groups for about 75 percent of the sample for secondary schools, 50 percent in the case of primary schools and 70 percent in the case of high schools. Because of the age group of those applied the tests (age 15 to 21) we will focus more attention in the analysis on secondary and high schools (where coverage also happens to be greater). Appendix Tables 1 through 3 present selected primary, junior high and high school characteristics from the Oportunidades sample and compares these characteristics to nationally representative data from the Mexican Family Life Survey in rural and urban areas. (The Oportunidades school survey instrument was based on the MxFLS survey, thus facilitating the comparison of schools in very poor areas with school characteristics based on a nationally representative sample). In general, the schools in our sample are fairly comparable to those nationally representative in rural areas, although our sample appears to have smaller schools and a much higher percentage of distance education (e.g. telesecondary and telebachillerato schools).

5c Empirical analysis: distinguishing achievement of youth enrolled in schools versus those not enrolled.

In this section, we analyze the achieving levels of youth attending schools versus those not in school, in order to judge the potential bias in measuring achieving in a country using the sample for youth enrolled in school. We first present overall differences by current school enrollment and then present a simple multi-variate exercise relating individual, household and school level characteristics to student performance on standardized tests in math and writing. In this way, we

8 Primary schools include grades 1-6, secondary schools grades 7-9 and high school grades 10-12. Note that secondary schools and high schools are not alternative terms for the same schooling level as is the case in some countries such as the U.S.

aim to show the extent to which examining the socio-economic characteristics of achievement for a school-based sample can be problematic in a context where a large fraction of children do not attend school.

Table 18 compares descriptive characteristics of youth taking the Woodcock Johnson achievement tests with the subsample of youth taking the achievement tests and currently enrolled in school, providing t tests of significant differences. As might be expected, youth still in school have higher test scores, higher grades of completed schooling and are much less likely to be currently working. Differences in test scores between those enrolled in school and those not enrolled are statistically significant.

Enrolled youth also tend to have parents with a higher level of schooling and a higher standard of living as measured by household characteristics. Table 18 also carries out this exercise just for youth age 15, which is more comparable to the sample of the PISA. Only about half of all youth age 15 are enrolled in school and even at this age, there are large and significant differences between school achievement and attainment for those enrolled versus those not enrolled. In summary, Table 18 is suggestive that school- based achievement tests analysis, at least for rural areas, tends to contain a sample that is much better off than the overall population at large. In the multi-variate analysis below, we will analyze whether there are different relationships in terms of which variables appear to affect achievement for students enrolled in school versus all youth.

Those not enrolled in school have about a year and a half fewer grades of schooling than those enrolled in school. Do these differences in schooling explain differences in achievement? It is of course possible that students with less ability drop out earlier and these unobserved characteristics affect both their schooling attainment and achievement test score, rather than implying a causal relationship between schooling and achievement. Behrman, Parker and Todd (2004) carry out a simple regression analysis relating scores on the Woodcock Johnson test scores to grades of completed schooling, estimating that on average each additional grade of schooling passed leads to answering one additional question right. The differences observed between enrolled and uninvolved youth are consistent with differences in schooling explaining a large fraction of the differences in achievement between youth enrolled and not enrolled in school.

What other factors might affect differences in achievement between the two groups? One interesting issue is whether school quality affects the decision to dropout, that is whether youth having access to worse schools are more likely to drop out earlier. To provide some initial evidence on this, we compare available school characteristics for those in school to those out of school to see if those out of school live in areas with lower schooling quality, using both current level of characteristics and the historical level.[9] Table 19 provides descriptive evidence of the characteristics of available secondary schools in 2003, the same year the achievement tests were applied, the characteristics of available secondary schools in 1997 and the characteristics of available primary schools in 1997 for the group of youth aged 15 to 21 in 2003 or 9 to 15 in 1997. We use both current school characteristics and school characteristics six years earlier,

9 Note this is another advantage of using the characteristics of potential schools rather than actual schools attended, which is only relevant for children currently enrolled in school.

when most youth were either finishing primary school or beginning secondary school. We include historical measures of school quality under the hypothesis that earlier school characteristics may be relevant in determining current outcomes. Interestingly, for historical indicators of school characteristics at the primary level, the group enrolled in 2003 had access to better schools at least with regard to some indicators. For instance, students enrolled in 2003 had access to available primary schools with lower student teacher ratios and to schools with a larger proportion of libraries and a computer room versus those students who had dropped out by 2003. This is however not the case in general for available secondary schools, both historically and currently. Thus, the evidence is thus far mixed as to whether access to worse schools has led those with currently worse achieving to have dropped out earlier from school. Using primary school characteristics suggests some possibility of worse schools leading to earlier dropout but this is not the case with secondary schools. Presumably for the age groups studied here, available school characteristics at both levels should be important.

5d Correlates of achievement in rural areas of Mexico: an interactions analysis.

In this sub-section we examine through a multi-variate analysis, possible correlations between achievement and school level variables. Before turning to the multi-variate results, we discuss a couple issues relating to the association of school characteristics with achievement test results in our data. Firstly, assuming that school characteristics affect test scores, this is clearly a cumulative process e.g. all schools previously attended or potentially attended would impact the current level of achievement. Because of data availability, we will primarily be analyzing current school characteristics, although as described above for a limited number of school characteristics

we do have historical information on the schools from up to six years (1997) prior to the time of the application of the tests. Secondly, we construct available supply by compiling a list of all schools attended by children who live in the same community and taking a weighted average of their characteristics to measure available supply for each child. As a result, our measure of school quality is a community-based measure. However, school quality may be correlated with other unmeasured characteristics at the community level which may also affect school supply. To account for this, we will include a number of other locality characteristics, including distance to the closest school, the average agricultural wage and whether the community has access to a telephone.[10] Additionally, we carry out estimations similar to those estimated for the PISA data where we control for community level fixed effects and interact gender and indigenous status with the school quality variables. In this way, we estimate whether the impact of school characteristics varies by gender and indigenous status.

That is, we estimate:

$$T_{ich} = \mathrm{B}_0 + X_1\mathrm{B}_1 + X_2\mathrm{B}_2 + \delta_3 GEN * X_2 + \delta_4 INDIG * X_2 + u_c + \varepsilon_{ich} \quad (1)$$

Where T_{ich} represents the WJ test score child i in community c on subject h; X_1 represents a set of individual and household characteristics which include mother's and father's schooling attainment and age, measures of household wealth and dwelling characteristics, X_2 represents a

10 Given the rural isolated nature of the communities studied here, we think it unlikely that selective migration is quantitatively important, e.g. households moving to have access to better schools as is typically observed in the United States. Urquiola (2006) makes a similar argument for the case of Bolivia. A potential alternative is that families send children to live with relatives in regions with better schools, but in practice this is a fairly-rarely used alternative (in contrast to other regions, in particular, sub-Saharan Africa, where it is fairly common).

set of school level characteristics. Finally, ε_{ish} corresponds to an error component reflecting all remaining unobserved characteristics that determine test scores.

We include school level variables at the primary and secondary level, considering these to be the most relevant school levels to explain achievement for youth in our sample. The particular school level variables we include are the following:

1. Student-teacher ratio: since the student-teacher ratio in the local school may be affected by enrollment decisions, we use a common proxy for the student-teacher ratio, children in the community of school age divided by total teachers.
2. Budget per student: this indicator is constructed through information provided by the director of the school.
3. School facilities: these indicators include whether the school has a library, a laboratory, and computers.
4. Schooling attainment of teachers: we define a variable measuring the proportion of teachers with a "low" level of schooling attainment, these include those with a high school education or less and/or an incomplete teaching degree.
5. Type of school: in Mexico at both the junior and high school level, there are different types of schools including general schools, technical schools and tele-schools. Tele-secondary or bachillerato schools differ from other schools in Mexico as they rely on videos by satellite shown during class time in different subjects, followed by time spent doing exercises, as is discussed in Section 3. There is only one teacher for multiple subjects. They are thought to be a cost-effective way to bring schools to rural areas and

are the most common type of schools in rural areas of Mexico. Technical schools also have a specialized instructor who teaches each subject, with focus on technological education, generally with some relation to the particular economic activities of the area.

5e. Results.

Table 20 presents individual, household and school level factors associated with performance on the Woodcock Johnson standardized tests in mathematics and writing. For each specification, we present results for all youth and the subsample of youth enrolled in school. In this way, we attempt to provide some information on potential biases of focusing achievement studies only on children in school.

Overall, in all specifications boys do better on mathematics and worse on writing tests. As expected, maternal and paternal schooling have significant positive associations with children's test performance. Nevertheless, the size of the association as well as the significance differs significantly between the subsample of youth enrolled in school and the entire sample of youth. Focusing only on the sub-sample of youth enrolled in school shows no association of maternal schooling with mathematics achievement whereas for the sample of all youth, maternal schooling has a large and significant association. For the case of writing, while maternal schooling has a positive and significant association in both specifications, the association is significantly larger for the sample of all youth versus the sample of youth in school. In short, using the sample of youth in school to estimate the socio-economic correlates of achievement would in this context under-estimate the association of maternal schooling with achievement.

With respect to paternal schooling, the associations of paternal schooling with child test performance are smaller for all youth than for all youth enrolled and insignificant for writing achievement.

Grades of schooling have a large and direct association with both math and writing achievement scores. Being indigenous has a large negative association with mathematics but curiously no association with writing skills. [11] Dwelling characteristics, which presumably measure household wealth, show surprisingly few significant coefficients associated with learning.

Table 20 also reports school level variables. These reflect the characteristics of schools that could potentially be attended given the geographic residence location and are presumably less endogenous than characteristic of schools actually attended. As in the previous section, we allow achievement to be associated with current characteristics of secondary schools, historical characteristics of secondary schools and historical characteristics of primary schools. The results are mixed, with some school quality variables using current characteristics showing a positive association with achievement and others using historical characteristics showing a negative association.

While arguably school level characteristics of potential schools are more exogenous than characterizes of schools actually attended, the effects of school characteristics estimated in Table 20 may also suffer from endogenous and omitted variables, if for instance, unobservable variables are correlated with the characteristics of available school supply. Table 21 presents an interaction analysis where school characteristics are again interacted with gender and indigenous

11 Note that nearly all of the indigenous report speaking Spanish and therefore . are bilingual.

dummies, controlling for community fixed effects (we report only the interaction terms for current secondary school characteristics).

While most of the interactions are insignificant, there are a few interesting findings. For the indigenous, the school budget has a smaller association with math achievement than for the non-indigenous and laboratories have a smaller association with learning for the indigenous. One interpretation of these results is that the indigenous benefit less from available school resources than the non-indigenous. With respect to gender, male students seem to benefit more from tele-secondary schools than females and also from having access to a library.

6. Conclusions

This paper has studied student achievement in rural areas of Mexico using two separate data bases with information on student achievement tests, individual and household characteristics and school characteristics.

Youth living in rural areas clearly are in disadvantaged situations and attend schools with very limited resources. Even with a relatively disadvantaged environment however, there are some notable trends. As in other contexts, girls tend to do better on writing and reading, and boys better on mathematics and science. Maternal education has significant associations with achievement and generally larger associations than paternal achievement. Household wealth also seems to be associated with greater achievement.

With respect to school level characteristics, the analysis has been hampered by the use of purely cross-sectional information on achievement and on schools. Nevertheless, there are some associations with achievement, in particular of teacher characteristics, including teacher schooling levels, which are significantly associated with achievement.

The paper has also made a methodological point. Most studies of school achievement necessarily focus on school level data, as achievement tests are normally applied in the school. The Woodcock Johnson data we use here was applied in the household and thus allows us to compare the associations of socio-economic characteristics with achievement for the sample of those in school and the entire sample of youth. In a context where 50 percent of 15 year olds in rural areas no longer attend school, our analysis shows that the socio-economic characteristics associated with achievement appear to be different when one uses a sample of achievement only for those attending school versus a sample of youth both in school and out. In particular, we show here that the association of maternal schooling would likely be underestimated in a school-based rather than population sample.

There is a clear need for better quality data, for achievement tests applied to a nationally representative sample of youth and followed longitudinally over time, as well as in-depth questionnaires on both individual and household characteristics as well as characteristics of potential schools attended and actual schools. The PISA represents a first step in this direction, nevertheless the household/contextual variables are quite limited and only information is provided on school characteristics of schools actually attended, and information is only cross-sectional. As discussed above, the clearest evidence on the impacts of school quality has derived

from randomized experiments. While such experiments are generally only possible on a small scale, they tend to provide definitive evidence on their impacts. Mexico has yet to carry out a significant number of experiments with interventions related to school quality, and this would seem to be a fruitful area for research. [12]

12 In the first version of this draft, we proposed carrying out Mincer wage regressions to estimate the impact of achievement tests on wages for youth just finishing their schooling. We carry out these regressions for boys aged 18 and over, a group for which less than 20 percent continue to be enrolled in school. The results are fairly disappointing, neither grades of schooling of achievement tests show significant associations with the level of wage earned. These results might reflect the limited employment options young males face in rural communities or alternatively, selection issues with respect to who works (about 75% of male youth 18 and over are employed).

Table 1. Annual Growth of Primary Schools. Number of Schools and Students.

	Number of Students				Number of Schools			
	Total	General	Indigenous	Communitaria	Total	General	Indigenous	Communitaria
1991-1992	0.0%	-0.3%	4.9%	14.4%	2.8%	1.6%	3.6%	15.0%
1992-1993	0.2%	0.1%	3.7%	-10.0%	0.8%	1.6%	4.7%	-10.3%
1993-1994	0.3%	0.1%	3.1%	11.2%	2.4%	1.7%	3.3%	8.7%
1994-1995	0.7%	0.5%	1.4%	36.0%	5.3%	1.0%	-0.3%	51.5%
1995-1996	0.3%	0.0%	6.2%	10.3%	3.3%	0.9%	11.1%	13.0%
1996-1997	0.2%	0.0%	2.4%	3.3%	1.1%	0.6%	1.4%	3.3%
1997-1998	0.0%	-0.1%	1.9%	1.9%	1.8%	0.8%	2.6%	7.1%
1998-1999	0.3%	0.2%	2.9%	1.7%	1.5%	0.4%	1.7%	6.7%
1999-2000	0.5%	0.4%	2.0%	-3.6%	-0.8%	0.4%	0.5%	-7.4%
2000-2001	0.2%	0.1%	1.8%	1.5%	0.7%	0.2%	1.1%	3.1%
2001-2002	0.3%	0.2%	3.3%	-5.2%	0.2%	0.3%	2.7%	-1.8%
2002-2003	0.1%	0.0%	2.3%	0.7%	-0.2%	0.2%	1.8%	-0.5%
2003-2004	-0.5%	-0.5%	0.4%	-4.0%	-0.4%	0.3%	1.6%	-5.4%
2004-2005	-0.9%	-0.8%	-0.4%	-8.1%	-0.9%	0.3%	0.7%	-8.4%
2005-2006	-0.7%	-0.7%	-0.8%	-6.6%	-0.1%	0.5%	0.4%	-4.3%
Accumulated Growth	1.0%	-0.9%	41.2%	41.4%	19.2%	11.2%	43.3%	75.4%
1990	14401588	13730778	588464	82346	82280	68714	6787	6779
2006	14548194	13600980	830792	116422	98045	76428	9726	11891

Source: Sistema Nacional de Estadísticas Educativas. SEP. Mexico.

Table 2. Annual Growth of Secondary Schools. Number of Schools and Students.

	Number of Students				Number of Schools			
	Total	General	Telesecondary	Technical	Total	General	Telesecondary	Technical
1991	-0.70%	-2.15%	3.15%	1.02%	2.31%	1.11%	3.59%	1.81%
1992	1.02%	-0.71%	5.75%	2.86%	1.83%	1.47%	2.10%	1.97%
1993	3.30%	-23.56%	8.97%	3.76%	3.81%	3.04%	4.84%	2.84%
1994	3.48%	35.39%	10.70%	4.32%	7.02%	3.11%	11.78%	3.21%
1995	4.32%	2.19%	11.66%	5.13%	5.31%	1.89%	8.95%	2.59%
1996	2.60%	0.00%	9.55%	3.55%	4.12%	1.59%	6.23%	3.43%
1997	2.50%	1.28%	8.00%	2.50%	5.20%	2.35%	8.05%	2.50%
1998	2.87%	0.55%	11.80%	2.12%	4.05%	2.06%	6.11%	1.62%
1999	2.73%	0.99%	8.64%	2.26%	3.00%	1.83%	4.11%	1.77%
2000	2.70%	1.58%	6.13%	2.47%	3.06%	2.21%	3.93%	1.84%
2001	2.44%	1.87%	4.10%	2.33%	2.65%	1.93%	3.33%	1.79%
2002	3.28%	2.79%	4.56%	3.28%	2.22%	2.12%	2.49%	1.38%
2003	2.13%	-59.53%	3.08%	2.29%	1.98%	2.10%	2.27%	1.41%
2004	1.97%	155.49%	2.78%	1.87%	2.87%	5.78%	3.51%	1.59%
2005	1.44%	1.38%	1.57%	1.46%	2.58%	4.70%	2.93%	1.28%
Accumulated Growth	42.70%	17.83%	162.47%	50.09%	66.49%	44.38%	105.31%	35.92%

Table 3. Annual Growth of Technical Schools and High Schools. Number of Students and Schools.

	Technical schools								High school (Bachillerato)							
	Number of Students				Number of Schools				Number of Students				Number of Schools			
	Total	CET	CONALEP	Others	Total	CET	CONALEP	Others	Total	General	Technical	Tele High School	Total	General	Tele High School	Technical
1990	8.4%	-0.6%	16.4%	5.0%	2.6%	-5.4%	-0.5%	5.1%	0.2%	-1.9%	NA	6.5%	6.3%	6.9%	NA	4.5%
1991	-0.2%	-8.2%	0.5%	1.6%	8.4%	-6.7%	2.0%	12.8%	2.4%	0.8%	NA	6.8%	2.7%	2.3%	NA	4.1%
1992	-0.9%	5.7%	9.0%	-11.0%	-0.2%	-2.8%	4.4%	-1.3%	4.0%	2.3%	NA	8.5%	7.0%	5.6%	NA	11.7%
1993	0.1%	-10.2%	7.5%	-4.4%	0.2%	-1.7%	0.2%	0.5%	5.4%	1.7%	NA	10.0%	8.9%	-0.8%	NA	13.2%
1994	-4.7%	-9.4%	3.1%	-12.5%	-2.9%	-3.5%	0.5%	-3.8%	5.9%	3.8%	30.1%	9.8%	5.5%	4.4%	21.3%	5.0%
1995	-1.1%	4.8%	-1.2%	-2.7%	-3.2%	-4.2%	0.2%	-4.2%	8.4%	6.5%	25.2%	11.6%	7.7%	5.4%	27.1%	8.8%
1996	1.8%	-13.6%	10.6%	-5.5%	-2.8%	5.7%	-1.2%	-4.4%	4.5%	4.2%	28.7%	3.9%	9.2%	6.1%	45.5%	6.2%
1997	0.5%	3.1%	2.0%	-2.7%	-0.9%	-2.4%	0.2%	-1.1%	3.9%	3.5%	18.6%	3.6%	7.2%	5.9%	20.9%	4.5%
1998	-4.6%	-18.6%	-1.6%	-5.4%	-6.5%	-14.0%	-0.9%	-7.4%	4.4%	4.2%	13.6%	3.9%	4.8%	4.0%	15.5%	1.7%
1999	-3.5%	-10.6%	-4.5%	0.0%	-4.5%	-7.8%	-0.7%	-5.5%	3.0%	2.2%	13.6%	3.9%	3.8%	2.2%	12.7%	3.1%
2000	-1.5%	-12.6%	1.6%	-4.0%	-2.6%	-13.1%	2.8%	-3.4%	6.6%	4.8%	30.1%	8.0%	10.7%	10.7%	16.7%	6.9%
2001	0.8%	-6.6%	6.1%	-7.1%	4.2%	-14.2%	1.4%	7.4%	6.2%	5.3%	17.4%	6.8%	7.5%	7.5%	8.1%	7.1%
2002	0.2%	0.4%	2.6%	-4.7%	-2.0%	-8.2%	0.7%	-2.5%	5.0%	4.6%	13.0%	4.8%	6.7%	7.3%	5.9%	5.3%
2003	0.8%	-13.9%	5.0%	-5.2%	-2.7%	-10.1%	2.7%	-4.3%	3.3%	3.3%	2.1%	3.4%	4.7%	5.9%	4.1%	1.8%
2004	-1.6%	-7.7%	0.2%	-4.6%	-1.3%	-15.0%	0.7%	-1.1%	3.7%	3.5%	5.6%	3.8%	4.4%	5.7%	2.4%	2.3%
2005	-1.3%	-16.6%	0.3%	-2.4%	-4.3%	-20.6%	-0.2%	-5.0%	2.7%	2.3%	1.6%	3.6%	3.7%	4.3%	1.7%	3.4%
Accumulated Growth	-7.0%	-71.0%	72.5%	-49.6%	-17.7%	-73.5%	12.8%	-18.6%	96.9%	64.9%	506.1%	159.7%	165.5%	124.3%	412.2%	137.6%
1990	378894	54814	141894	182186	1816	204	406	1206	1721626	1291664	0	429962	4406	3379	0	1027
2006	352511	15870	244813	91828	1494	54	458	982	3390432	2130006	143756	1116670	11700	7580	1680	2440

Table 4. PISA 2003 Exam scores by country indexed to Mexican scores

	Science		Math		Reading	
	Mean	SD	Mean	SD	Mean	SD
Australia	130	2.094	136	2.145	131	2.120
Austria	121	3.436	131	3.260	123	3.753
Belgium	126	2.455	137	2.283	127	2.576
Brazil	96	4.312	92	4.824	101	4.560
Canada	128	2.004	138	1.812	132	1.740
Czech Republic	129	3.356	134	3.538	122	3.451
Denmark	117	2.950	134	2.729	123	2.796
Finland	135	1.907	141	1.853	136	1.633
France	126	2.971	133	2.496	124	2.667
Germany	124	3.628	131	3.316	123	3.383
Greece	119	3.773	115	3.897	118	4.076
Hong Kong (China)	133	4.253	143	4.518	127	3.684
Hungary	124	2.745	127	2.827	121	2.462
Iceland	122	1.460	134	1.415	123	1.536
Indonesia	98	3.203	93	3.903	95	3.371
Ireland	125	2.673	131	2.441	129	2.617
Italy	120	3.124	121	3.058	119	3.023
Japan	135	4.138	139	4.012	125	3.908
Korea	133	3.534	141	3.229	134	3.084
Latvia	121	3.880	125	3.681	123	3.661
Liechtenstein	130	4.228	139	3.994	131	3.550
Luxembourg	119	1.461	128	0.969	120	1.433
Macao	130	2.999	137	2.876	124	2.120
Mexico	**100**	**3.458**	**100**	**3.640**	**100**	**4.087**
Netherlands	130	3.127	140	3.125	128	2.839
New Zealand	129	2.341	136	2.241	130	2.451
Norway	120	2.863	129	2.374	125	2.755
Poland	123	2.861	127	2.496	124	2.865
Portugal	116	3.456	121	3.404	119	3.728
Russia	121	4.139	122	4.190	111	3.928
Slovakia	122	3.710	129	3.344	117	3.121
Spain	120	2.602	126	2.400	120	2.579
Sweden	125	2.693	132	2.555	129	2.410
Switzerland	127	3.679	137	3.375	125	3.275
Thailand	106	2.688	108	2.989	105	2.783
Tunisia	95	2.555	93	2.534	94	2.780
Turkey	107	5.882	110	6.729	110	5.781
United Kingdom	128	2.517	132	2.419	127	2.449
United States	121	3.062	125	2.932	124	3.198
Uruguay	108	2.893	110	3.281	109	3.411
Yugoslavia	108	3.485	113	3.744	103	3.557

Table 5. PISA 2003 Exam scores by country and gender, indexed to Mexican scores

	Women						Men					
	Science		Math		Reading		Science		Math		Reading	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Australia	131	2.758	137	2.686	133	2.540	128	2.898	135	2.997	130	2.830
Austria	123	4.170	132	3.951	125	4.207	120	4.276	130	3.948	120	4.522
Belgium	127	3.423	138	3.224	128	3.290	124	3.554	136	3.395	126	3.727
Brazil	97	4.218	92	4.379	102	4.101	96	5.236	93	6.055	99	5.749
Canada	129	2.191	139	1.868	133	1.814	129	2.281	138	2.050	132	2.031
Czech Republic	130	4.060	134	4.344	123	4.403	128	4.227	134	4.271	122	4.101
Denmark	117	3.140	133	2.958	123	2.940	118	3.555	134	3.361	123	3.305
Finland	138	2.155	142	2.086	138	1.947	133	2.535	140	2.434	134	2.191
France	128	3.507	133	2.908	125	3.144	125	4.127	132	3.547	123	3.777
Germany	125	4.173	131	3.921	125	3.900	123	4.461	130	3.974	121	4.221
Greece	119	3.878	115	3.846	120	3.931	119	4.739	116	4.740	117	5.082
Hong Kong (China)	135	4.185	144	4.544	128	3.486	131	6.040	141	6.503	127	5.296
Hungary	126	3.310	128	3.293	121	3.022	123	3.284	126	3.318	120	3.140
Iceland	125	2.371	138	2.153	127	2.197	120	2.345	130	2.270	119	2.311
Indonesia	99	3.813	94	4.558	96	3.890	97	3.060	93	3.872	95	3.342
Ireland	126	3.860	130	3.389	129	3.686	124	3.067	131	3.001	129	3.256
Italy	121	3.622	120	3.821	121	3.393	119	5.151	122	4.552	117	5.032
Japan	136	4.088	140	3.960	124	4.054	134	5.987	138	5.807	125	5.468
Korea	132	5.507	139	5.334	133	4.266	133	4.729	141	4.349	135	3.674
Latvia	123	3.882	127	3.548	124	3.635	119	5.075	124	4.765	121	4.505
Liechtenstein	128	7.212	137	6.165	130	6.445	131	7.576	141	7.117	133	7.112
Luxembourg	119	1.855	128	1.522	121	1.815	119	2.493	128	1.847	119	2.544
Macao	130	3.975	136	3.257	123	2.681	129	4.931	138	4.787	126	3.555
Mexico	**100**	**4.149**	**100**	**4.072**	**100**	**4.562**	**100**	**3.854**	**100**	**4.269**	**100**	**4.542**
Netherlands	130	3.633	141	3.479	128	3.179	129	4.120	138	4.070	129	3.644
New Zealand	128	3.337	136	3.191	131	3.277	129	2.950	136	2.736	131	3.116
Norway	121	3.314	129	2.861	128	3.336	118	3.434	127	2.833	122	3.339
Poland	123	3.361	128	2.938	126	3.177	122	3.238	126	2.948	123	3.517
Portugal	116	3.626	121	3.438	121	3.707	115	4.002	121	4.176	118	4.268
Russia	121	3.954	122	4.189	111	3.677	121	5.340	121	5.268	110	4.725
Slovakia	122	3.917	129	3.575	118	3.318	123	4.282	130	3.898	117	3.815
Spain	121	2.568	127	2.172	122	2.450	119	3.827	125	3.366	119	3.748
Sweden	126	3.414	133	3.083	130	2.874	124	3.048	131	2.968	128	2.799
Switzerland	127	3.929	136	3.640	126	3.092	126	4.981	137	4.735	124	4.365
Thailand	108	3.116	110	3.386	107	2.984	104	3.718	106	3.944	102	3.687
Tunisia	97	2.986	93	2.929	94	3.233	93	2.742	93	2.731	93	3.270
Turkey	108	6.411	109	6.669	112	6.085	106	6.649	110	7.860	110	6.791
United Kingdom	129	3.974	133	3.870	127	3.598	127	3.127	131	2.890	127	3.048
United States	122	3.497	126	3.222	125	3.536	120	3.436	124	3.308	123	3.616
Uruguay	109	3.561	110	3.820	111	3.684	108	3.674	110	3.935	107	4.432
Yugoslavia	110	4.198	115	4.442	106	3.893	106	3.678	112	4.216	100	3.658

Table 6. PISA 2003 Exam results indexed to Mexican scores by urban/rural residence.

	Rural						Urban					
	Science		Math		Reading		Science		Math		Reading	
Australia	133.9	(3.381)	141.5	(3.563)	137.4	(3.617)	122.4	(2.775)	127.2	(2.711)	122.4	(2.790)
Austria	126.4	(3.643)	137.9	(3.627)	129.9	(4.134)	115.5	(10.40)	123.9	(9.521)	114.9	(10.43)
Belgium	132.3	(2.962)	146.3	(2.962)	135.6	(3.106)	119.3	(10.32)	128.0	(10.78)	118.6	(10.31)
Brazil	97.6	(6.495)	93.4	(7.356)	103.2	(7.027)	93.8	(6.773)	90.2	(7.375)	97.1	(6.391)
Canada	134.5	(2.480)	145.9	(2.148)	140.5	(2.236)	120.2	(3.281)	128.8	(2.989)	122.2	(2.822)
Czech Republic	134.1	(3.919)	140.3	(4.032)	128.6	(4.209)	126.9	(7.847)	130.5	(8.377)	118.7	(7.323)
Denmark	123.9	(3.047)	142.1	(2.755)	132.0	(3.077)	110.8	(10.65)	124.7	(9.382)	114.9	(9.356)
Finland	142.7	(1.857)	150.1	(1.834)	145.5	(1.617)	126.9	(5.567)	131.5	(5.527)	125.4	(4.726)
Germany	130.0	(5.917)	138.2	(5.429)	130.7	(5.649)	117.3	(10.41)	121.8	(9.652)	114.7	(10.01)
Greece	123.5	(3.967)	121.2	(3.747)	124.3	(4.168)	115.8	(8.245)	111.3	(9.279)	114.4	(8.515)
Hungary	126.8	(5.604)	130.5	(5.974)	124.5	(5.596)	120.8	(5.610)	122.7	(5.928)	115.5	(5.384)
Iceland	128.5	(1.931)	141.9	(1.848)	131.2	(2.035)	116.0	(3.884)	125.4	(3.496)	115.8	(3.538)
Indonesia	100.5	(3.331)	96.3	(4.078)	99.3	(3.686)	96.2	(7.694)	93.0	(9.470)	93.8	(7.525)
Ireland	130.7	(3.376)	138.3	(3.070)	136.8	(3.496)	118.2	(7.226)	121.5	(6.998)	120.8	(7.388)
Italy	125.1	(4.639)	127.7	(4.420)	125.7	(4.655)	115.2	(7.555)	113.3	(7.234)	112.6	(6.676)
Japan	138.6	(9.032)	143.2	(8.686)	128.9	(8.841)	128.0	(6.765)	129.9	(6.630)	116.5	(6.087)
Korea	130.1	(13.24)	138.4	(12.02)	135.6	(11.47)	125.9	(3.620)	131.9	(3.421)	124.1	(3.129)
Latvia	126.2	(4.631)	132.2	(4.264)	130.5	(4.214)	114.9	(7.231)	118.1	(6.983)	114.4	(7.011)
Liechtenstein	136.9	(4.227)	148.1	(3.993)	140.7	(3.550)	-	-	-	-	-	-
Luxembourg	125.8	(1.461)	136.3	(0.969)	128.5	(1.432)	-	-	-	-	-	-
Mexico	100.0	(3.459)	100.0	(3.860)	100.0	(4.236)	100.0	(5.940)	100.0	(6.328)	100.0	(7.150)
Netherlands	135.2	(5.615)	147.2	(5.944)	136.2	(5.018)	122.4	(8.750)	130.3	(8.462)	119.3	(7.576)
New Zealand	134.6	(3.514)	143.3	(3.337)	138.8	(3.685)	121.1	(4.107)	126.7	(3.736)	120.7	(4.143)
Norway	125.3	(3.047)	135.9	(2.405)	133.0	(2.855)	114.1	(8.229)	121.4	(6.842)	117.4	(7.353)
Poland	127.0	(3.240)	133.3	(2.886)	130.4	(3.363)	122.5	(6.185)	123.5	(4.970)	121.4	(5.680)
Portugal	119.9	(4.170)	126.7	(4.130)	125.8	(4.514)	114.9	(7.238)	119.1	(7.162)	117.5	(7.498)
Russian Federation	123.9	(4.920)	125.7	(4.674)	114.3	(4.503)	116.6	(6.140)	116.0	(6.414)	105.9	(5.776)
Slovakia	127.1	(4.286)	135.7	(3.620)	124.1	(3.719)	121.8	(7.565)	127.6	(7.301)	114.4	(6.862)
Spain	125.2	(3.797)	132.6	(3.414)	127.1	(3.911)	114.2	(5.553)	118.0	(5.057)	112.3	(5.468)
Sweden	132.1	(2.591)	140.8	(2.374)	137.9	(2.212)	116.0	(8.925)	121.5	(8.711)	117.9	(8.295)
Switzerland	132.7	(3.495)	144.6	(3.479)	133.0	(3.132)	124.4	(20.48)	132.2	(19.14)	118.8	(16.36)
Thailand	108.7	(3.208)	111.6	(3.678)	109.5	(3.253)	106.3	(8.501)	108.4	(8.300)	103.6	(8.790)
Tunisia	99.6	(2.926)	98.3	(3.038)	99.6	(3.222)	92.2	(13.19)	90.5	(13.55)	90.2	(14.00)
Turkey	108.4	(7.801)	110.9	(8.821)	113.1	(7.796)	103.7	(8.379)	106.0	(9.277)	105.1	(7.926)
United Kingdom	136.1	(4.090)	141.5	(3.850)	136.8	(3.910)	118.2	(6.100)	120.6	(5.891)	115.5	(5.808)
United States	131.7	(2.967)	137.1	(2.859)	136.5	(3.166)	107.9	(8.611)	110.4	(8.211)	108.6	(8.782)
Uruguay	109.8	(5.027)	111.0	(5.146)	111.0	(5.819)	106.3	(5.294)	107.8	(6.158)	105.9	(5.964)
Yugoslavia	112.1	(4.599)	119.3	(4.831)	108.8	(4.670)	102.9	(5.906)	106.7	(7.010)	96.8	(5.929)

Table 7. PISA 2003 Exam Scores by grade: Mexico

	Science		Math		Reading	
	Mean	SD	Mean	SD	Mean	SD
Women						
7	301.90	14.05	278.18	11.24	295.06	12.94
8	352.16	7.53	318.09	7.11	340.16	7.81
9	384.90	9.01	361.08	8.99	390.47	10.01
10	427.04	2.18	411.47	2.36	445.13	1.91
11	466.13	14.40	458.05	12.13	485.60	14.25
12	482.60	34.25	436.86	22.98	490.56	26.27
Men						
7	340.99	10.81	290.67	10.67	289.47	11.96
8	357.79	5.98	333.80	5.70	327.44	6.36
9	397.32	6.73	376.78	7.06	374.63	7.66
10	446.30	2.37	434.05	2.61	432.71	2.39
11	470.61	16.10	454.66	18.84	461.87	13.43
12	570.93	24.07	588.13	38.57	586.05	31.61
Total						
7	325.77	7.70	285.81	7.20	291.65	8.50
8	355.42	4.97	327.17	4.81	332.81	5.53
9	391.04	6.76	368.84	7.06	382.64	7.95
10	435.36	1.97	421.23	2.10	439.76	1.78
11	468.38	7.60	456.35	7.66	473.71	9.22
12	550.09	32.67	552.45	54.03	563.53	38.85

Table 8. Percentage of Students taking PISA 2003 tests in 9th grade or above. By country

	9th or above	SD		9th or above	SD
Australia	99.9%	0.000	Luxembourg	85.1%	0.002
Austria	94.6%	0.010	Macao	61.8%	0.006
Belgium	96.0%	0.004	**Mexico**	85.4%	0.012
Brazil	61.5%	0.026	Netherlands	95.4%	0.006
Canada	97.0%	0.003	New Zealand	99.9%	0.000
Czech Republic	97.0%	0.004	Norway	100.0%	0.000
Denmark	90.8%	0.006	Poland	96.2%	0.004
Finland	87.3%	0.005	Portugal	85.2%	0.013
France	94.4%	0.006	Russian Federation	97.1%	0.004
Germany	83.4%	0.008	Slovakia	82.3%	0.011
Greece	97.7%	0.004	Spain	96.8%	0.004
Hong Kong	84.1%	0.011	Sweden	97.6%	0.002
Hungary	93.9%	0.005	Switzerland	98.5%	0.004
Iceland	100.0%	0.000	Thailand	98.7%	0.005
Indonesia	84.9%	0.010	Tunisia	62.6%	0.010
Ireland	97.2%	0.003	Turkey	94.8%	0.018
Italy	98.4%	0.004	United Kingdom	100.0%	0.000
Japan	100.0%	0.000	United States	97.3%	0.008
Korea	100.0%	0.000	Uruguay	84.7%	0.011
Latvia	82.2%	0.008	Yugoslavia	100.0%	0.000
Liechtenstein	79.0%	0.009			

Source: PISA 2003

Table 9. PISA 2003 Exam results indexed to Mexican scores. By current grade enrollment

	Only youth in 9th or above						Only youth in 10th or above					
	Science		Math		Reading		Science		Math		Reading	
Australia	126.7	(2.088)	132.2	(2.136)	127.3	(2.114)	121.6	(2.283)	125.5	(2.257)	120.5	(2.304)
Austria	120.0	(3.191)	129.1	(2.988)	120.6	(3.403)	115.9	(4.700)	123.2	(4.308)	114.6	(4.836)
Belgium	124.4	(2.338)	135.3	(2.199)	124.6	(2.487)	125.7	(2.206)	135.5	(2.116)	124.5	(1.998)
Brazil	102.3	(4.160)	99.8	(4.631)	107.1	(3.998)	102.9	(5.569)	100.5	(6.463)	106.9	(5.240)
Canada	126.9	(1.775)	135.8	(1.596)	129.2	(1.554)	122.6	(1.861)	129.4	(1.697)	122.9	(1.648)
Czech Republic	127.0	(3.211)	131.1	(3.455)	119.2	(3.389)	124.4	(3.730)	126.8	(3.813)	115.6	(3.673)
Denmark	115.9	(3.084)	131.3	(2.889)	120.7	(2.917)	118.6	(12.03)	132.8	(12.15)	126.1	(9.805)
Finland	134.0	(1.952)	139.0	(1.873)	133.0	(1.653)	-	-	-	-	-	-
France	125.2	(2.968)	130.5	(2.461)	121.8	(2.624)	129.4	(3.204)	131.5	(2.742)	122.9	(2.807)
Germany	126.1	(3.184)	131.7	(2.970)	123.8	(2.997)	129.6	(3.858)	134.3	(3.569)	126.4	(3.480)
Greece	116.5	(3.785)	112.7	(3.886)	114.9	(4.060)	111.7	(3.906)	107.1	(4.033)	108.9	(4.230)
Hong Kong (China)	133.0	(3.597)	142.1	(3.851)	125.6	(3.141)	128.7	(4.301)	136.3	(4.563)	119.7	(3.719)
Hungary	123.0	(2.911)	125.1	(3.005)	118.0	(2.618)	122.1	(3.757)	123.4	(3.538)	114.8	(3.232)
Iceland	119.3	(1.459)	129.9	(1.414)	119.1	(1.536)	113.4	(1.459)	122.0	(1.414)	111.6	(1.536)
Indonesia	96.9	(3.337)	92.9	(4.093)	94.4	(3.470)	97.0	(6.102)	93.8	(7.754)	94.1	(6.122)
Ireland	122.6	(2.712)	127.5	(2.475)	125.6	(2.656)	122.1	(3.862)	125.1	(3.894)	123.7	(3.276)
Italy	118.0	(2.993)	118.0	(2.967)	115.7	(2.953)	114.7	(2.856)	113.3	(2.849)	111.1	(2.772)
Japan	132.1	(4.137)	134.7	(4.011)	120.6	(3.908)	125.6	(4.137)	126.6	(4.011)	113.1	(3.908)
Korea	129.9	(3.533)	136.7	(3.229)	129.3	(3.084)	123.5	(3.593)	128.5	(3.286)	121.3	(3.127)
Latvia	120.3	(3.797)	124.8	(3.691)	121.4	(3.655)	123.3	(7.160)	127.1	(7.641)	122.3	(7.349)
Liechtenstein	131.3	(4.685)	139.8	(4.346)	130.9	(3.745)	141.1	(14.95)	149.5	(11.22)	137.2	(11.86)
Luxembourg	118.7	(1.525)	126.5	(1.137)	118.3	(1.417)	125.2	(2.412)	131.3	(2.203)	122.4	(2.280)
Macao (China)	133.9	(4.551)	141.4	(3.768)	126.7	(3.189)	131.9	(6.267)	138.2	(6.453)	122.5	(3.753)
Mexico	100.0	(3.312)	100.0	(3.392)	100.0	(3.687)	100.0	(1.985)	100.0	(2.060)	100.0	(1.749)
Netherlands	127.5	(3.193)	136.8	(3.198)	125.3	(2.885)	128.8	(3.086)	136.4	(2.93)	124.1	(2.621)
New Zealand	125.6	(2.349)	132.0	(2.244)	126.3	(2.465)	120.6	(2.391)	125.2	(2.272)	119.6	(2.505)
Norway	116.8	(2.862)	124.8	(2.374)	121.0	(2.755)	111.1	(2.884)	117.4	(2.386)	113.5	(2.762)
Poland	121.3	(2.620)	124.8	(2.213)	121.7	(2.500)	139.0	(18.88)	137.7	(21.72)	134.5	(17.85)
Portugal	117.2	(2.856)	122.1	(2.810)	120.6	(2.842)	116.2	(2.472)	119.7	(2.139)	118.0	(2.370)
Russian Federation	118.6	(4.245)	118.8	(4.322)	107.7	(4.066)	114.6	(5.648)	113.8	(5.652)	103.1	(5.598)
Slovakia	120.1	(3.301)	126.2	(3.128)	114.2	(2.966)	115.8	(4.484)	120.3	(4.626)	108.3	(4.423)
Spain	118.6	(2.508)	123.4	(2.353)	117.5	(2.463)	118.6	(2.542)	121.6	(2.428)	115.7	(2.472)
Sweden	122.7	(2.652)	129.0	(2.505)	125.3	(2.340)	128.0	(17.37)	133.3	(17.18)	129.1	(13.99)
Switzerland	127.6	(4.294)	137.1	(3.887)	124.4	(3.839)	127.8	(13.22)	135.2	(11.77)	121.3	(13.62)
Thailand	103.7	(2.679)	105.3	(2.982)	101.9	(2.817)	102.9	(3.542)	103.3	(3.564)	99.6	(3.542)
Tunisia	100.9	(3.059)	98.9	(3.079)	99.8	(3.174)	102.1	(4.334)	99.9	(4.474)	100.0	(4.047)
Turkey	106.0	(5.941)	108.3	(6.765)	108.3	(5.704)	100.8	(6.008)	101.8	(6.814)	101.5	(5.789)
United Kingdom	125.0	(2.516)	128.1	(2.418)	122.8	(2.449)	118.9	(2.517)	120.4	(2.419)	115.1	(2.448)
United States	119.1	(2.932)	122.5	(2.723)	120.7	(2.966)	115.6	(3.045)	118.0	(2.801)	116.2	(2.912)
Uruguay	109.9	(2.815)	111.2	(3.104)	110.1	(3.028)	108.9	(2.849)	109.3	(2.867)	108.1	(2.605)
Yugoslavia	105.2	(3.484)	110.1	(3.743)	99.7	(3.556)	113.0	(15.00)	116.7	(14.67)	104.6	(12.19)

Table 10. Mexican PISA 2003 Exam Scores by type of community

	Science		Math		Reading	
	Mean	SD	Mean	SD	Mean	SD
Total						
Urban	416.94	3.87	399.26	4.13	416.00	4.48
Rural	361.98	7.45	335.45	8.34	340.10	8.71
Urban						
Men	423.19	4.21	405.85	4.31	405.46	4.69
Women	411.35	4.34	393.37	4.70	425.42	4.98
T-test sig gender dif	3.87		5.06		8.3	
Rural						
Men	364.59	10.03	341.80	11.10	330.75	11.51
Women	359.354	8.637	329.069	8.533	349.507	9.822
T-test sig gender dif	15.8		16.7		19.7	

Table 11: Between and within school variance: Mexican PISA 2003 scores

	Math		Reading		Science			
	Between-school variance	Within-school variance	Between-school variance	Within-school variance	Between-school variance	Within-school variance	Students	Schools
Total	46.0%	54.0%	44.6%	55.4%	40.7%	59.3%	29983	1124
Women	47.5%	52.5%	45.9%	54.1%	43.0%	57.0%	16167	1114
Men	48.3%	51.7%	46.6%	53.4%	43.7%	56.3%	13814	1102
9th grade or above	44.9%	55.1%	43.5%	56.5%	40.1%	59.9%	27635	1076
10th grade or above	40.1%	59.9%	37.7%	62.3%	35.9%	64.1%	22802	817
Rural	44.1%	55.9%	43.1%	56.9%	38.5%	61.5%	16141	612
Urban	44.0%	56.0%	41.9%	58.1%	39.6%	60.4%	11561	424

Source: Authors' calculations with the PISA

Table 12. Individual characteristics

All communities

Indicator	Mean	Standard Error
Student characteristics		
Female	51.85%	0.010
Speak Indigenous Dialect	4.22%	0.011
Number of books at home		
Less than 10	38.06%	0.013
Between 11 and 25	30.68%	0.007
Between 25 and 100	20.85%	0.008
More than 100	10.02%	0.008
Student have at home		
Desk	68.69%	0.012
Room	45.48%	0.011
Place to study	54.53%	0.011
Computer	33.22%	0.018
Software	19.87%	0.012
Internet	18.35%	0.016
Literature	17.20%	0.012
Text books	62.73%	0.013
Dictionary	84.96%	0.009
Dishwashers	13.66%	0.007
Mother's education		
None	22.20%	0.011
Primary	25.22%	0.010
Junior High School	24.21%	0.009
High School or more	29.94%	0.018
Father's education		
None	17.89%	0.011
Primary	23.00%	0.011
Junior High School	24.81%	0.010
High School or more	38.30%	0.017
Student lives with		
Mother	91.21%	0.005
Father	62.67%	0.010
Other female guardian	2.77%	0.002
Other male guardian	2.56%	0.003
Other	31.18%	0.011

Source: PISA2003

Table 13. School characteristics

All communities

Indicator	Mean	Standard Error
School characteristics		
Students	763	40.429
Computers	59	3.552
Hours of instruction per week	24	0.337
Weeks of instruction per year	24	0.704
Schools with…		
Enrichment or remedial classes	82.6%	0.027
How often are the students assessed using standardized tests?		
Never	24.9%	0.031
1-2 times a year	34.5%	0.034
3-5 times a year	23.9%	0.030
Once a month or more	16.7%	0.024
The learning of students is hindered in a lot or some extent by		
Teacher absenteeism	26.6%	0.031
Student-teacher ratio	23.7%	0.029
Which of the following are not school's responsibility		
Hire teachers	76.9%	0.028
Fire teachers	70.6%	0.031
Define teacher's salary	48.3%	0.032
Define increases in teacher's salary	45.0%	0.032
Formulate budget	85.6%	0.019
Allocate budget	86.0%	0.019

Source: PISA 2003

Table 14. Science, Math and Reading scores by individual characteristics

All communities

	Science		Math		Reading	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Student characteristics						
Female	400	4.15	380	4.07	410	4.56
Male	410	3.85	391	4.27	389	4.54
Indigenous	341	11.05	302	10.38	299	12.64
Number of books at home						
Less than 10	390	3.01	369	3.39	384	3.70
Between 11 and 25	398	3.42	380	3.76	395	4.17
Between 25 and 100	429	4.23	413	4.57	432	5.13
More than 100	457	7.24	433	6.60	450	7.35
Student have at home						
Desk	417	3.50	399	3.66	415	4.14
Room	415	3.98	398	4.08	410	4.92
Place to study	419	3.84	401	3.96	416	4.74
Computer	448	4.24	432	4.39	450	4.82
Software	452	5.41	432	5.37	452	5.85
Internet	455	5.64	437	5.75	458	5.74
Literature	465	5.84	445	5.56	464	6.56
Text books	423	3.90	406	3.87	423	4.30
Dictionary	412	3.46	393	3.59	409	4.13
Dishwashers	408	4.85	388	4.89	401	5.68
Mother's education						
None	367	4.02	345	4.39	355	5.02
Elementary School	392	3.33	371	3.50	385	4.43
Junior High School	408	3.80	390	3.65	405	4.11
High School or more	444	4.33	426	4.64	445	5.30
Father's education						
None	364	4.07	344	4.74	353	5.25
Primary	384	4.49	362	4.97	372	6.30
Junior High School	407	3.98	382	3.79	402	3.82
High School or more	435	4.59	418	4.69	434	5.20
Student lives with						
Mother	406	3.38	387	3.65	402	4.16
Father	409	3.58	390	3.72	402	4.18
Other female guardian	403	9.72	370	10.99	401	12.59
Other male guardian	406	11.95	377	10.86	409	13.87
Other	422	4.55	404	4.93	420	5.41

Source: PISA2003

Table 15. Exam scores by school characteristics

All communities

	Science		Math		Reading	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Size school						
Less than 500	382	5.77	361	6.16	373	6.72
Between 500 and 1000	420	7.59	403	7.74	419	9.53
More than 1000	419	4.62	400	4.96	416	5.26
Number of computers						
Less than 40	392	5.96	372	6.59	387	7.27
Between 40 and 80	444	9.04	430	8.93	448	10.66
More than 80	401	4.43	380	4.72	393	5.31
Hours of instruction per week						
Less than 23	405	3.43	383	3.63	399	4.34
Between 23 and 28	433	4.60	421	4.46	438	5.14
More than 28	399	4.15	378	4.32	392	4.88
Weeks of instruction per year						
Less than 19	429	5.78	413	6.55	431	7.13
Between 19 and 23	401	7.14	379	8.09	393	8.93
More than 23	399	4.74	380	5.08	393	5.34
Schools with						
Enrichment or remedial classes	408	4.10	389	4.29	404	4.87
How often are the students assessed using standardized tests?						
Never	405	5.96	386	6.23	401	6.71
1-2 times a year	415	6.94	395	7.58	413	8.53
3-5 times a year	398	8.16	378	9.08	390	10.43
Once a month or more	394	9.55	372	10.67	384	11.74
The learning of students is hindered in a lot or some extent by…						
Teacher absenteeism	397	4.62	375	5.26	389	5.25
Student-teacher ratio	402	5.86	381	6.68	397	6.68
Which of the following are not school's responsibility						
Hire teachers	411	3.85	391	4.19	407	4.53
Fire teachers	411	4.69	392	5.13	407	5.64
Define teacher's salary	410	5.80	391	6.14	407	6.93
Define increases in teacher's salary	411	6.13	392	6.50	408	7.36
Formulate budget	408	4.03	389	4.22	404	4.64
Allocate budget	408	4.01	389	4.20	405	4.62

Source: PISA2003

Table 16: Relationship of student, parental and school characteristics to PISA test scores

	Rural areas			Urban areas		
	Math	Reading	Science	Math	Reading	Science
Student characteristics						
Gender (female=1)	-19.694	12.134	-14.648	-18.362	14.139	-16.675
	[2.428]**	[2.640]**	[2.505]**	[0.868]**	[0.887]**	[0.879]**
Speaks indigenous language	-14.226	-21.89	-0.683	-27.823	-29.485	-13.13
	[5.112]**	[5.559]**	[5.275]	[4.800]**	[4.904]**	[4.857]**
Grade enrolled	30.135	33.613	23.988	28.979	28.797	22.842
	[1.950]**	[2.120]**	[2.012]**	[0.856]**	[0.875]**	[0.866]**
Lives with mother and father	2.695	0.04	-0.857	2.85	-2.178	-0.063
	[2.505]	[2.724]	[2.585]	[0.903]**	[0.922]*	[0.913]
Parental education						
Mother has no education	0.906	-0.617	-7.098	-4.637	-5.713	-5.627
	[3.898]	[4.239]	[4.023]	[1.596]**	[1.630]**	[1.615]**
Mother has primary education	-1.939	1.254	-2.444	-0.68	-2.454	-1.084
	[3.539]	[3.849]	[3.652]	[1.299]	[1.327]	[1.314]
Mother has high school education	11.677	15.509	14.945	7.197	8.478	5.256
	[5.338]*	[5.805]**	[5.508]**	[1.469]**	[1.501]**	[1.487]**
Father has no education	-0.123	-3.945	-8.46	3.484	-1.404	-6.57
	[3.962]	[4.308]	[4.088]*	[1.670]*	[1.706]	[1.690]**
Father has primary education	0.632	-6.678	-6.676	-0.502	-5.052	-3.29
	[3.498]	[3.804]	[3.610]	[1.358]	[1.388]**	[1.375]*
Father has high school education	11.091	5.883	-5.216	5.929	5.795	1.621
	[4.674]*	[5.083]	[4.823]	[1.460]**	[1.491]**	[1.477]
Student has at home						
Between 0 and 10 books in home	-1.094	7.499	8.383	3.21	7.071	6.784
	[2.847]	[3.096]*	[2.937]**	[1.101]**	[1.125]**	[1.114]**
26 to 100 books	0.491	4.232	3.517	7.045	6.29	6.223
	[3.778]	[4.109]	[3.899]	[1.201]**	[1.227]**	[1.215]**
More than 101 books	13.336	7.702	10.516	14.256	11.613	19.781
	[5.684]*	[6.181]	[5.865]	[1.634]**	[1.669]**	[1.653]**
Student has desk	7.551	11.193	10.429	2.806	4.899	4.079
	[2.687]**	[2.922]**	[2.773]**	[1.064]**	[1.087]**	[1.077]**
Student has own room	-1.099	-4.127	-3.934	-3.891	-8.042	-6.003
	[2.527]	[2.748]	[2.607]	[0.901]**	[0.921]**	[0.912]**
Student has place to study	4.65	7.484	4.326	6.487	7.291	5.627
	[2.481]	[2.698]**	[2.560]	[0.930]**	[0.950]**	[0.941]**
Student has computer	22.822	15.329	13.607	21.16	19.592	18.891
	[4.391]**	[4.775]**	[4.531]**	[1.276]**	[1.304]**	[1.292]**
Student has software	-2.371	0.805	4.849	-5.807	-4.102	-3.138
	[5.338]	[5.805]	[5.509]	[1.310]**	[1.338]**	[1.326]*
Student has access to internet	10.229	9.408	11.06	10.283	12	9.665
	[5.325]	[5.791]	[5.495]*	[1.300]**	[1.328]**	[1.315]**
Student has literature books	20.014	21.262	23.088	21.194	22.922	26.685
	[4.229]**	[4.599]**	[4.364]**	[1.187]**	[1.212]**	[1.201]**
Student has textbooks	3.058	9.241	6.255	8.529	11.259	8.04
	[2.754]	[2.995]**	[2.842]*	[1.116]**	[1.140]**	[1.129]**
Student has dictionary	14.739	13.125	12.094	14.575	13.831	12.376
	[3.449]**	[3.751]**	[3.559]**	[1.579]**	[1.613]**	[1.598]**
School characteristics						
Weekly hours of class instruction	1.068	0.714	0.513	0.911	0.728	0.492
	[0.157]**	[0.171]**	[0.162]**	[0.057]**	[0.059]**	[0.058]**
School size	0.002	0.009	0.005	0.005	0.004	0.004

	[0.005]	[0.005]	[0.005]	[0.001]**	[0.001]**	[0.001]**
Instructional weeks per year	0.632	0.894	0.421	0.124	0.131	0.088
	[0.252]*	[0.275]**	[0.261]	[0.096]	[0.098]	[0.097]
Number of computers	0.084	0.159	0.091	0.144	0.128	0.135
	[0.069]	[0.075]*	[0.072]	[0.009]**	[0.009]**	[0.009]**
Standardized tests not applied	-2.041	-7.135	-4.192	1.298	0.117	1.194
	[3.025]	[3.290]*	[3.122]	[0.986]	[1.008]	[0.998]
Student learning hindered by teacher absenteeism	-3.43	-4.19	-4.3	-5.808	-7.84	-4.959
	[3.246]	[3.530]	[3.350]	[1.085]**	[1.108]**	[1.098]**
Learning hindered by student teacher ratio	-5.293	-1.822	-4.425	-1.963	-1.604	-1.254
	[3.569]	[3.881]	[3.683]	[1.081]	[1.104]	[1.094]
School has enrichment classes	-1.036	-1.684	-1.411	4.501	6.385	2.847
	[3.783]	[4.114]	[3.904]	[1.527]**	[1.560]**	[1.546]
Is not school's responsibility						
Hire teacher	-5.005	-5.993	-4.146	-1.605	-1.138	-1.834
	[3.147]	[3.423]	[3.248]	[1.339]	[1.368]	[1.355]
Fire teachers	5.711	7.03	6.958	2.415	2.11	2.829
	[3.026]	[3.291]*	[3.123]*	[1.166]*	[1.191]	[1.180]*
Define teacher salary	-5.136	-6.921	-5.824	2.183	3.109	3.569
	[6.266]	[6.814]	[6.466]	[2.016]	[2.059]	[2.040]
Increase teacher salary	-0.489	2.067	0.027	-0.327	0.026	-0.621
	[6.267]	[6.815]	[6.467]	[1.999]	[2.042]	[2.023]
Set school budget	1.077	2.132	2.06	-4.79	-1.939	-1.188
	[3.531]	[3.840]	[3.643]	[5.478]	[5.597]	[5.544]
Constant	46.244	7.045	142.065	67.102	77.244	155.235
	[21.409]*	[23.282]	[22.092]**	[9.174]**	[9.372]**	[9.283]**
Observations	2309	2309	2309	18757	18757	18757
R-squared	0.38	0.38	0.3	0.36	0.36	0.32

Standard errors in brackets
* significant at 5%; ** significant at 1%

Table 17. Percentage of the Oportunidades 2003 sample with information on available schools: by level of school.

	SEP 1997			Oportunidades 2003		
	1997			2003		
Children eligible for primary school	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
Treatment 1998	0.2	99.8	100.0	46.6	53.4	100.0
Treatment 2000	0.1	99.9	100.0	49.3	50.7	100.0
Control 2003	1.7	98.3	100.0	39.7	60.3	100.0
Total	0.4	99.6	100.0	46.2	53.8	100.0
Children eligible for secondary/middle school	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
Treatment 1998	0.3	99.7	100.0	24.0	76.0	100.0
Treatment 2000	0.1	99.9	100.0	27.5	72.5	100.0
Control 2003	1.6	98.4	100.0	42.8	57.2	100.0
Total	0.5	99.5	100.0	28.4	71.6	100.0
Children eligible for high school	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
Treatment 1998	15.0	85.0	100.0	26.1	73.9	100.0
Treatment 2000	18.4	81.6	100.0	30.8	69.2	100.0
Control 2003	21.7	78.3	100.0	67.2	32.8	100.0
Total	17.3	82.7	100.0	34.0	66.0	100.0

Source: SEP Administrative Databases, 1997 and Oportunidades (ENCEL) 2003.

Table 18 Descriptive statistics of youth taking the Woodcock Johnson tests: by current school enrollment

Variable	15 to 21 year olds					15 year olds				
	All	Not enrolled		Enrolled		Tstat	All	Not enrolled		Enrolled	
		Mean	Std. Dev	Mean	Std. Dev	Sig dif.		Mean	Std. Dev	Mean	Std. Dev
Prop. Enrolled	0.3						0.48				
Math score		31.08	6.16	34.53	6.33	20.16		30.73	5.53	33.17	6.01
Writing score		34.05	7.81	38.68	6.00	23.26		33.59	7.19	37.51	5.75
Grades of schooling		7.19	2.52	8.96	1.98	27.57		6.84	2.23	7.93	1.66
Currently working		0.47	0.50	0.05	0.22	-35.60		0.37	0.48	0.04	0.19
Currently married		0.16	0.37	0.01	0.10	-18.13		0.04	0.20	0.01	0.11
HH head schooling		2.84	2.37	3.64	2.79	11.52		2.79	2.36	3.49	2.66
Spouse schooling		2.59	2.19	3.27	2.55	10.66		2.67	2.32	3.26	2.55
Dirt floor		0.56	0.50	0.60	0.49	2.59		0.57	0.50	0.59	0.49
Drainage		0.44	0.50	0.39	0.49	-3.77		0.46	0.50	0.41	0.49
Electricity		0.77	0.42	0.83	0.37	5.44		0.74	0.44	0.84	0.37
Blender		0.35	0.48	0.38	0.49	2.80		0.33	0.47	0.36	0.48
Refrigerator		0.15	0.36	0.18	0.38	2.68		0.13	0.33	0.17	0.38
Television		0.53	0.50	0.55	0.50	1.51		0.50	0.50	0.54	0.50
VCR		0.04	0.19	0.04	0.20	0.63		0.03	0.16	0.05	0.22
Washer		0.05	0.21	0.05	0.21	-0.42		0.04	0.20	0.05	0.22
Car		0.03	0.17	0.03	0.17	-0.17		0.03	0.16	0.03	0.16
Owns land		0.60	0.49	0.63	0.48	2.36		0.56	0.50	0.61	0.49
Owns animals		0.41	0.49	0.37	0.48	-3.14		0.43	0.50	0.36	0.48

Source: ENCEL 2003

Table 19: Descriptive statistics of available schools for youth taking the Woodcock Johnson tests in 2003: By current school enrollment

School characteristics of potential schools

By year	Not enrolled		Enrolled	
Secondary school, 2003	Mean	Std. dev	Mean	Std. dev
Student/teacher ratio	20.87	8.71	20.88	8.55
Proportion of teachers with HS educ or less	10.20	17.75	12.65	22.07
Secondary with running water	0.39	0.48	0.34	0.46
Proportion of available schools telesec	0.87	0.26	0.86	0.29
Proportion of schools with library	0.49	0.50	0.55	0.49
Average computers per student	0.35	0.41	0.31	0.52
Average budget per student	837.09	2176.26	657.22	1750.09
Total students	90.14	45.49	90.92	44.88
Proportion with lab	0.29	0.44	0.34	0.46
Sec ondary school, 1997				
Student/teacher ratio	27.94	14.04	31.76	16.91
Total students	145.38	145.74	145.42	134.56
Proportion of teachers with HS educ or less	0.12	0.17	0.13	0.22
Only available school is telesecundary	0.42	0.49	0.47	0.50
Has computer room	0.03	0.15	0.03	0.13
Has laboratory	0.49	0.45	0.51	0.46
Primary school, 1997				
Student/teacher ratio	41.16	17.61	36.50	14.06
Total students	116.72	87.13	115.67	72.70
Proportion of teachers with HS educ or less	0.08	0.21	0.07	0.17
Proportion with library	0.04	0.18	0.09	0.27
Has computer room	0.19	0.37	0.24	0.41
Proportion with sufficient desks	47.44	54.63	49.09	61.42
Proportion with indigenous school	0.18	0.37	0.23	0.40

Source: ENCEL2003

Table 20. Individual, household and schooling characteristics and their association to achievement.

	By current school enrollment, Youth age 15 to 20.							
	Mathematics Score				Writing Score			
	Enrolled	All youth	Enrolled	All youth	Enrolled	All youth	Enrolled	All youth
Individual and Parental Characteristics								
Gender	1.12	0.961	1.006	0.953	-0.208	-0.417	-0.605	-0.478
(male=1)	[0.260]***	[0.154]***	[0.285]***	[0.167]***	[0.255]	[0.171]**	[0.268]**	[0.177]***
Age	-0.05	-0.053	-0.043	-0.019	-0.187	-0.236	-0.189	-0.187
	[0.107]	[0.049]	[0.119]	[0.053]	[0.105]*	[0.054]***	[0.113]*	[0.056]***
Father Schooling	0.107	0.081	0.126	0.072	0.01	0.046	-0.012	0.016
	[0.057]*	[0.036]**	[0.064]**	[0.039]*	[0.056]	[0.040]	[0.060]	[0.041]
Mother Schooling	0.076	0.173	0.093	0.165	0.162	0.248	0.168	0.231
	[0.061]	[0.039]***	[0.067]	[0.042]***	[0.060]***	[0.043]***	[0.063]***	[0.044]***
Father Age	0.01	0.009	0.022	0.017	0.022	0.035	0.027	0.039
	[0.021]	[0.012]	[0.023]	[0.013]	[0.021]	[0.013]***	[0.022]	[0.014]***
Mother Age	-0.051	-0.025	-0.059	-0.031	-0.015	-0.015	-0.024	-0.016
	[0.024]**	[0.014]*	[0.027]**	[0.015]**	[0.024]	[0.015]	[0.025]	[0.016]
Grades of Schooling	-0.635	-0.336	-0.254	0.124	-0.692	-0.393	-0.306	0.02
	[0.558]	[0.368]	[0.601]	[0.395]	[0.547]	[0.408]	[0.566]	[0.419]
Grades of Schooling	1.266	1.18	1.184	1.143	1.264	1.674	1.242	1.601
	[0.078]***	[0.033]***	[0.089]***	[0.037]***	[0.078]***	[0.037]***	[0.085]***	[0.040]***
Indigenous	-1.317	-1.336	-1.097	-1.115	-0.233	-0.29	0.148	-0.248
	[0.434]***	[0.284]***	[0.531]**	[0.342]***	[0.426]	[0.315]	[0.502]	[0.364]
Dwelling								
Dirt floor	-0.29	0.003	-0.203	-0.036	-0.577	0.04	-0.715	-0.185
	[0.306]	[0.175]	[0.339]	[0.190]	[0.300]*	[0.194]	[0.319]**	[0.202]
Electricity	0.066	0.141	-0.025	-0.05	0.044	0.58	-0.184	0.317
	[0.387]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.404]	[0.000]
Number of rooms	0.003	-0.016	0.004	-0.015	0.004	-0.004	0.001	-0.009
	[0.028]	[0.013]	[0.029]	[0.014]	[0.028]	[0.015]	[0.027]	[0.014]
Access to water	0.45	0.251	0.467	0.116	0.256	0.176	0.079	-0.187
	[0.288]	[0.165]	[0.338]	[0.189]	[0.282]	[0.183]	[0.318]	[0.200]
Blender	0.375	0.22	0.664	0.507	0.216	-0.046	0.504	0.195
	[0.323]	[0.197]	[0.356]*	[0.212]**	[0.316]	[0.218]	[0.335]	[0.225]
Refrigerator	0.557	0.552	0.892	0.642	-0.308	0.388	0.048	0.407
	[0.402]	[0.245]**	[0.440]**	[0.263]**	[0.393]	[0.271]	[0.414]	[0.279]
Television	0.176	0.26	-0.094	0.112	0.082	0.171	-0.114	0.075
	[0.312]	[0.186]	[0.342]	[0.202]	[0.306]	[0.207]	[0.322]	[0.215]
Washer	-0.237	0.17	-0.65	0.271	0.156	-0.102	0.117	-0.095
	[0.696]	[0.394]	[0.823]	[0.445]	[0.682]	[0.437]	[0.773]	[0.473]
Car	1.322	0.675	1.049	0.399	0.834	0.655	0.906	0.706
	[0.822]	[0.465]	[0.888]	[0.476]	[0.812]	[0.516]	[0.844]	[0.506]

Available secondary school characteristics in 2003				
Student-teacher ratio	0.014	0.007	0.003	-0.007
	[0.020]	[0.011]	[0.018]	[0.012]
Prop. of teacher with low level of education	-0.01	-0.005	-0.014	-0.013
	[0.008]	[0.004]	[0.007]*	[0.004]***
School has bathroom	0.053	-0.101	0.503	0.029
	[0.396]	[0.230]	[0.374]	[0.245]
School is telesecondary	1.279	0.271	0.97	-0.308
	[0.613]**	[0.343]	[0.577]*	[0.364]
School has library	-0.228	-0.286	0.162	-0.123
	[0.435]	[0.254]	[0.410]	[0.269]
Computers per student	0.181	-0.095	0.478	-0.052
	[0.368]	[0.249]	[0.347]	[0.264]
Budget per student	0.0000	0	0	0
(*1000)	[0.000]*	[0.000]	[0.000]	[0.000]
Number of students	0.001	0	0.001	0.001
	[0.004]	[0.002]	[0.003]	[0.002]
School has laboratory	-0.263	0.222	-0.167	0.27
	[0.404]	[0.237]	[0.382]	[0.252]
Available secondary school characteristics in 1997				
Student teacher ratio	0	-0.005	0.009	0.004
	[0.011]	[0.006]	[0.010]	[0.007]
Number of students	0	0	0.003	0.001
	[0.002]	[0.001]	[0.001]*	[0.001]
Proportion of teachers with	1.214	1.471	0.259	0.953
low level of education	[0.683]*	[0.447]***	[0.645]	[0.475]**
Only telesecondary school	-0.808	-0.57	-0.464	-0.53
Available	[0.411]**	[0.231]**	[0.388]	[0.245]**
Has computer room	0.782	0.634	-0.324	-1.372
	[1.646]	[0.780]	[1.547]	[0.827]*
Has laboratory	0.209	-0.201	-0.104	-0.233
	[0.457]	[0.248]	[0.431]	[0.264]
Available primary school characteristics in 1997				
Student teacher ratio	0.023	0.011	0.019	0.007
	[0.012]*	[0.006]*	[0.012]*	[0.006]
Number of students	-0.005	-0.003	-0.002	-0.004
	[0.003]*	[0.002]*	[0.003]	[0.002]**
Proportion of teachers with	-0.195	-0.388	0.777	0.291
low level of education	[0.894]	[0.496]	[0.841]	[0.525]
Has library	-0.462	-1.042	-1.158	-1.128
	[0.632]	[0.399]***	[0.605]*	[0.426]***
Has computer room	0.293	0.42	-0.507	-0.746
	[1.706]	[1.030]	[1.606]	[1.092]
Has sufficient desks	0.008	0.005	0.003	0.006
	[0.004]**	[0.002]**	[0.004]	[0.002]**
Primary is indigenous	-0.201	-0.676	0.549	1.088

			[1.846]	[1.116]			[1.739]	[1.183]
Observations	1858	5204	1562	4340	1848	5166	1553	4312
R-squared	0.24	0.28	0.25	0.27	0.21	0.36	0.25	0.36

Source: ENCEL2003 Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Note: Regressions also include demographic variables (number of children and female and male adult members), and locality level variable (including daily salary, distance to secondary school, telephone available in community)

Table 21: Gender and indigenous interactions with school characteristics: Community FE				
By current school enrollment, Youth age 15 to 20				
	Math		Writing	
	Enrolled	All youth	Enrolled	All youth
Indigenous interactions with school characteristics				
Student-teacher ratio	-0.032	-0.013	0.027	0.033
	[0.038]	[0.026]	[0.038]	[0.028]
Proportion of teachers	0.005	-0.004	-0.022	-0.015
with low level of education	[0.015]	[0.009]	[0.015]	[0.010]
School has internal bathroom	0.083	-0.398	-0.916	-0.343
	[0.798]	[0.536]	[0.791]	[0.586]
School is tele-secundary	-1.341	-0.701	-0.09	0.014
	[1.391]	[0.829]	[1.376]	[0.905]
School has library	-1.1	-0.946	0.175	-0.251
	[0.889]	[0.630]	[0.880]	[0.687]
Computers per student	1.621	0.818	1.55	0.293
	[1.169]	[0.746]	[1.155]	[0.815]
Budget per student	-0.003	-0.002	-0.002	-0.001
(*1000)	[0.002]*	[0.001]*	[0.002]	[0.001]
Total number of students	0.003	-0.001	0.008	0.004
	[0.007]	[0.005]	[0.007]	[0.005]
School has lab	-1.21	-1.062	-2.36	-1.267
	[0.772]	[0.522]**	[0.766]***	[0.571]**
Gender interactions with school characteristics				
Student-teacher ratio	-0.043	-0.016	-0.004	-0.026
	[0.032]	[0.018]	[0.032]	[0.020]
Proportion of teachers	-0.001	0.011	-0.006	-0.001
with low level of education	[0.013]	[0.007]	[0.012]	[0.008]
School has internal bathroom	-0.164	-0.37	0.202	0.354
	[0.641]	[0.393]	[0.635]	[0.429]
School is tele-secundary	1.004	1.197	2.164	1.033
	[1.041]	[0.625]*	[1.031]**	[0.683]
School has library	-0.287	-0.4	1.064	0.808
	[0.722]	[0.439]	[0.715]	[0.480]*
Computers per student	-0.131	0.741	0.141	0.748
	[0.696]	[0.462]	[0.688]	[0.504]
Budget per student	0	0	0	0
(*1000)	[0.000]	[0.000]	[0.000]	[0.000]
Total number of students	0.007	0.008	-0.002	0.003
	[0.006]	[0.004]**	[0.006]	[0.004]
School has lab	0.157	-0.58	0.292	-0.176
	[0.640]	[0.395]	[0.634]	[0.431]
Observations	1472	3803	1464	3781
R-squared	0.25	0.27	0.23	0.34
Standard errors in brackets				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Figure 1a. Distribution of achievement scores: reading

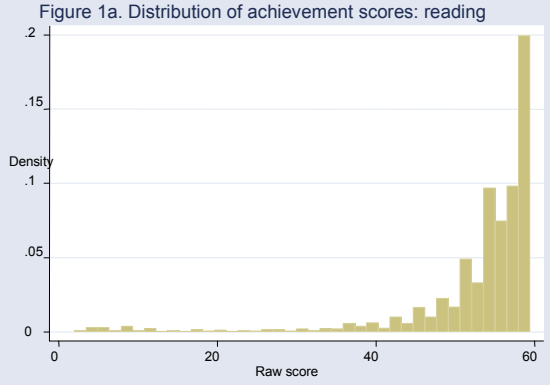


Figure 1b. Distribution of achievement scores: math

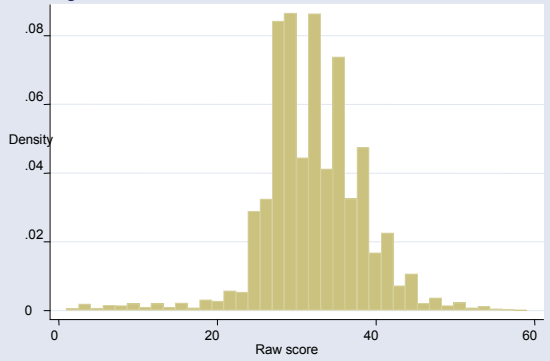
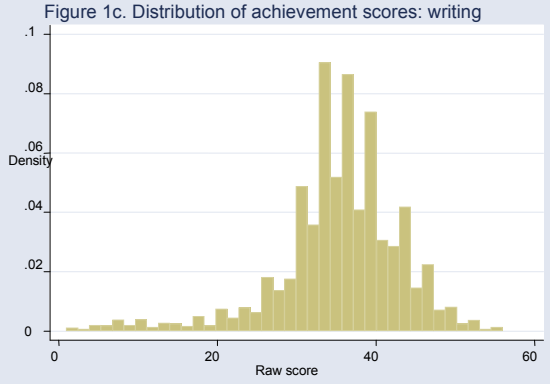


Figure 1c. Distribution of achievement scores: writing



Appendix Table 1. Selected schools characteristics, *Oportunidades* evaluation sample and nationally representative ENNVIH. Urban/Rural.

Primary schools		**ENCEL2003**	**ENNIVH2002**	
		Total	Rural	Urban
Observations		251	508	135
Principal grades of schooling	*Mean*	15.9	15.8	16.0
	S.D.	1.5	0.9	1.0
Principal salary monthly average	*Mean*	5711.1	6712.4	7896.7
	S.D.	5169.6	2448.9	3668.8
# of Teachers	*Mean*	3.73	8.7	13.3
	S.D.	4.15	4.9	7.1
Average of teachers attend	*Mean*	96.4	96.5	95.3
	S.D.	11.58	7.8	10.6
Low educational level (teachers)*	*Mean*	14.16	5.3	4.3
	S.D.	30.77	13.4	13.2
# of Students	*Mean*	75.61	234.0	391.8
	S.D.	62.56	163.37	222.12
% class in indigenous language	*Mean*	1.6	3.0	0.0
	S.D.	12.52	17.0	0.0
% class in indigenous language and spanish	*Mean*	16.3	3.7	1.0
	S.D.	37.0	19.0	9.9
Student/teacher ratio	*Mean*	24.1	25.9	29.8
	S.D.	10.8	8.1	9.5
Budget per student	*Mean*	349.7	149.6	623.5
	S.D.	1027.1	472.9	1976.6
# of Classrooms	*Mean*	4.07	9.9	14.6
	S.D.	2.73	5.3	6.6
Bathroom with running water	*Mean*	34.26	71.6	73.3
	S.D.	47.55	45.2	44.3
Library (0-1)	*Mean*	60.2	23.0	39.6
	S.D.	49.1	42.2	49.0
Education (tele type) (0-1)	*Mean*	4.4	2.3	4.7
	S.D.	20.51	15.0	21.3
Desks for all the students (0-1)	*Mean*	92.43	95.6	96.1
	S.D.	26.5	20.7	19.5
Computers (0-1)	*Mean*	17.93	21.5	45.6
	S.D.	38.43	41.2	49.9
Number of computers	*Mean*	0.99	1.4	6.9
	S.D.	3.98	3.5	12.2

Source: ENCEL2003, ENNVIH2002

Appendix Table 2. Selected schools characteristics, *Oportunidades* evaluation sample and nationally representative ENNVIH. Urban/Rural.

Middle School	**ENCEL2003**	**ENNIVH2002**	
	Total	Rurales	Urbanas

Observations		421	305	104
Principal grades of schooling	*Mean*	16.8	16.3	16.6
	S.D.	1.0	0.8	1.0
Principal salary monthly average	*Mean*	8645.2	10681.1	12917.5
	S.D.	5463	4721.5	6530.1
# of Teachers	*Mean*	6.8	16.8	33.5
	S.D.	7.34	14.6	32.9
Average of teachers attend	*Mean*	95.0	92.9	93.3
	S.D.	14.6	14.2	7.0
Low educational level (teachers)*	*Mean*	12.0	9.4	8.6
	S.D.	25.22	16.9	15.5
# of Students	*Mean*	89.6	322.8	617.3
	S.D.	56.91	337.0	539.4
Student/teacher ratio	*Mean*	21.0	18.8	20.7
	S.D.	10.8	8.8	10.5
Budget per student	*Mean*	547.9	265.6	1008.5
	S.D.	1602.6	756.5	2530.0
# of Classrooms	*Mean*	5.4	11.8	19.7
	S.D.	4.15	7.9	9.4
Bathroom with running water	*Mean*	52.5	76.9	77.8
	S.D.	49.99	42.34	41.62
Library (0-1)	*Mean*	74.8	57.7	72.1
	S.D.	43.45	49.64	44.91
Tele-secondary schools	*Mean*	82.0	30.0	20.5
	S.D.	38.51	46.16	40.43
Desks for all the students (0-1)	*Mean*	86.2	89.4	91.5
	S.D.	34.51	30.9	27.97
Computers (0-1)	*Mean*	62.0	64.4	82.6
	S.D.	48.6	48.1	38.0
Number of computers	*Mean*	3.5	9.1	18.0
	S.D.	5.3	11.68	17.08

Source: ENCEL2003, ENNVIH2002

Appendix Table 3: Selected schools characteristics, *Oportunidades* evaluation sample and nationally representative ENNVIH. Urban/Rural.

High School		**ENCEL2003**	**ENNIVH2002**	
		Total	Rurales	Urbanas
Observations		225	185	40
Principal grades of schooling	*Mean*	16.5	16.4	16.6
	S.D.	0.9	0.8	1.0

Principal salary monthly average	*Mean*	7256.1	11767.2	11849.3
	S.D.	4814.3	5662.2	6013.4
# of Teachers	*Mean*	13.7	29.8	43.8
	S.D.	13.9	22.4	44.6
Average of teachers attend	*Mean*	94.2	92.8	92.9
	S.D.	13.9	9.4	3.5
Low educational level (teachers)*	*Mean*	6.41	6.0	9.8
	S.D.	17.7	16.6	15.1
# of Students	*Mean*	113.2	654.27	793.71
	S.D.	58.9	716.0	962.4
Student/teacher ratio	*Mean*	18.5	21.6	19.5
	S.D.	14.3	11.1	12.0
Budget per student	*Mean*	1151.8	429.5	1947.1
	S.D.	2783.0	370.7	2691.7
# of Classrooms	*Mean*	7.3	17.2	21.6
	S.D.	5.6	11.9	14.1
Bathroom with running water	*Mean*	62.2	72.5	80.5
	S.D.	48.6	45.22	39.7
Library (0-1)	*Mean*	64.4	75.0	85.4
	S.D.	47.97	43.85	35.4
Tele-bachillerato schools	*Mean*	20.4	8.3	11.0
	S.D.	40.42	28.03	31.36
Desks for all the students (0-1)	*Mean*	88.4	100.0	96.8
	S.D.	32.04	0	17.76
Computers (0-1)	*Mean*	77.8	87.5	91.8
	S.D.	41.7	33.4	27.9
Number of computers	*Mean*	14.8	53.8	50.7
	S.D.	18.4	154.31	143.6

Source: ENCEL2003, ENNVIH2002

References

Alderman, Harold, Peter Orazem and Elizabeth M. Paterno. 2001,"School Quality, School Cost and the Public/private School Choices of Low-Income Households in Pakistan." *Journal of Human Resources* 36(2):304-326.

Alvarez, Jesus, Vicente Garcia Moreno, Harry Anthony Patrinos. 2007. Institutional Effects as Determinants of Learning Outcomes: Exploring State Variations in Mexico. Mimeo.

Banerjee, Abhijit, Shawn Cole, Esther Duflo and Leigh Linden, 2007, "Remedying Education: Evidence from Two Randomized Experiments in India," *Quarterly Journal of Economics*.

Behrman, Jere R., 2008, "Investment in Education – Inputs and Incentives" in Dani Rodrik and Mark R. Rosenzweig, eds,, *Handbook of Development Economics: The Economics of Development Policy* Vol. 5 Amsterdam: North-Holland Publishing Co.

Behrman, Jere R. and Nancy Birdsall, 1983, "The Quality of Schooling: Quantity Alone is Misleading" *American Economic Review* 73:928-946.

Behrman, Jere R., Susan W. Parker, and Petra E. Todd,. 2007, "The Impacts of Obligatory Secondary School Education in Mexico," Mexico City, Mexico: CIDE, Mimeo.

Behrman, Jere R., Susan W. Parker and Petra E. Todd, 2008, "Medium-Term Impacts of the Oportunidades Conditional Cash Transfer Program on Rural Youth in Mexico" in S. Klasen and F. Nowak-Lehmann, (eds.) Poverty, Inequality, and Policy in Latin America. Cambridge, MA: MIT Press. Forthcoming.

Behrman Jere R., Susan W. Parker, Petra E. Todd and Luciana Gandini, 2006, "Impacts of Oportunidades and Available School Supply in Rural Communities." Mexico City: CIDE, Mimeo.

Behrman, Jere R., Piyali Sengupta and Petra Todd, 2005, "Progressing through PROGRESA: An Impact Assessment of Mexico's School Subsidy Experiment," *Economic Development and Cultural Change* 54:1 (October 2005) 237-275.]

Behrman, Jere R., Mark R. Rosenzweig and Paul Taubman, 1996, "College Choice and Wages: Estimates Using Data on Female Twins," *Review of Economics and Statistics* 73(4):672-685.

Betts, J.R., 1995, "Does School Quality Matter? Evidence from the National Longitudinal Survey of Youth," *Review of Economics and Statistics* 77(2):231-250.

Card, David and Allan B. Krueger, 1992a, "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States," *Journal of Political Economy* 100(1):1-40.

Card, David and Allan B. Krueger, 1992b, "School Quality and Black-White Relative Earnings: A Direct Assessment," *Quarterly Journal of Economics* 107(1):151-200.

Card, David and Allan B. Krueger, 1996, "Labor Market Effects of School Quality: Theory and Evidence." Working Paper 357. Industrial Relations Section. Princeton University.

Coady, David and Susan W. Parker, 2004, "A Cost-Effectiveness Analysis of Demand- and Supply-Side Education Interventions: The Case of PROGRESA in Mexico," *Review of Development Economics* [Revision of Discussion Paper No. 128. Washington, DC: Food Consumption Nutrition Division, International Food Policy Research Institute; 2002. Available from: URL:http://www.ifpri.org/divs/fcnd/fcnpubs.htm]

Cole, Shawn, Esther Duflo, Leigh Linden, 2004, "Remedying Education: Evidence from Two Randomized Experiments in India," Cambridge, MA: M.I.T., Mimeo.

Duflo, Esther and Rema Hanna, 2005, "Monitoring Works: Getting Teachers to Come to School," Cambridge, MA: M.I.T., Mimeo.

Gertler, Paul, Harry Patrinos, and Marta Rubio-Codina, 2006, "Empowering parents to improve education : evidence from rural Mexico," Policy Research Working Paper Series 3935, The World Bank.

Ghuman, Sharons, Jere R. Behrman, Soccoro Gultano and Elizabeth M. King, 2006, "Children's Nutrition, School Quality and Primary School Enrollment in the Philippines," New York, New York: Population Council, Mimeo.

Glewwe, Paul, 2002, "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes," *Journal of Economic Literature* 40:2, 436-482.

Glewwe, Paul, Michael Kremer, and Sylvie Moulin, 2007, "Many Children Left Behind? Textbooks and Test Scores in Kenya," Cambridge, MA: MIT Poverty Action Lab Paper No. 44

Grogger, Jeoffrey, 1996, "School Expenditures and Post-Schooling Earnings: Evidence from High School and Beyond," *Review of Economics and Statistics* 78(4):628-637.

Hanushek, Eric, 1986, "The Economics of Schooling: Production and Efficiency in Public Schools," *Journal of Economic Literature* 49:3, 1141-1177.

Hanushek, Eric A., Victor Lavy and Kohtaro Hitomi, 2006, "Do Students Care about School Quality? Determinants of Dropout Behavior in Developing Countries," Cambridge, MA: National Bureau of Economic Research Working Paper 12737.

Hanushek, Eric A. and Ludger Wößmann, 2006, "Does Educational Tracking Affect Performance and Inequality? Differences-in-Differences Evidence across Countries," *Economic Journal* 116 (510): C63

Hanushek, Eric A. and Ludger Wößmann, 2007, Education Quality and Economic Growth. The World Bank.

Parker Susan W,, Luis Rubalcava and Graciela M. Teruel "Evaluating Conditional Schooling Health Transfer Programs (PROGRESA Program)" *Handbook of Development Economics*, Volume 4, edited by T. Paul Schultz. Forthcoming.

Parker, Susan W., Luis Rubalcava and Graciela M. Teruel,2005, "Schooling Inequality and Language Barriers", *Economic Development and Cultural Change* 55:1, 71-94.

Rivkin, Steven G., Eric A. Hanushek, and John F. Kain, 2005, "Teachers, Schools, and Academic Achievement," *Econometrica* 73:2

Santibanez Lucrecia, Jose Felipe Martinez, Ashlesha Datar, Patrick J. McEwan, Claude Messan Setodji, Ricardo Basurto-Davila, 2007, "Breaking Ground. Analysis of the Assessment System and Impact of Mexico's Teacher Incentive Program "Carrera Magisterial"," The Rand Corporation**.**

Skoufias, Emmanuel and Joseph Shapiro, , 2006, "Evaluating the Impact of Mexico's Quality Schools Program: The Pitfalls of Using Nonexperimental Data" World Bank Policy Research Working Paper No. 4036 Available at SSRN: http://ssrn.com/abstract=937531

Skoufias, Emanuel, 2001, "PROGRESA and Its Impacts on the Human Capital and Welfare of Households in Rural Mexico: A Synthesis of the Results of an Evaluation by IFPRI," Washington, DC: International Food Policy Research Institute, mimeo.

Urquiola, Miguel, 2006, "Identifying Class Size Effects in Developing Countries: Evidence from Rural Bolivia," *Review of Economics and Statistics*, 88(1).

The World Bank, 2005, "Determinants of Learning Policy Note," Washington, DC: World Bank.