WPS3935-IE

IMPACT EVALUATION SERIES NO. 4

EMPOWERING PARENTS TO IMPROVE EDUCATION: EVIDENCE FROM RURAL MEXICO

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Abstract: Mexico's compensatory education program provides extra resources to primary schools that enroll disadvantaged students in highly disadvantaged rural communities. One of the most important components of the program is the school-based management intervention known as AGEs. The impact of the AGEs is assessed on intermediate school quality indicators (failure, repetition and dropout), controlling for the presence of the conditional cash transfer program. Results prove that school-based management is an effective measure for improving outcomes, based on an over time difference-in-difference evaluation. Complementary qualitative evidence corroborates the veracity of such findings.

JEL Codes: I20, I21, I28

Keywords: School-based management, impact evaluation, Mexico

World Bank Policy Research Working Paper 3935, June 2006

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We thank Halsey Rogers and participants at the World Bank AAA decision meetings for useful comments and suggestions. For providing data and institutional knowledge, we are grateful to Felipe Cuellar, Narciso Esquivel, José Carlos Flores, and Miguel Ángel Vargas at CONAFE; Alejandra Macías and Iliana Yaschine at OPORTUNIDADES; and Edgar Andrade at INEE.

1 Introduction

Starting in the United States, the United Kingdom, Australia and Canada, the decentralization of administrative responsibilities and levels of authority to the school level is a form of educational reform that has been gaining increasing support in developing countries. School-based management (SBM) programs – also known as school autonomy reform programs or school improvement programs – are currently being implemented in a number of countries, including Hong Kong (China), Indonesia, El Salvador, Nicaragua, Kenya, Kyrgyz Republic, Nepal, Paraguay and Mexico. They consist in shifting responsibility and decision-making to school actors: principals, teachers, parents, sometimes even students, and possibly other school community members (school councils).

The usual argument supporting the implementation of SBM programs is that they may be a low cost way of improving the efficiency of public spending on education to improve learning outcomes. The argument is analogous to the basic ideas favoring the decentralization of public services. Decentralization provides a more efficient and better tailored delivery of services given that it minimizes information asymmetries concerning tastes, improves the incentives scheme to provide the good, and reduces the top-down decision-making structure, thus increasing political accountability. Similarly, SBM initiatives give power to the end users of the service. This "voice" of the local agents creates a "pressure" to influence and alter school management and change the form of decision-making to favor students. This eventually leads to a better and more conducive learning environment for the students and improves learning outcomes.

Analogically, empowerment of the local agents might entail the same deficiencies in service delivery as those associated with the decentralization of public services: degradation in service provision. Resources might be misallocated given the increased scope for capture of resources by the local agents, or because they lack the technical abilities to provide the service or fail to internalize the positive externalities derived from its provision (Galiani et al 2005). It is thus crucial for the government to design incentives systems that will minimize the potential for conflicting interests and opportunistic behavior once decentralization is in place. This is why SBM programs empower school-level actors conditional upon conformance to a set of centrally determined operational policies. Moreover, there is substantial variation across interventions both in terms of the identity of the empowered agents and the level of shifted responsibility.

In 1992, the Mexican Government began a process of decentralization of educational services from the federal to the state level, the "National Agreement for the Modernization of Basic Education". A number of reform measures at the central and state levels were implemented. Among others, these included the advancement of legally supported parental participation in schools and the development of innovative supply-side interventions to promote education. Some of these initiatives, like the Quality Schools Program *(Programa Escuelas de Calidad*, PEC) launched in 2001, started as pure SBM interventions. Others, like the Compensatory Education Program –initiated in 1992, combined an SBM component with other more common input provision interventions. The SBM component of the Compensatory Education Program –the Support to School Management (*Apoyo a la Gestión Escolar*) or AGEs, started only in 1996 and consists of monetary support and training (*Capacitación a la Gestión Escolar*, CAPAGES) to Parent Associations (*Asociaciones de Padres de Familia*, APFs). The APF can spend the money on the educational purpose of their choosing although spending is limited to small civil works and infrastructure improvements. Despite being a limited version of SBM, the AGEs represent a significant advance in the Mexican education system, where parent associations have tended to play a minor role in school decision-making. AGEs increase school autonomy through improved mechanisms for participation of directors, teachers and parents' associations in the management of the schools. In 2005 more than 45 percent of primary schools in Mexico had an AGE.

In this paper, we examine the impacts of the AGEs on intermediate school quality indicators (grade failure, grade repetition and intra-year dropout) on the sample of rural general primary schools that received AGEs support from 1998 onwards. These schools are located in highly disadvantaged areas and present educational outcomes below the national average. We exploit the gradual phasing-in of the AGEs intervention over time to identify difference-in-difference average treatment estimate effects. Results prove that the AGEs are an effective measure for improving outcomes, grade failure and grade repetition in particular, even after controlling for the presence of other educational interventions. Qualitative work consisting of discussions with parents, teachers and school directors in beneficiary and non-beneficiary schools corroborate the quantitative findings.

The remainder of the paper is organized as follows. The next section reviews the existing literature on SBM. Section 3 describes the Mexican Compensatory Program and its SBM component, the AGEs, in greater detail. In Section 4 we discuss the data and expose the identification strategy used. Results and a discussion of potential biases are provided in sections 5

and 6. Section 7 provides a summary of the qualitative interviews assessment. Section 8 concludes.

2. School-Based Management (SBM): A Deeper Look

SBM is the decentralization of levels of authority to the school level. Responsibility and decision-making over school operations is transferred to school-level actors, which in turn have to conform to, or operate within a set of centrally determined policies. SBM programs can take on many different forms, both in terms of who has the power to make decisions as well as the degree of decision-making devolved to the school level. While some programs transfer authority to principals or teachers only, others encourage or mandate parental and community participation, often in school committees (sometimes known as school councils). In general, SBM programs transfer authority over one or more of the following activities: budget allocation, hiring and firing teachers and other school staff, curriculum development, textbook and other educational material procurement, infrastructure improvement, setting the school calendar to better meet the specific needs of the local community, and monitoring and evaluation of teacher performance and student learning outcomes. SBM also includes school-development plans, school grants, and sometimes information dissemination of results (otherwise known as "report cards").

The goals of programs vary, though they typically involve: (i) increasing the participation of parents and communities in schools, (ii) empowering principals and teachers, (iii) building local level capacity, and, perhaps most importantly, (iv) improving quality and efficiency of schooling, thus raising student achievement levels. Advocates of SBM assert that it should improve educational outcomes for a number of reasons. First, it improves accountability of principals and teachers to students, parents and teachers. Accountability mechanisms that put people at the center of service provision can go a long way in making services work and improving outcomes by facilitating participation in service delivery. Second, it allows local decision-makers to determine the appropriate mix of inputs and education policies adapted to local realities and needs.

The implied benefits of such a system are tremendous with only marginal costs. Among the benefits are included: increased resources from parents, such as time and in-kind contributions; more effective use of resources since the site-based actors know more about where the real need of resources exists; higher school "quality" as a result of efficient use of resources, and more welcoming school climate since most of the community is involved in management;

and increased performance of the students as a result of reduced repetition and dropout rates and eventually improved learning outcomes. The supposed costs are: payments for school committees' time (sometimes); extra resources to be managed at the school level, which also creates extra work burden for teachers and principals; and parents' and teachers' time for administration, which might be a significant cost for low-income parents who might have to forego some wage-earning work time to be involved in school committees.

There are a variety of programs under the rubric of SBM, and the literature is voluminous. Yet rigorous impact evaluations are rare. Summers and Johnson (1994) review the evidence on the effects of SBM in the United States. In developing countries, evaluations of SBM programs offer mixed evidence of impacts. El Salvador's EDUCO (*Educación con participación de la comunidad*) program gives parent associations the responsibility for hiring, monitoring and dismissing teachers. In addition, the parents are also trained in school management, as well as on how to help their children with school work. Despite rapid expansion of EDUCO schools, education quality was comparable to traditional schools. In fact, parental participation was considered the principal reason for EDUCO's success (Jimenez and Sawada 1999, 2003). Nicaragua's Autonomous School Program gives school-site councils –comprised of teachers, students and a voting majority of parents– authority to determine how 100 percent of school resources are allocated and to hire and fire principals, a privilege that few other school councils in Latin America enjoy. Two evaluations found that the number of decisions made at the school level contributed to better test scores (King and Ozler 1998; Ozler 2001).

In the case of Mexico, only one evaluation exists on the urban pilot of the PEC (Quality Schools Program) intervention. Using a panel of 74,700 schools and propensity score matching to create a control group, Shapiro and Skoufias (2005) used difference-in-differences models to estimate the impact of PEC on dropout, repetition and failure rates. They found that participation in PEC significantly decreases dropout rates by 0.22 percentage points, failure rates by 0.20 percentage points and repetition rates by 0.28 percentage points. These estimated impacts were not sensitive to whether participation in PEC was measured as receiving PEC grants for all or for any one of the three school years covered by the study.

3. The Mexican Compensatory Programs and the AGEs Component

In the early 1990s the National Council of Education Promotion (*Consejo Nacional de Fomento Educativo*, CONAFE), a division of the Mexican Secretariat of Public Education

(*Secretaría de Educación Pública*, SEP) started to implement the Compensatory Programs on behalf of SEP.[1] The Compensatory Programs aim to increase the supply and improve the quality of education in schools with the lowest educational performance levels in highly disadvantaged communities. The intervention channels extra monetary and in-kind resources to the state governments. It now serves about five million students in initial, preschool and primary education, and about 300,000 students in *telesecundaria* education (lower secondary schooling imparted by satellite and television), in 29,534 schools in marginalized rural and urban areas in all 31 states in Mexico.

Since its beginning, CONAFE has received substantial funding from international agencies to help finance the compensatory program. The World Bank's Basic Education Development Loan (PAREIB, 1998-2006) provides a nominal total of $625 million to support the intervention. Previously, the World Bank had already operated several similar loans between 1991 and 1998 and the Inter-American Development Bank had operated the PIARE intervention (1995-2000). These loans provided a nominal total of nearly $2 billion dollars between 1991 and 2003[2]. CONAFE's real costs, despite having grown in the last decade, now are just over $50 per student per year on average, an extremely low cost compared to a typical cost of $527 per *telesecundaria* student and $477 per general middle school student (Shapiro and Trevino 2004).

3.1 Evolution of the Compensatory Programs: Targeting and Phasing-in

Since their start in 1991, the Compensatory Programs have substantially evolved and expanded their coverage, both to new geographical areas and to new school levels. From 1991-1996, the Program to Abate Educational Lag (*Programa para Abatir el Rezago Educativo*, PARE) operated exclusively in all indigenous and general primary schools in rural localities in the four states with the highest incidence of poverty: Oaxaca, Guerrero, Chiapas and Hidalgo. In 1993, the Program to Abate Basic Education Lag (*Programa para Abatir el Rezago en Educación Básica*, PAREB) included all general and indigenous primary schools in the poorest and educationally worst performing municipalities in the next ten poorest states, according to the National Council Population's (*Consejo Nacional de Población*, CONAPO) marginality index. Simultaneously, the Project for the Development of Initial Education (*Proyecto para el*

[1] CONAFE also operates a community education program that leads instruction in highly isolated areas with very few children in school age. Since we only examine CONAFE's Compensatory Programs, subsequent mention of CONAFE will exclusively refer this intervention unless otherwise noted.

[2] Costs are expressed in 2002 US dollars, using an exchange rate of 9.74 Mexican pesos to the dollar.

Desarrollo de la Educación Inicial, PRODEI) started to support initial education in the 14 states attended by PAREB.

In 1995 the Integrated Program to Abate Educational Lag (*Programa Integral para Abatir el Rezago Educativo*, PIARE) consolidated the actions enhanced by both initial and basic education compensatory programs. It extended coverage to all indigenous primary schools and general primary schools with first year repetition rates above the state average in the next nine poorest states. In 1998, the PIARE was extended to the eight remaining Mexican states (PIARE-8). Worst performing schools in the PIARE-8 states were selected according to a targeting index constructed by CONAFE on the basis of: (i) CONAPO's community marginality index; (ii) teacher-student ratios; (iii) the number of students per school; and (iv) educational outcomes. All general primary schools falling in the third and fourth quartiles of the targeting index were selected as beneficiary schools. As in previous stages, all indigenous primary schools were automatically attended.

Finally, in 1998 and in order to integrate all previous Compensatory Programs and to provide integrated and continuous educational support to all children ages 0 to 14, the Program to Abate Educational Lag in Initial and Basic Education (*Programa para Abatir el Rezago Educativo en Educación Inicial y Básica*, PAREIB) was established. PAREIB targets for the first time pre-schools, general and technical junior high schools, and *telesecundarias.* It also extended its coverage to marginalized semi-urban and urban areas. General primary schools were targeted using the same criteria applied to target PIARE-8 schools. These were also extended to pre-school and junior high schools.[3] Schools offering any form of indigenous or community education were automatically targeted. The PAREIB is the only Compensatory Education Program currently functioning.

3.2 Components of the Compensatory Programs

CONAFE's compensatory programs do not operate schools, but rather give extra support to all indigenous schools, and targeted primary and secondary schools. By design, the interventions and supports given have varied across school types and along the different program phases. Moreover, the final decision to allocate resources depends on the state government and is based on the school needs and on the availability of resources in each state. As a consequence,

[3] Section 4.2 further details the targeting methodology applied to select beneficiary schools.

there is a substantial variation in the type, number and timing of interventions each attended school receives.

By 1996 the number of interventions was reorganized and limited to the improvement and/or building of school infrastructure facilities, the provision of school equipment and supplies, pedagogical training for teachers, institutional strengthening, incentives to monitors (school supervisors), and performance based monetary incentives to teachers in multiple grade schools and in schools with more than six teachers. Starting in 1996, CONAFE introduced the support to school management component, the AGEs, which is the focus of this study. The AGEs financial support consists of quarterly transfers to APF school accounts, varying from $500 to $700 per year according to the size of the school. The use of funds is specified in the Operational Manual of the project and is subject to annual financial audits for a random sample of schools. Among other things, the parents are not allowed to spend money on wages and salaries for teachers. Most of the money goes to infrastructure improvements and small civil works. The intervention was complemented, starting in 2003, with a training component (CAPAGEs) aimed at guiding parents in the management of the school funds transferred through the AGES. The CAPAGEs also provides parents with participatory skills to increase their involvement in school activities, and with information on achievement of students and ways in which parents can help improve their learning.[4]

3.3 Existing Evidence on the Impact of Compensatory Education

Results from previous Government supported evaluations show a significant impact of CONAFE in lowering the probability that school average repetition rates increase between 1998-99 and 2001-02 in rural primary schools (Benemérita Universidad Autónoma de Puebla 2004). External evaluations show significant increases in Spanish test scores for indigenous students (López-Acevedo 2002). The author compares CONAFE (PARE) -supported schools between the school years 1992-93 and 1994-95 with comparable schools in the state of Michoacán that were not receiving the support at the time. The evaluation concluded that the PARE program could result in increases of 45 to 90 percent on indigenous student performance, and of the order of 19 to 38 percent on aggregate rural school performance. A complementary evaluation by Paqueo and López-Acevedo (2003) used the same methodology to study the differential effects of CONAFE's

[4] The AGEs component does not operate in *telesecundarias*. Although CONAFE is supposed to provide audiovisual materials and infrastructure improvements to all *telesecundaria* schools; in practice, the intervention has so far been limited to the delivery of one or two computers per intervened *telesecundaria.*

PARE intervention on sixth graders' Spanish test scores between the poorest and the least poor children in indigenous and rural schools. The authors found that the poorest students benefited less from the intervention than the not so poor students. These findings raise the question of whether the very poor are able to fully take advantage of new opportunities in the form of school quality improvements as their ability might be compromised by malnutrition and lack of brain stimulation at early life stages.

More recently, Shapiro and Moreno (2004) conducted an impact evaluation of the PAREIB intervention on Spanish and math test scores at both the primary and junior-high school levels. Using propensity score matching techniques on student background data, the authors find that CONAFE is effective in improving primary school math learning and junior-high school Spanish learning. CONAFE also seems to lower primary school repetition and failure rates. They conclude that while CONAFE seems to improve short term educational outcomes the improvement varies by subject of instruction and student demographics.

Evaluations of specific components in CONAFE-implemented compensatory program do not yet exist.[5] This paper, while contributing to the nascent literature on the effects of SBM interventions on educational outcomes, also fills the existing gap in the evaluation of CONAFE's Compensatory Programs.

4. Estimation and Identification

Our objective is to estimate the impacts of the SBM support component of the Compensatory Education Program – the so-called AGEs – on intermediate indicators of student performance and school quality, namely failure, repetition and (intra-year) dropout rates.[6] We specifically focus on the impact of the AGEs support between 1998 and 2001. These years correspond to stages PIARE-8 and PAREIB (Phase I) of the CONAFE intervention. Section 4.1 lays out the econometric specification; section 4.2 describes the data; finally, we discuss and validate the identifying assumptions in section 4.3.

[5] In previous work on the joint evaluation of the impacts of the Compensatory Programs (supply-sided intervention) and the *Oportunidades* scholarships (demand-sided intervention) on schooling outcomes, (Gertler et al 2006), we decomposed the CONAFE implemented intervention in its different components, for the first time. Our findings motivated the direction of the current piece of research.

[6] Ideally, we would like to use test score data as a more direct measure of student performance. However, standardized national assessments (*Estándares Nacionales*) were collected on a sample representative of all schools (from all geographical and social strata) in Mexico. The sample of schools common to both the CONAFE and the *Estándares Nacionales* datasets is too small to perform the analysis on test score data.

4.1 Econometric Specification

Let us assume that the probability that student *i* in school *s* at time *t* attains educational outcome $Y_{ist}=Y$ is a function of: the presence (or the lack) of the AGEs support in the school during the previous school year, $AGEs_{s,t-1} = \{0,1\}$; the student's *i* vector of *j* individual characteristics, I_{isjt}, such as her ability, skills and family background; and the *k*-th vector of school's *s* characteristics, including school quality and all other educational interventions received at the school level during the previous year, X_{skt}. More formally,

$$pr(Y_{ist} = Y) = f(AGEs_{s,t-1}, I_{isjt}, X_{skt}) \tag{1}$$

We consider three different educational outcomes: the probability that the student fails an exam ($F_{ist} = F$), repeats a grade ($R_{ist} = R$) or drops out of school during the school year *t* ($D_{ist} = D$). Unfortunately, we do not have individual (student) measures of performance but rather school aggregate measures, so we are not able to estimate (1) directly. However, assuming that *f(.)* is a linear function, we can obtain the average rate of success/failure at the school level by adding up the student individual probabilities by school and normalizing them by the number of students in each school, N_{st}. Then, equation (1) re-writes:

$$pr(\bar{Y}_{st}) = f(AGEs_{s,t-1}, \bar{I}_{sjt}, X_{skt}) \tag{2}$$

where $\bar{Y}_{st} = \frac{1}{N_{st}} \sum_{i=1}^{N} Y_{ist}$ represents the school average failure rate, repetition rate or dropout rate at *t*; and $\bar{I}_{sjt} = \frac{1}{N_{st}} \sum_{i=1}^{N} I_{isjt}$, the vector of the *j* school-averaged student characteristics.

In order to evaluate the impact of the AGEs component on school averaged student performance, we estimate the following reduced form for all *t* =1997-2001 that follows from (2):[7]

$$Y_{st} = \alpha_s + \eta_t + \xi_{lt} + \sum_t \pi_{1t} trend * POTAGEs_s + \beta_1 AGEs_{s,t-1} + \sum_{k=2}^{K} \beta_k X_{skt} + \bar{\varepsilon}_{st} \tag{3}$$

where α_s and η_t are school and time fixed effects; ξ_{lt} are state specific time dummies intended to capture state specific aggregate time effects correlated with schooling outcomes (demographic trends or changes in government, for example). $POTAGEs_s$ is a dichotomous variable equal to 1 if the school *s* is a potential treatment school; this is to say, if *s* will receive the AGEs support

[7] We take school year 1997-98 as the baseline year. Evaluation years are from school year 1998-99 to school year 2001-02.

(*POTAGES*$_s$ =1) for some (or all) of the treatment years (*t* =1998-2001). Thus, the term *trend* POTAGES*$_s$ is the time trend specific to potential AGEs-treatment schools, and attempts to control for the different evolutions that schools that receive and that do not receive AGEs might have experienced over time. The dummy *AGES*$_{s,t-1}$ takes on the value of one if the school has received the AGEs support during school year *t-1*. Then, $\hat{\beta}_1$ is the difference-in-difference estimate of the one period lagged effect of the presence of AGEs in the school on educational outcomes. More specifically, it measures changes in school-averaged student performance trends between early intervened schools (treatments) and latter intervened or not yet intervened schools (controls). Note that we are explicitly assuming that the AGEs support requires some time – a full school year at least, to be effective. Thus, we take educational outcomes at the end of the school year (at *t*) and run them as a function of the school receiving the AGEs support for, at least, the entire school year; this is to say, starting at *t-1*. X_{skt} is the vector of current school characteristics and education related interventions received during the year previous to that of analysis that we describe below. $\bar{\varepsilon}_{st} = \frac{1}{N_{st}} \sum_{i=1}^{N} \varepsilon_{ist}$ is the school averaged individual error terms that includes all the unobserved individual characteristics (learning ability, disutility from studying, etc.) that we assume uncorrelated with the explanatory variables for the time being.[8] We compute robust standard errors clustered at the school level to correct for heteroskedasticity and serial correlation. Because of the inclusion of school fixed effects, all time invariant school observed and unobserved characteristics that could be correlated with both school outcomes and program placement are controlled for.

The vector of school characteristics includes the school student-to-teacher ratio, and the average number of students per class (crowding index).[9] With regards to alternative public policies directed to improve schooling quality and accessibility, we specifically control for: the ratio of *Oportunidades* beneficiary students in the school, which is a measure of the intensity of the *Oportunidades* program in the school – on the demand side; and the proportion of teachers

[8] The intervention might alter the number of children enrolling in school. If as a consequence the distribution of students' skills changes in treatment schools (with respect to control schools), then the program impact estimates are likely to be biased. We will explore the existence of this bias in section 6. The characteristics of the average student in the school $\bar{I}_{sjt}$ are also included in the error term because of lack of data on individual students' characteristics.

[9] Missing values for school characteristics (but not school education interventions) have been replaced by the time specific municipality (or state, if the value was still missing) average. We include indicator variables to account for the replacement. The School Census – described below, also collects data on the number of classrooms, desks, habilitated workshop and lab areas, etc. Unfortunately, these variables did not vary enough over time to be included as additional controls.

under *Carrera Magisterial*, and the reception of other (sporadic) CONAFE supported interventions – on the supply side.

Oportunidades, formerly known as *Progresa*, combines a traditional cash transfer program with financial incentives for families to invest in the human capital of their children. Program benefits include cash transfers that are disbursed conditional on the household engaging in a set of behaviors designed to improve health and nutrition (preventive checkups, prenatal care, and health and hygiene education) and on school aged children attending school. The size of the cash transfer is large, corresponding on average to about one-third of household income for the beneficiary families. Another unique feature of the program is that the cash transfers are given to the mother of the family, a strategy designed to target the funds within the household to improving the children's education and nutrition. See Skoufias (2005) for a review of evaluations on the program impacts. *Carrera Magisterial* was launched in the 1990s. In that program principals, along with teachers and teacher aides, voluntarily participate in a year-long assessment process that awards 100 points for education, experience and other factors. Each principal receives up to 20 points based on the mean test scores of her school's students and teachers in standardized assessments. In recent years, principals scoring above a nationally-specified cut-off score (70) have a sharply higher probability of receiving an award. The awards are substantial - more than 35 percent of the principal's annual wage, and they persist for their entire career. Since 1993, close to 85,000 principals have been awarded the lowest level of promotion, and several hundred thousand more have received promotions to even higher (and more lucrative) levels. For an evaluation, see McEwan and Santibañez (2005).

As previously noted, the CONAFE intervention is composed of several different interventions besides the AGEs monetary support. These include: provision of school and student teaching and learning supplies (textbooks, notebooks, pencils and pens), teacher training, improvement of existing or building of new facilities, provision of equipment (desks, bookcases, typewriters, etc.) and performance based incentives to teachers. Depending on the econometric specification, we explicitly control for the presence of these interventions in the school.

4.2 Data Sources and Sample Sizes

We use administrative data on CONAFE coverage from 1991 to 2003 to identify AGEs beneficiary schools and schools receiving any of the other CONAFE supported interventions. We use data from the Mexican School Census (*Censo Escolar*), an annual listing of background and

outcome data for all schools in Mexico to measure failure, repetition and intra-year dropout.[10] Data on the number of *Oportunidades* beneficiary students in each school comes from administrative *Oportunidades* coverage data from 1997 to 2003. All school data sources are combined at the school level thanks to a unique school identifier code. We also take advantage of the Mexico's 1990 and 2000 Population Census and the 1995 *Conteo* to construct socioeconomic locality indicators that will help identify the evaluation subsample. This data is combined with the school level data using locality identifier codes.[11]

The set of AGEs treatment schools is defined as the set of schools that started receiving the AGEs monetary support in the beginning of any school year between the school years 1998-99 and 2001-02, and that received it continuously ever since. The comparison group consists of those schools that started receiving the AGEs allowance from school year 2002-03 onwards. In some cases and because we only have coverage data until school year 2003-04 some of the schools included in the control group might not have yet received treatment. Ideally, this group of control schools would only differ from the group of treatment schools in their treatment status. However, given CONAFE's phasing-in criteria (CONAFE targeted indigenous schools, and schools in poorer and higher marginalized areas first), this is unlikely to be the case and less so if indigenous areas are systematically different from non-indigenous (Ramirez 2006). In order to achieve well-balanced (comparable) samples, we restrict our study to the balanced panel of 6,038 rural non-indigenous primary schools observed continuously between 1995 and 2003.[12] Out of these, 2,580 (42.7 percent) are AGEs treatment schools, and the remaining 3,258 (57.3 percent) are AGEs control schools (see Table 1). Table 1 also shows the number of schools that started receiving AGEs by school year. For all these schools we know the value of the targeting index computed by CONAFE in 2000.

[10] The information in the School Census also allows computation of inter-year dropout rate. However, because it is impossible to distinguish between students that are purely dropping out of the educational system or merely changing schools, we chose to work with intra-year dropout rates – where the potential of error measurement is arguably smaller.

[11] For a non-negligible number of localities, locality and municipality codes as registered in the Population Census have changed over time. This prevents following these localities through time. To construct locality level indicators, we take the 2000 Census as the reference year and keep only those localities whose identifying codes have remained the same.

[12] To allow comparison across outcomes, the analysis sample is restricted to those schools with non-missing observations for any of the dependent variables studied. Results are robust to the inclusion/exclusion of schools with missing information for one or more of the outcome variables. We have also dropped out of the sample schools with extremely high numbers of students and/or teachers (top 0.5 percent of each distribution).

Table 1: Sample Sizes and Number of Schools Phased into AGEs by Year -Subsample of General Rural Primary Schools

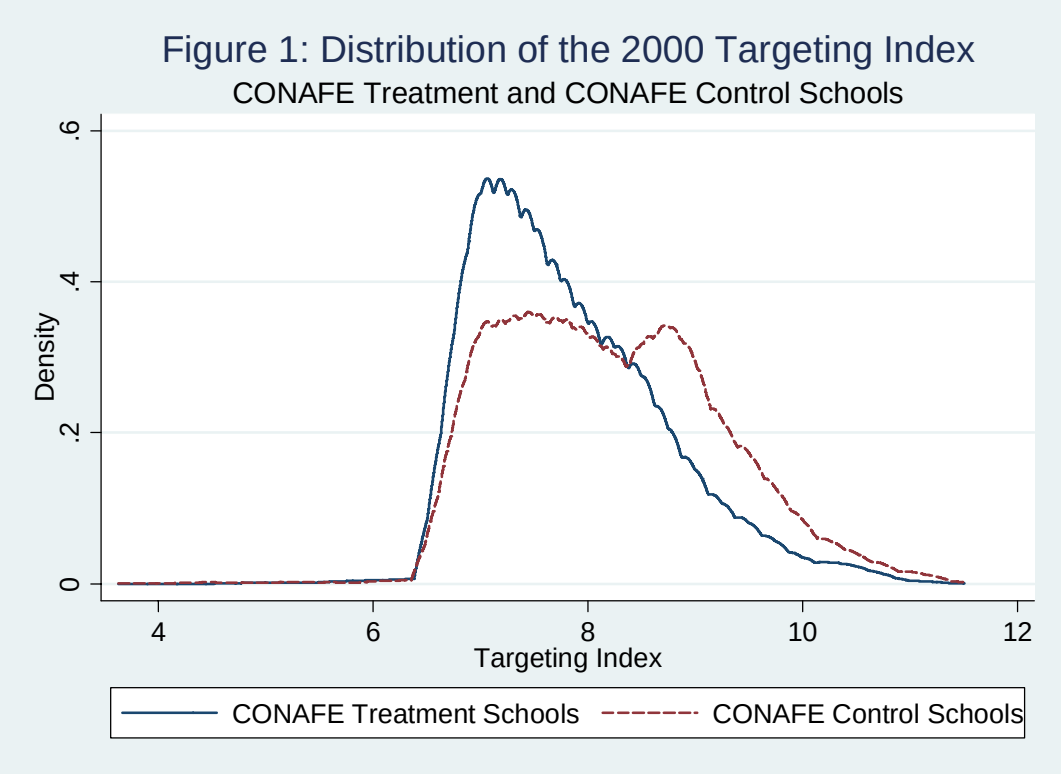
	Date school starts receiving AGEs Support							
	AGEs Treatment Schools				AGEs Control Schools			
	1998	1999	2000	2001	2002	2003	After	Total
Number of Schools by Phase In Date	72 (1.19)	801 (13.27)	1,084 (17.95)	623 (10.32)	3,173 (52.55)	53 (0.88)	232 (3.84)	6,038 (100)
Number of Schools by Treatment Status	2,580 (42.73)				3,458 (57.27)			

AGEs treatment schools are schools that continuously receive the Apoyo a la Gestión Escolar (AGEs),starting in 1998 (or later) until 2001.

The 2000 targeting index was constructed by CONAFE as a tool to select the worst performing schools in less marginalized states to be targeted by PAREIB. It used 2000 Census data on localities and School Census data for the school year 1999-2000 on school characteristics (student density, student teacher ratio, etc.) and educational outcomes (failure, repetition and school dropout).[13] The targeting rule applied implied that (i) all rural schools in highly marginalized areas and (ii) all schools falling in the third and fourth quartiles of the targeting index in less marginalized areas would be selected as CONAFE beneficiaries starting in 2001. As in previous stages of the program, all indigenous primary schools were automatically selected. We basically exploit the index as a way of testing for balance between the constructed treatment and control groups of schools: schools with similar targeting indexes are likely to have similar values of the variables used in its construction. Hence, they are likely to be in similar environments and have similar educational outcomes. We also use the index to define different samples on which we check the robustness of the results found. Figure 1 shows that the index distributions for treatment and control schools overlap over the entire support.[14]

[13] See CONAFE (2000) for more details on the weighting of variables and construction of the targeting index. A previous index that used 1995 Census data and 1995-96 School Census data was constructed to target PIARE-8 schools. Unfortunately, we could only find data on this index for urban schools.

[14] At first, it might seem surprising the fact that the distribution of treatment schools (targeted at earlier stages because of larger index values; that is, lower efficiency levels) is more to the left than the distribution of control schools. Recall nonetheless, that this index was computed when most treatment schools had already been under treatment for a year or two, and therefore had had time to improve their educational outcomes with respect to control schools.



Means and standard deviations for a few school observable characteristics and for the dependent variables in 1997 (baseline), across AGEs treatment and AGEs control schools, are shown in Table 2. Summary statistics on the intensity of the different education interventions across treatment years is also shown. Schools in the sample have, on average, 132 students, 7 classrooms and between 4 and 5 teachers. AGEs treatment schools are smaller on average: they have less students and teachers, and lower student teacher ratios and crowding indexes. The failure rate is 10 percent in both types of schools. However, while repetition rates are larger in AGEs treatment schools (9.6 versus 9.2 in control schools), intra-year dropout is 0.4 points lower in treatment schools (3.8 percent in treatment schools versus 4.2 percent in control schools). This might reflect a higher mobility and school turnover in larger towns, where schools are more unlikely to receive AGEs. Control schools have a larger proportion of teachers in *Carrera Magisterial* but a significantly lower share of *Oportunidades* students. This is suggestive of a relatively high degree of overlap between CONAFE and *Oportunidades*, which is not at all surprising given that both interventions are targeting schools and populations in highly disadvantaged areas. Moreover, schools that do not receive AGEs are significantly less likely to receive any of the other CONAFE supported interventions, which suggests a high prevalence of AGEs support amongst CONAFE schools.

Table 2: Descriptive Statistics by Treatment Status -Subsample of General Rural Primary Schools

All Schools	**N**	**Mean**	**SD**
Dependent Variables at Baseline (1997)			
Failure Rate	6038	0.100	(0.058)
Repetition Rate	6038	0.093	(0.056)
Intra-Year Drop Out Rate	6038	0.040	(0.045)
School Characteristics at Baseline (1997)			
Number of Teachers	6038	4.889	(3.504)
Number of Desks	6034	79.785	(86.755)
Number of Classrooms	6038	6.946	(2.215)
Student-Teacher Ratio	6038	26.381	(7.671)
Class Crowding Index	6038	24.729	(8.727)
Total Enrollment	6038	132.217	(111.839)
Other Interventions over Treatment Period (1998-2001)			
Proportion of Teachers in Carrera Magisterial	6038	0.527	(0.363)
Proportion of Schools with Infrastructure Support (CONAFE)	6038	0.018	(0.131)
Proportion of Schools with Equipment Support (CONAFE)	6038	0.005	(0.074)
Proportion of Schools with Teacher Inventives Support (CONAFE)	6038	0.003	(0.053)
Proportion of Schools with School Supplies Support (CONAFE)	6038	0.200	(0.400)
Proportion of Schools with Teacher Training Support (CONAFE)	6038	0.096	(0.295)
Ratio of *Oportunidades* students in the School	6038	0.253	(0.225)
AGEs Treatment Schools			
Dependent Variables at Baseline (1997)			
Failure Rate	2580	0.100	(0.063)
Repetition Rate	2580	0.096	(0.061)
Intra-Year Drop Out Rate	2580	0.038	(0.048)
School Characteristics at Baseline (1997)			
Number of Teachers	2580	3.517	(2.455)
Number of Desks	2579	59.398	(54.346)
Number of Classrooms	2580	6.206	(1.335)
Student-Teacher Ratio	2580	25.607	(7.575)
Class Crowding Index	2580	23.317	(8.530)
Total Enrollment	2580	89.283	(69.370)
Other Interventions over Treatment Period (1998-2001)			
Proportion of Teachers in Carrera Magisterial	10320	0.505	(0.380)
Proportion of Schools with Infrastructure Support (CONAFE)	10320	0.034	(0.181)
Proportion of Schools with Equipment Support (CONAFE)	10320	0.010	(0.097)
Proportion of Schools with Teacher Inventives Support (CONAFE)	10320	0.006	(0.079)
Proportion of Schools with School Supplies Support (CONAFE)	10320	0.438	(0.496)
Proportion of Schools with Teacher Training Support (CONAFE)	10320	0.209	(0.407)
Ratio of *Oportunidades* students in the School	10320	0.319	(0.216)
AGEs Control Schools			
Dependent Variables at Baseline (1997)			
Failure Rate	3458	0.100	(0.055)
Repetition Rate	3458	0.092	(0.051)
Intra-Year Drop Out Rate	3458	0.042	(0.042)
School Characteristics at Baseline (1997)			
Number of Teachers	3458	5.913	(3.807)
Number of Desks	3455	95.003	(101.979)
Number of Classrooms	3458	7.498	(2.555)
Student-Teacher Ratio	3458	26.958	(7.693)
Class Crowding Index	3458	25.782	(8.725)
Total Enrollment	3458	164.250	(125.899)
Other Interventions over Treatment Period (1998-2001)			
Proportion of Teachers in Carrera Magisterial	13832	0.544	(0.350)
Proportion of Schools with Infrastructure Support (CONAFE)	13832	0.005	(0.074)
Proportion of Schools with Equipment Support (CONAFE)	13832	0.002	(0.049)
Proportion of Schools with Teacher Inventives Support (CONAFE)	13832	0.000	(0.019)
Proportion of Schools with School Supplies Support (CONAFE)	13832	0.023	(0.149)
Proportion of Schools with Teacher Training Support (CONAFE)	13832	0.012	(0.108)
Ratio of *Oportunidades* students in the School	13832	0.204	(0.219)

AGEs treatment schools are schools that continuously receive the Apoyo a la Gestión Escolar (AGEs),starting in 1998 (or later) until 2001. Schools with extremely high values of the dependent variables have been dropped (top 0.5% of each distribution). Sample restricted to schools with no missing information on any of the dependent variables studied.

4.3 Sources of Variation and Balance in Pre-Intervention Trends

We rely on the phasing in of schools into either intervention over space and time to generate sufficient variation in the treatment variable to achieve identification. Table 1 shows the number and proportion of schools that started receiving the AGEs support by school year. However, the existence of a control group (the group of schools receiving benefits from 2002 onwards, in our case) does not imply its validity. Given the non-experimental nature of our data schools with the strongest (weakest) potential for improvement might have been incorporated at earlier stages. Then, our estimates would be overestimating (underestimating) the true program effects. Unbiased identification of the difference-in-difference estimates in this setting heavily hinges on the fact that post-intervention trends between intervened and non-intervened schools would have been identical in the absence of the intervention:

$$E\left[Y_{1t} - Y_{1,t-1} \mid T = 0\right] = E\left[Y_{0t} - Y_{0,t-1} \mid T = 0\right] \tag{4}$$

Such an assumption is impossible to test as the counterfactual is never observed. We can nonetheless test whether pre-intervention trends of the educational outcomes under study were similar between the treatment group and the proposed control group. If pre-intervention trends (at $t'<t$) for the outcome measures were not significantly different between treatment and control schools, there is no reason to believe they would be significantly different in the post intervention periods (t) *were* the interventions not in place. Thus the identifying assumption re-writes:

$$E\left[Y_{1t'} - Y_{1,t'-1} \mid T = 0\right] = E\left[Y_{0t'} - Y_{0,t'-1} \mid T = 0\right] \tag{4'}$$

We test the validity of (4') for the proposed treatment and control groups by running the following equation on pre-intervention data; this is to, say, for all t' =1995-1997:

$$Y_{st'} = \alpha_s + \xi_{lt} + \sum_{t'} \gamma_{t'} YR_{t'} + \sum_{t'} \delta_{1t'} POTAGEs_s * YR_{t'} + u_{st'} \tag{5}$$

where $POTAGEs_s$ is, as defined above, a dichotomous variable that equals 1 if school s is a potential treatment school $YR_{t'}$ are year dummy variables for all pre-intervention school years t' =1995-1997. As in equation (3), α_s are school fixed effects and ξ_{lt} are state specific time dummies. $u_{st'}$ denotes now the heteroskedastic disturbance that allows for correlation within schools over time. If the $\delta_{t'}$'s are not significantly different from zero, then the pre-intervention trends for schools that will eventually become AGEs treatment schools are not significantly different from those in the control group at each time t'.

Pre-intervention trends for failure, grade repetition and intra-year dropout rates for the subsample of primary rural general schools under study are reported in Table 3. Models B include state-time specific trends as additional controls. In either case, estimates show no significant differences in pre-intervention trends in grade failure rates (Models 1A and 1B), grade repetition rates (Models 2A and 2B) and school dropout rates (Models 3A and 3B) between schools receiving AGEs in earlier and latter years.

Table 3: Differences in Pre-Intervention Trends (1995 to 1997) between Intervened and Non-Intervened Schools -Subsample of General Rural Primary Schools

	FAILURE RATE		REPETITION RATE		DROP OUT RATE		TOTAL ENROLLMENT	
	Mod 1A	Mod 1B	Mod 2A	Mod 2B	Mod 3A	Mod 3B	Mod 4A	Mod 4B
Control Schools								
Mean Dep. Var. in 1995	0.104**	0.104**	0.094**	0.094**	0.041**	0.041**	133.222**	133.222**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.169)	(0.166)
Difference in year 1996	-0.002	0.012	-0.001	0.010	0.001	0.015+	-0.170	2.659
	(0.001)	(0.010)	(0.001)	(0.011)	(0.001)	(0.009)	(0.340)	(2.060)
Difference in year 1997	-0.003*	0.005	-0.001	0.003	-0.001	0.004	-0.158	5.502+
	(0.001)	(0.008)	(0.001)	(0.009)	(0.001)	(0.008)	(0.494)	(2.890)
AGEs beneficiary schools								
Difference in year 1996	0.000	0.003	0.001	0.003	0.002	0.002	-0.961*	-1.460*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.419)	(0.697)
Difference in year 1997	-0.003	-0.001	-0.000	0.000	0.001	0.001	-1.980**	-2.764**
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.614)	(0.998)
School Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
State Specific Time Trends	-	Y	-	Y	-	Y	-	Y
Number of Observations	18114	18114	18114	18114	18114	18114	18114	18114
Number of Schools	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038

Notes: +significant at the 10%, *significant at the 5%, **significant at the 1%. LS regressions with school FE. Robust SE clustered at the school level in parantheses. AGEs treatment schools are schools that continuously receive the Apoyo a la Gestión Escolar (AGEs), starting in 1998 (or later) until 2001. Extreme values for the dependent variables trimmed at the top 0.5% of the dependent variable distribution.Sample restricted to schools with no missing information on any of the dependent variables studied.

One can also test the equality in pre-intervention trends between schools that entered the program in different years. In this case, the equation to estimate on pre-intervention data is:

$$Y_{st'} = \alpha_s + \xi_{lt} + \sum_{t'} \gamma_{t'} YR_{t'} + \sum_{t'} \sum_{j} \lambda_{1t'} INAGEs_{sj} * YR_{t'} + \upsilon_{st'} \qquad (6)$$

where $INAGEs_{sj}$ is a set of dummies that take on the value 1 if the school *s* started benefiting from the AGEs intervention on year *j*=1998-2001. Thus, the coefficients on the interaction with the year dummies, the $\lambda_{1t'}$'s, capture differences in pre-intervention trends for schools entering in the AGEs scheme at different years. Results of this test on the sample of schools under analysis are reported in Table 4. Schools that start to receive AGEs benefits in the school year 1999-00 show significantly larger increases in their dropout rates during school year 1996-97 (Model 3A). This difference is however removed with the introduction of the state-specific time dummies (Model 3B). As a matter of fact, whenever state-specific time trends are controlled for, significant differences in pre-intervention trends actually indicate larger *increases* in failure (Model 1B) and

repetition (Model 2B) across AGEs treatment schools. This is suggestive that, if anything schools that start receiving AGEs in earlier years were experiencing worst dynamics in terms of schooling outcomes than schools that receive the AGEs support later. Therefore, our estimates are more likely to underestimate the AGEs effect rather than overestimate it. Given the sets of estimates in Tables 3 and 4, pre-intervention trends look well-balanced enough overall for endogenous program placement bias not be a serious threat to identification.[15]

Table 4: Differences in Pre-Intervention Trends (1995 to 1997) between Non-Intervened Schools and Schools Intervened in Subsequent Years -Subsample of General Rural Primary Schools

	FAILURE RATE		REPETITION RATE		DROP OUT RATE		TOTAL ENROLLMENT	
	Mod 1A	Mod 1B	Mod 2A	Mod 2B	Mod 3A	Mod 3B	Mod 4A	Mod 4B
Control Schools								
Mean Dep. Var. in 1995	0.104**	0.104**	0.094**	0.094**	0.041**	0.041**	133.222**	133.222**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.169)	(0.166)
Difference in year 1996	-0.002	0.014	-0.001	0.012	0.001	0.014	-0.170	2.518
	(0.001)	(0.010)	(0.001)	(0.011)	(0.001)	(0.009)	(0.340)	(2.098)
Difference in year 1997	-0.003*	0.006	-0.001	0.004	-0.001	0.003	-0.158	5.259+
	(0.001)	(0.008)	(0.001)	(0.009)	(0.001)	(0.008)	(0.494)	(2.938)
AGEs beneficiary schools								
Difference in year 1996 * AGEs starting in 1998	-0.001	0.001	-0.003	-0.002	0.006	0.009	3.018	0.480
	(0.013)	(0.013)	(0.012)	(0.012)	(0.009)	(0.009)	(2.492)	(2.926)
Difference in year 1996 * AGEs starting in 1999	0.004	0.007+	0.006+	0.008*	-0.000	-0.001	-0.504	-1.490*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.461)	(0.640)
Difference in year 1996 * AGEs starting in 2000	-0.003	-0.002	-0.004	-0.003	0.002	0.004	-1.254*	-1.361
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.543)	(0.936)
Difference in year 1996 * AGEs starting in 2001	0.002	0.004	0.002	0.004	0.006**	0.002	-1.499*	-1.855*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)	(0.596)	(0.897)
Difference in year 1997 * AGEs starting in 1998	-0.006	-0.008	-0.004	-0.006	0.009	0.004	3.270	-0.386
	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)	(2.924)	(3.650)
Difference in year 1997 * AGEs starting in 1999	-0.002	-0.000	0.002	0.003	-0.000	-0.003	-0.774	-2.766**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.665)	(0.933)
Difference in year 1997 * AGEs starting in 2000	-0.005+	-0.003	-0.003	-0.004	0.002	0.003	-2.722**	-2.449+
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.794)	(1.301)
Difference in year 1997 * AGEs starting in 2001	-0.000	0.002	0.002	0.002	-0.001	0.004	-2.848**	-3.671**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.949)	(1.419)
School Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
State Specific Time Trends	-	Y	-	Y	-	Y	-	Y
Number of Observations	18114	18114	18114	18114	18114	18114	18114	18114
Number of Schools	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038

Notes: +significant at the 10%, *significant at the 5%, **significant at the 1%. LS regressions with school FE. Robust SE clustered at the school level in parantheses. AGEs treatment schools are schools that continuously receive the Apoyo a la Gestión Escolar (AGEs), starting in 1998 (or later) until 2001. Extreme values for the dependent variables trimmed at the top 0.5% of the dependent variable distribution.Sample restricted to schools with no missing information on any of the dependent variables studied.

Identification also relies in the inclusion of school fixed effects that control for biases due to differences in time-invariant factors across schools. In addition, the state-time dummies are

[15] Alternatively we could control for the program phase-in rule as a way of minimizing the potential for endogenous program placement. The many deficiencies associated with this approach dissuaded us from applying it. First, the targeting rule is computed at one point in time. We could construct a time-varying targeting index applying the formula to different years. However, we would need to generate time variation to some variables by extrapolation which might add considerable measurement error. Second and more importantly, the targeting rule for primary schools is not unique. According to CONAFE, schools that were to be phased in under earlier stages (PAREB, PIARE) will continue to respond to the criteria associated with those stages, even if they start receiving benefits at later years. Since we are unable to perfectly assign –given the data available, the correct rule to each school, we chose not to control for the specific targeting rule. In any case, the targeting rule does not determine when schools do receive a particular CONAFE intervention, the AGEs support in this particular case.

meant to capture state-specific aggregate time effects that might be correlated with schooling outcomes: changes in demographic trends in the state that might affect enrollment; or changes in the state government characteristics, for example, shifts in tastes and priorities about education that might alter the allocation of resources. Treatment specific time trends are included to capture the different evolutions treatment and control schools might have experienced over time. Moreover, we control for other education programs currently operating in the school to avoid incorrectly attributing effects to the AGEs intervention. In the same spirit, we also use as many school varying characteristics we are able to construct as controls. Although there are not many, it seems plausible to assume that schools do not change substantially in the span of 5 years. The estimate of the treatment effect will be unbiased as long as there are no unobserved time-varying characteristics or trends correlated with the treatment variables. We discuss potential biases in section 6.

5. Quantitative Evidence on Failure, Repetition and Dropout

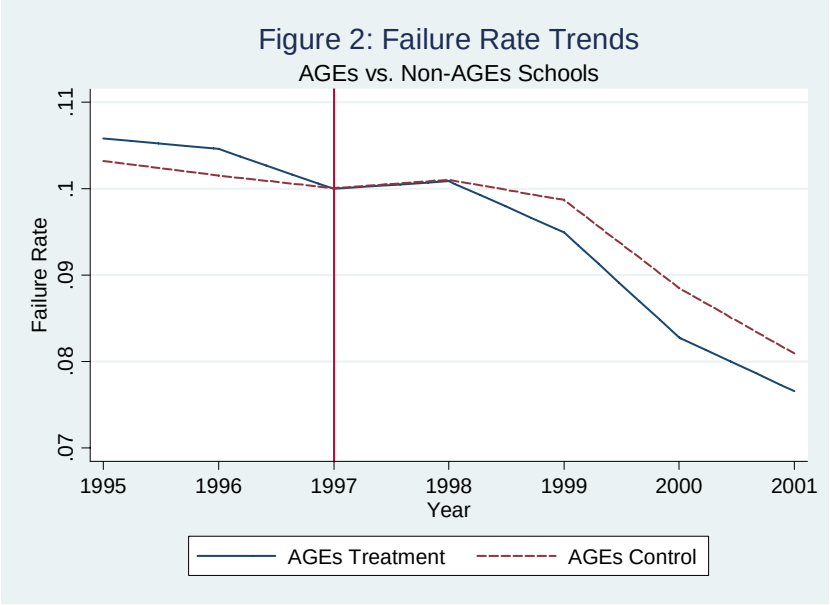
5.1 Graphical Evidence

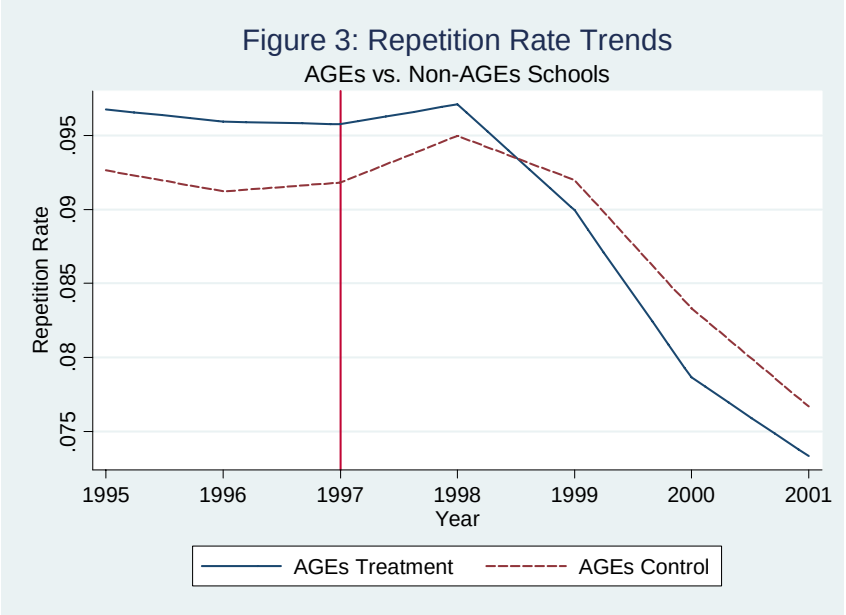
Albeit limited, graphs can provide suggestive evidence. Figures 2, 3 and 4 present the evolution of average grade failure, grade repetition and school intra-year dropout rates over time for AGEs treatment schools (solid line) and AGEs control schools (dashed line). The vertical line at 1997 marks the beginning of the intervention period.[16]

Grade failure and grade repetition start being higher for the group of initially treated schools. Intra-year dropout rates, however, are lower amongst treatment schools all the way through. By 1997 – the baseline year, the marginally higher average failure rate observed in treatment schools drops down to the failure rate level of control schools, at exactly 10 percent. From school year 1999-2000 on, failure and repetition rates for treatment schools fall below those of control schools. Although the difference is unlikely significant it shows some trend towards minimizing the gap between AGEs compensated and AGEs non-compensated schools in terms of intermediate quality of schooling indicators. As a matter of fact, the graphs clearly show a sharper decrease in failure and repetition rates for treatment schools by the end of school year 1999-2000, when 13.3 percent of the schools have already received the monetary support for a

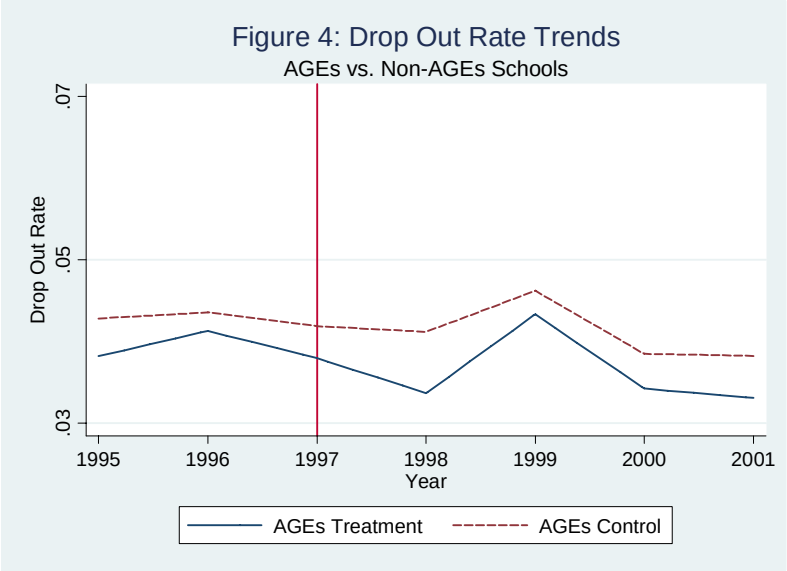
[16] The intervention period starts in school year 1998-99. However, by construction failure and repetition are measured at the end of the school year. Thus, the average failure plotted in t =1998 corresponds to the average failure at the end of the school year 1998-99, once the program has already been in place for an entire school year had it started at the beginning of the school year. Hence, the vertical line separating pre- and post-intervention trends is drawn at $t\text{-}1$ =1997 to graphically depict the school year difference we allow for the intervention to be effective.

full school year and an insignificant 1.2 of schools for a couple of years (see Table 1). The plots do not show any effect concerning intra year dropout rates. Also, note that pre-intervention trends are rather parallel which graphically supports the validity of the identification strategy.[17]





[17] The evidence depicted in these graphs is only partial and has to be seen accordingly. They plot raw means for AGEs treatment and AGEs control schools. As such, the effect of any other factors that might be altering the outcome evolution in any way is not netted out in here. Moreover, these graphs do not take into consideration the differences in phase-in of the AGEs support across schools either.



5.2 Average Treatment Effects

Estimates of the average treatment effect in equation (3) between school years 1998-99 and 2001-02 for failure, grade repetition and intra-year dropout rates are presented in Table 5. As already explained, the school year 1997-98 will act as the pre-intervention year in the computation of the difference-in-difference treatment estimates. For each dependent variable, the first column (under Model A) shows the estimated AGEs effect when no other education intervention is controlled for. In the next column (Model B), we add the proportion of *Oportunidades* students in the school and the proportion of teachers under the *Carrera Magisterial* scheme as controls. In the last column (Model C) we include additional indicator variables that control for the existence of any other CONAFE supported intervention. All regressions include school and time fixed effects, state specific time trends, a treatment specific trend and all the time varying school characteristics listed above.

Results consistently show a significant effect of AGEs in reducing failure and grade repetition, which is independent of the inclusion of controls for the other education interventions. As a matter of fact, the point estimates – of -0.4 percentage points or alternatively, a 4.4 percent decrease in the proportion of students failing or repeating a grade in the school, practically does not vary across regressions. This suggests that the effects of the AGEs intervention on failure and repetition in the first column are not biased because of the coexistence in the school of other

Table 5: Effect of AGEs on School Aggregate Educational Outcomes: Failure, Repetition and Intra-Year Drop Out Rates; and Total Enrollement from 1998 to 2001 -Subsample of General Rural Primary Schools

	FAILURE RATE			REPETITION RATE			DROP OUT RATE			TOTAL ENROLLEMENT		
	Mod 1A	Mod 1B	Mod 1C	Mod 2A	Mod 2B	Mod 2C	Mod 3A	Mod 3B	Mod 3C	Mod 4A	Mod 4B	Mod 4C
AGEs =1	-0.004*	-0.004*	-0.004*	-0.004*	-0.005*	-0.004*	0.000	-0.000	-0.000	0.383	0.360	0.356
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.385)	(0.385)	(0.391)
Other Interventions												
Ratio of *Oportunidades* Students in the School		-0.010**	-0.010**		-0.008**	-0.008**		-0.013**	-0.013**		-2.596**	-2.582**
		(0.003)	(0.003)		(0.003)	(0.003)		(0.002)	(0.002)		(0.740)	(0.737)
Proportion of Teachers under *Carrera Magisterial*		-0.003+	-0.003+		-0.004*	-0.004*		-0.002	-0.002		0.275	0.274
		(0.002)	(0.002)		(0.002)	(0.002)		(0.002)	(0.002)		(0.399)	(0.399)
Other CONAFE Interventions												
Infrastructure =1			0.002			0.000			0.000			-0.457
			(0.003)			(0.003)			(0.003)			(0.732)
Equipment =1			-0.000			-0.001			-0.001			3.734*
			(0.005)			(0.005)			(0.004)			(1.486)
Incentives =1			0.009			0.013			-0.002			0.918
			(0.012)			(0.011)			(0.007)			(2.234)
Student Supplies =1			-0.001			-0.002			-0.001			0.677
			(0.002)			(0.002)			(0.002)			(0.856)
Training =1			0.001			0.002			0.002			-1.191*
			(0.002)			(0.002)			(0.002)			(0.538)
School Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Time-Varying School Charact.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Specific Time Trends	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Treatment Specific Trends	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of Observations	30190	30190	30190	30190	30190	30190	30190	30190	30190	30190	30190	30190
Number of Schools	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038	6,038
Mean Failure Rate	0.09	0.09	0.09	0.09	0.09	0.09	0.04	0.04	0.04	131.23	131.23	131.23

Notes: +significant at the 10%, *significant at the 5%, **significant at the 1%. LS regressions with school FE. Robust SE clustered at the school level in parantheses. AGEs treatment schools are schools that continuously receive the Apoyo a la Gestión Escolar (AGEs), starting in 1998 (or later) until 2001. Extreme values for the dependent variables trimmed at the top 0.5% of the dependent variable distribution.Sample restricted to schools with no missing information on any of the dependent variables studied.

schemes designed to enhance school quality. Consistent with the graphical evidence, no effects of AGEs on intra-year dropout rates are observed.[18]

Likewise, the proportion of teachers under *Carrera Magisterial* significantly reduces repetition and almost significantly (at the 10 percent) reduces failure.[19] On the other hand, results show larger effects of demand-oriented interventions. Indeed, the intensity of *Oportunidades* in the school –measured as the share of *Oportunidades* beneficiary students, appears consistently significant in decreasing all of the educational outcomes considered; this is to say failure, repetition and intra-year dropout. The conditionality on not repeating more than twice a grade and the fact that the scholarships increase with the grade the student is enrolled in, might be part of the reason behind the observed effects in failure and repetition. Another mechanism through which *Oportunidades* might impact learning outcomes are the improved nutrition and better health practices the program enforces. This is consistent with the growing literature that establishes strong positive effects of health on school performance (Miguel and Kremer 2004; Glewwe and others 2004). Moreover, the *Oportunidades*' effect on intra-year dropout, not attained by the AGEs intervention, is very likely related to the educational stipend being conditional upon school enrollment and attendance. Lastly, estimates show no significant impact of any of the other CONAFE interventions in any of the specifications.

6. Potential Biases

6.1 Endogenous Program Placement Bias

Biases due to program placement might arise if the state authority decides to allocate programs in certain schools non-randomly in response to budgetary or other political considerations. There is enough variation in the time schools first receive the AGEs benefits in the data to raise such concern. Moreover, it is common practice amongst state governments to assign benefits to more marginalized schools given resource constraints. In this case, our estimates would be downward biased. We argue that the inclusion of state specific trends capture state specific aggregate time effects (shifts in tastes, changes in the allocation of resources) thus minimizing the potential for such bias.

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[18] In further identifications, we have exploited the length under the AGEs treatment as an alternative treatment measure. Results on the number of periods the school has continuously benefited from AGEs do not arise as significant in impacting educational outcomes.

[19] We will not comment on this result any further since any naïve estimate of the incentive scheme –such as the one presented here, is very likely to suffer from serious teacher self-selection bias into the scheme (see McEwan and Santibañez 2004). Moreover, it is beyond the purpose of the present work to analyze the effects of such intervention.

It could also be that program placement responds to some specific characteristics of the school correlated with school performance. It is plausible to think that "better" schools that have more motivated teachers and students living in families where education is perceived as a priority, might be receiving the AGEs first, for at least two reasons: (i) the state government decides to assign the money to schools that are more likely to succeed to increase the chances of positive outcomes [and "its reputation as a good manager to the eyes of the state government"]; (ii) more motivated and concerned parental associations might push the local authority to allocate benefits in their school.[20] In either case, our estimates would suffer from an upward bias. However, if we are willing to assume these characteristics to be time invariant, then the inclusion of school fixed effects in the analysis would correct for the bias. Contrarily, if it is school time varying unobserved characteristics that are correlated with outcomes, then we need to rely on the identifying assumption in equation (4') to legitimate our estimates. The fact that pre-intervention trends in educational outcomes are not significantly different between AGEs treatment and AGEs control schools – as tested earlier, implies that endogenous program placement bias is no likely to be a serious threat to identification.

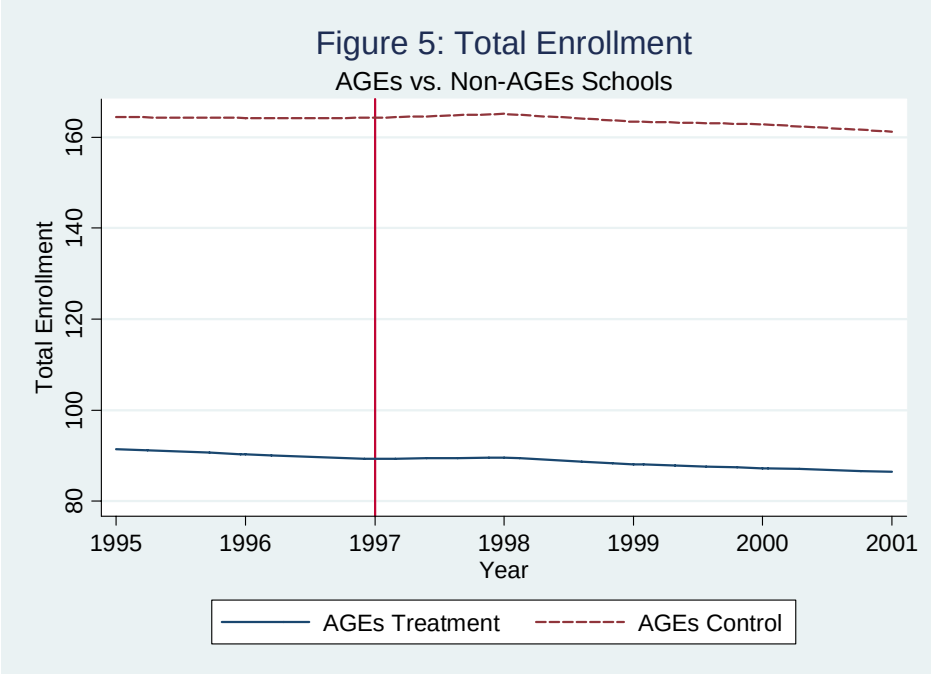
6.2 Changes in the Distribution of Students in the School

The error term in $\bar{\varepsilon}_{st}$ in (3) includes unobserved student characteristics (θ_{ist} = skills, ability, motivation) that we have so far assumed uncorrelated with the observed treatment variables. However, treatment might affect the individual decision of enrolling in school, thus changing the total number of students attending school. Assume, for instance, that through empowering local decision making, AGEs-supported schools attract higher skill students or that more motivated parents enroll more motivated students.[21] Thus, if changes in total enrollment significantly alter the distribution of students' skills in the school, then treatment is correlated with unobserved ability and so the estimated average treatment effect is likely to be biased. In other words, if the interventions affect the individual probability of enrolling in school, $N_{st} = g(AGEs_{s,t-1})$ and the skills of the marginal student attracted are different from the average

[20] This raises the natural concern that the identified effect on AGEs may disappear over time as worse performing schools (less motivated, etc.) join the program. Probably in anticipation of such a pattern CONAFE already started introducing, since 2003, a new support called CAPAGEs (*Capacitación para el Apoyo a la Gestión Escolar*) aimed at providing guidance on the administration of the monetary resources provided by the AGEs support.

[21] Note that on the other hand, a demand-side intervention like *Oportunidades* might be attracting lower skill (or less motivated) students with an opportunity cost of schooling large enough to not attend school without the subsidy.

pre-intervention distribution of skills in the school, $\theta_{ist} \neq \overline{\theta_{st}} = \frac{1}{N_{st}} \sum_{i=1}^{N} \theta_{ist}$, then changes in the school aggregate failure or repetition rate might not only come from changes in existing students' individual performance (changes in the numerator) but also from changes in the distribution of students, which is affected by the total number of students (changes in the denominator). In other words, now $pr(\overline{Y}_{st}) = f(AGEs_{s,t-1}, \overline{\theta_{st}}(N_{st}(AGEs_{s,t-1})); \overline{I}_{sjt}, X_{skt})$. If better students are attracted, our estimates of the treatment effect are upward biased; contrarily, if worse performing students are now enrolling in school, our estimates are likely to be downward biased.



Although it is difficult to determine the direction of the bias, we can at least test for its existence by examining changes in enrollment in response to the AGEs treatment. Figure 5 plots total enrollment over time AGEs treatment and AGEs control schools. As it can be observed, enrollment is being mildly but consistently reduced over time, and more so in AGEs treatment schools. We test for the existence of enrollment effects more formally by re-running equation (3) on total enrollment, after checking for the equality in pre-intervention trends. The last set of regressions in Tables 3 and 4 shows results on aggregate pre-intervention trends and by year of phasing in. In accordance with the graphical evidence, results indicate larger reductions in the total enrollment across schools that start receiving the AGEs support earlier. The last set of regressions in Table 5 examines whether the AGEs intervention has affected total enrollment and finds no significant effects. Given the significant trend in reduced enrollment in potential AGEs beneficiary schools before the intervention, one might think that the AGEs have indeed reversed

the pattern on enrollment by slowing down the diminishing trend. In any case, the size of the pre-intervention larger reductions in AGEs schools of between one and three students is small enough to consider the potential for bias negligible. We therefore consider that the composition of students and consequently students' skills in the school are unlikely to have been modified as a result of the intervention.

7. A Qualitative Assessment on the True Impact of AGEs

In an attempt to further justify the importance of the AGEs, qualitative work was undertaken, consisting of discussions with parents, teachers and school directors of beneficiary and non-beneficiary schools in the Mexican state of Campeche (for full details, see Patrinos 2006). The qualitative assessment was instructive as it became apparent just what the main benefits of the AGEs are -mostly through the discussion with parents. In terms of economic and financial benefits, parents argued that the AGEs monetary support helped to reduce the household burden associated with sending their children to school. As a result, their children's school attendance increases and their school work improves. They also noted significantly less child labor now, although parents acknowledged that *Oportunidades* helps. They also argued that the AGEs helped improve school maintenance (one of its main goals) and that there are more school supplies. In other words, the AGEs allow parents to buy materials and improve school infrastructure. The connection to the positive results reported here could be that AGEs help create a better learning environment, thus improving outcomes, which in turn induces higher school attendance. In addition, there were arguments that the AGEs help motivate the teacher.

Before the AGEs the parents would undertake "*faenas*" (tasks) informally. Thus, although the parents association used to participate and was somewhat organized, the AGEs catalyzed this nascent organization and participation, and made it more formal and effective. Another set of arguments from the parents focused on participation and other social aspects. That is, parents expressed the view that the AGEs helped generate significantly higher levels of school participation and communication – both amongst parents, and with teachers and school directors. The AGEs are vocal representatives of the school community. They are well known by parents, and valued. The AGEs articulate expectations and promote social participation. Parents may not be sure about how these things improve education; but they see how school was before and contrast the situation now, and deduce that the improvement is due to the AGEs. In many cases the parents attended the same school where their children are currently students.

The AGEs meetings are important for the school as they facilitate dialogue with teachers and school directors. Families use the AGEs to generate demands for the development of their children, who they view as change agents. The AGEs and the school experience help create expectations. Moreover, they improve school climate. This is believed to further foster parental involvement in the school, as well as at home with their children's school work. Many parents believe that the AGEs put pressure on school directors and teachers to help their children. Moreover, it is believed that the AGEs may help reduce absenteeism among teachers as they are seen as an economic benefit that helps teachers. As a matter of fact, when asked about how the AGEs helped teachers and what impacts they have noticed, parents commented on the fact that teachers used to work 8am-1pm and now stayed until late afternoon to help students who were falling behind academically. Parents are pleased with the fact that now they are able to meet with their child's teacher and report are careful to listen to teachers on how to improve their child's performance. Parents believe that the AGEs at least to some extent help motivate their children to study more. The AGEs also motivate parents to follow their children's progress.

Both sets of arguments are plausible explanations for how AGEs improve schooling outcomes. However, reduced household financial burden is also a product of *Oportunidades*, which operates in most schools where the AGEs are present. Therefore, there is probably more weight behind participation as the answer, especially as it improves relations between parents and teachers, and overall school climate. There may also be less teacher absenteeism as a result of these better relations, social pressure and economic incentives for teacher and directors to benefit from the AGEs resources. However, independent data on teacher absences is not available in Mexico.

8. Conclusions

Mexico's AGEs –school-based management in rural, disadvantaged schools– are part of a large Compensatory Education Program and are aimed to empower parent associations through a small grant. They have been proven to substantially improve intermediate schooling outcomes, namely grade repetition and grade failure. The strong and significant effects persist even after controlling for *Oportunidades* – Mexico's large conditional cash transfer program, and other supply-side interventions aimed at increasing the quantity and quality of education. Thus, results suggest that increasing parental participation at the school level can have positive impacts on outcomes. Qualitative interviews with parents, teachers and directors in beneficiary and non-beneficiary AGEs schools support these findings.

The AGEs are a very cost effective intervention. While the unit cost of the compensatory education program overall is $50, the AGEs are a much less costly component. Parents at each participating school receive between $500 and $700 a year depending on school size. There are over 45,000 schools and over 4.5 million students participating in the AGEs. The total cost of the AGE school grants is about $26 million a year; for 4.4 million students this comes to $5.86 per student annually. *Oportunidades*, which is also very effective and has other important benefits, pays students at the primary school level between $100 and $200 depending on which school grade they attend.

Also, given the low cost of AGEs, pouring more resources into schools may not be necessary to improve outcomes if parental participation exists and is strong. The results suggest that it may be wise to increase decision-making power to local levels and schools and increase parental participation at schools. All this will improve the school climate. Moreover, as it has been pointed out in the literature, socioeconomic, cultural and family backgrounds exert a very strong influence in the perception and (good) use of education. Results found go along these lines. That is, increasing the demand for education involving parents in the school decision-making process (AGEs support) seems to have a larger effect on children's learning.

References

Benemérita Universidad Autónoma de Puebla (2004), *Evaluación Prospectiva de Programas Compensatorios*. Mexico (processed).

CONAFE. 2000. *Focalización del Universo de Atención Compensatoria*, Mexico City.

Galiani, S., P. Gertler and E. Schargrodsky. 2005. "School Decentralization: Helping the Good Get Better, but Leaving the Poor Behind." Mimeo.

Gertler, P., H. Patrinos and M. Rubio-Codina. 2006. "Do Supply-Side-Oriented and Demand-Side-Oriented Education Programs Generate Synergies? Evidence from Rural Mexico." World Bank, Washington DC. Processed.

Glewwe, P., M. Kremer, S. Moulin and E. Zitzewitz. 2004. "Retrospective v. Prospective Analysis of School Inputs: The Case of Flip Charts in Kenya." *Journal of Development Economics* 74(1): 251-268.

Jiménez, E. and Y. Sawada. 1999. "Do Community-Managed Schools Work? An Evaluation of El Salvador's EDUCO Program." *World Bank Economic Review* 13(3): 415-441.

Jiménez, E. and Y. Sawada. 2003. "Does Community Management Help Keep Kids in School? Evidence Using Panel Data from El Salvador's EDUCO Program." CIRJE F-236 Discussion Paper, University of Tokyo.

King, E. and B. Ozler. 1998. "What's Decentralization Got to do with Learning? The Case of Nicaragua's School Autonomy Reform." Working Paper on Impact Evaluation of Education Reforms. Washington, DC: World Bank.

López-Acevedo, Gladys. 2002. "Learning Outcomes and School Cost-Effectiveness in México." *Journal of Education Planning and Administration*, 16(1):31-53.

McEwan, P.J. and L. Santibañez. 2004. "School Principal Incentives in Mexico: Evidence from a Large-Scale Reform," in E. Vegas...

Miguel, E. and M. Kremer. 2004. "Worms: Identifying impacts on education and health in the presence of externalities." *Econometrica* 72(1): 159-217.

Ozler, B. 2001. "Decentralization and Student Achievement: The Case of Nicaragua's School Autonomy Reform." Working Paper on Impact Evaluation of Education Reforms. Washington, DC: World Bank.

Paqueo, V. and G. Lopez-Acevedo. 2003. "Supply-Side School Improvement and the Learning Achievement of the Poorest Children in Indigenous and Rural Schools: the Case of PARE." World Bank Policy Research Working Paper No. 3172.

Patrinos, H.A. 2006. "Mexico: AGEs (Apoyo a la Gestión Escolar) – School Management Support: A Qualitative Assessment." World Bank. Processed.

Ramirez, A. 2006. "Mexico," in G. Hall and H.A. Patrinos, eds., *Indigenous Peoples, Poverty and Human Development in Latin America*. Palgrave McMillan, London.

Shapiro, J. and E. Skoufias. 2005. "The Pitfalls of Evaluating a School Grants Program Using Nonexperimental Data." World Bank, Washington, DC. Processed.

Shapiro, J. and J. Moreno. 2004. "Compensatory Education for Disadvantaged Mexican Students: An Impact Evaluation Using Propensity Score Matching." World Bank Policy Research Working Paper No. 3334, Washington D.C.

Skoufias, E. 2005. "PROGRESA and Its Impacts on the Welfare of Rural Households in Mexico." International Food Policy Research Institute Research Report 139. Washington, DC.

Summers, A. and A. Johnson. 1994. "A Review of the Evidence of the Effects of School-Based Management Plans." *Review of Education Research*.