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Abstract

School-based management programs aim to improve education outcomes by involving parents in allocation decisions about external funds transferred to the school. This paper explores the effects of two school-based management programs on parental investment in schools via voluntary contributions. One program provides both a cash grant and a matching scheme for privately raised funds. Difference-in-differences estimation shows that parents in richer schools increased voluntary contributions by 28 percent, while parents in poorer schools decreased voluntary contributions by 11 percent. This implies that a matching scheme results in higher inequality in resources available to schools. The second program provides only a cash grant to poor schools. Based on a randomized control, estimation shows that parents use 83 percent of the grant to substitute for voluntary contributions. A cash grant alone for poor schools results in an increase in resources available to the school in less than the cash grant transfer.

JEL code: D1, H5, I2, O2

Keywords: Education, investment, parental investment, school based matching, management, school grants, voluntary contributions.

1. Introduction

One of the main goals of most governments and international agencies is to improve the quality of education. This task has proven to be elusive. Evidence shows that increasing resources alone is not enough to improve outcomes (Patrinos, 2007). How resources are used is key to their effectiveness in achieving student learning (Vegas and Umansky, 2005; Galiani and Pérez-Truglia, 2014). How resources are used depends on the nature of the resources, the incentives provided to the agents who use them, and the institutional setting. One current policy that aims to improve the use of resources by changing how resources are used is school-based management (SBM). SBM programs transfer resources directly to schools and require parental involvement in resource allocation. The rationale behind SBM design is that parents can allocate resources more effectively than a centralized decision maker because they have the incentive to improve student learning, can better observe specific local school needs, and can better monitor the proper use of funds.

This paper explores the assumption that parents have the incentive to improve student learning through an efficient allocation of resources within the school. Parents may have other competing needs outside the school, such as food, clothing, and housing. Parents may not allocate resources efficiently when only school outcomes are considered. Specifically, this study explores whether parents change voluntary contributions when the school receives additional funding over which they have decision-making power.

The paper proposes a model that explains how parents decide on the allocation of in-school versus out-of-school resources by comparing expected returns. The model's implications are tested by observing parental reactions as a result of two different SBM programs in Mexico. The first program, the Quality Schools Program (*Programa Escuelas de Calidad—PEC)*, transfers MXN$50,000 per year (about US$3,846 at an exchange rate of 13 pesos per dollar) to marginal public elementary schools, which represents 340 percent of the funds raised through voluntary

contributions, and offers an additional two dollars for every dollar raised by the school. The program assumes that parents do not invest more in education due to financial constraints and a distortion in the allocation of funds. One such distortion could be positive externalities associated with education. The PEC program is evaluated using panel data and estimating differences in differences. Estimates show that parents in schools located in localities with very high marginality decrease voluntary contributions by 11 percent, while parents in schools located in localities with very low marginality increase voluntary contributions by 28 percent.

The second program, Support to School Management program (*Apoyo a la Gestión Escolar*—AGEs), provides secondary marginalized public schools with a grant of MXN$6000 (about US$462) per year, representing 19 percent of funds raised through voluntary contributions made by parents in the median school. The program assumes under-investment of parents in education only due to credit constraints. Estimates of program effects based on a randomized control trial show that parents decreased voluntary contributions by 14 percent. Although two programs are not directly comparable, the responses observed in terms of voluntary contributions made to the school are consistent with the predictions of the model. PEC results are consistent with a model with an elasticity of marginal returns that is sensitive to income levels.

Exploring whether parents change the amount of their voluntary contributions as a result of SBM is relevant for several reasons. First, changes in voluntary contributions by parents have a direct effect on the resources available to the school. PEC results in higher inequality of school resources. Resources for relatively rich schools increase by more than the cash grant. Parents increase voluntary contributions in response to the matching grant. Resources for the relatively poor schools increase by less than the cash grant. Parents substitute a percentage of the cash grant for voluntary contributions. AGEs results in an increase of resources available to the school that is less than the transfer amount because parents use a percentage of the grant to substitute for voluntary contributions. As a result, involving parents in the allocation process of school resources poses tradeoffs. Second,

program evaluation of transfers to school constituents may understate the benefits of a given program when resources are allocated outside of the school. Program evaluation should try to assess the benefits derived from resources used outside of the school. Third, the Mexican experience may provide some insights into how SBM programs work in a developing country context. This is relevant because other countries are implementing and operating similar programs (Skoufias and Shapiro, 2006). By 2007, SBM had been introduced in over one-third of primary schools in Mexico and it had been implemented in over 20 countries.

This paper makes three main contributions. First, it proposes a theoretical model to analyze the path through which the design of external transfers to schools mediate direct and indirect effects of SBM programs. Second, it provides empirical evidence that parents change the amount of their voluntary contributions when they receive external funding. These reactions are different depending on how the transfer is made and on household income. Third, it contributes to the literature that aims to explore the channels through which investment in education leads to heterogeneous findings in student outcomes.

The paper is organized as follows. Section 2 presents a literature review. Section 3 presents a simple model to discuss the theoretical prediction of the average effect of SBM on voluntary contributions. Section 4 explains the PEC and AGEs programs and how they were implemented. Sections 5 and 6 describe the data and estimation methods, respectively. Section 7 presents the impact of the programs on voluntary contributions. Section 8 concludes.

2. Literature Review

This section provides an overview of the literature on the effects of external investment on the behavior of school constituents and on student learning. The way in which external resources impact student learning can be thought of as a two-step process. In a first step, those who make decisions about resource allocation receive funds and adjust

their behavior within a given institutional framework. This change in behavior may introduce changes both in inputs toward which the resources are aimed (direct effect) and in other uses (indirect effect). Glewwe and Kremer (2006), Behrman and King (2001), and Bando (2013) state the importance of acknowledging both the direct and the indirect effects of resource provision on education outcomes and the role of other factors affecting decision-making in mediating the choices. Houtenville and Conway (2008) find a negative correlation between school resources and parental effort, and Liu et al. (2010) find that an improvement in school quality leads to increased labor supply by mothers. Other agents that change include teachers. For example, Muralidharan and Sundararaman (2013) and Duflo, Dupas, and Kremer (2012) find that the provision of extra teachers decreases teacher effort.

In a second step, the shock in inputs leads to changes in test scores. Das et al. (2013) and Pop-Eleches and Urquiola (2013) explore how key decision makers mediate resource allocation and its subsequent effects on student learning. Das et al. (2013) find that unanticipated grants to schools lead to an increase in inputs available within the school and student learning but that anticipated grants lead to parental substitution of resources and no changes in school inputs or student learning. Pop-Eleches and Urquiola (2013) find that when children are able to enroll in a better school, parents reduce effort but the overall effect is positive.

The literature on the effects of changes in inputs on student learning without a focus on direct and indirect effects is extensive. For example, Kremer (2003), Vegas and Umansky (2005), Bando (2013), and Glewwe et al. (2011) review the available evidence and conclude that there is heterogeneity of effects for a given input and that how inputs are provided seems to matter more than their amount.

Literature specific to SBM mostly focuses on direct effects. Barrera et al. (2009) describe the SBM model in detail and review the evidence. SBM reduces failure rates, reduces grade repetition, and reduces dropout rates. The effects of SBM on student learning are not always consistent. The authors propose several sources of heterogeneity on program impacts, such as differences in the nature of the interventions, program maturity, and differential use of impact estimation techniques. There are a limited

number of quantitative studies that provide evidence of possible indirect effects. Umansky and Vegas (2007) provide evidence that school based management reforms in Central America resulted in changes in management and teacher characteristics. More work remains to better understand what changes are detonated by SBM in the school community and how this affects student learning.

3. Conceptual Framework

This section proposes a model of how parents determine how much to invest in transfers to the school. This model is relevant in contexts where voluntary contributions of parents cover recurrent costs given limited transfers of public funds to the school, such as in the case of public schools in Mexico. In the model, parents maximize lifetime utility, which is a function of consumption and accumulated human capital. The optimal allocation of resources is such that the relative marginal return on human capital production equals the relative marginal return on consumption. Assuming decreasing rates of return, the model predicts that a cash transfer should lead to a reduction in voluntary contributions made by parents, while a matching scheme should lead to an increase.

3.1 Household Decisions on Human Capital Investment

Let the parents' association be a group of households represented by one parent each that meet and vote to set a common voluntary contribution for their children's school the following school year. According to the median voter theorem, if household preferences can be represented as a point along a single dimension, if they vote deterministically for the motion closest to their own preference, and if there are only two motions, then the winning motion will be the one preferred by the median household. The model focuses on the behavior for the median household and thus the choices made by the parents' association. Changes that could possibly take place within the organization of the parents' association and potential influences in decision

making are not taken into account. The assumptions of the median voter theorem are assumed to hold; more detailed decision making in the school is a subject for future research.

3.2 Setup

Simplifying the model by Glewwe and Jacoby (2004), consider a household that lives two periods with school-age children. The household is endowed with resources $Y \geq 0$ at time zero. In this period, parents allocate resources either to current consumption C or to investment in human capital accumulation as voluntary contributions M. Children go to school in the first period. The household only benefits from returns on education after the schooling period is over at time one.

The accumulation of human capital depends on the school production function. Schools require each of the n students enrolled to pay the same fee; therefore, human capital accumulation is a function of the total resources available to the school nM. Schools receive external transfers in a combination of a cash grant B and γ for each dollar of private transfers. In this case, the total income available to the school will accrue to $n(1 + \gamma)M + B$. Let the human capital accumulation function be given by

$$G = G(n(1 + \gamma)M + B, \mathbf{Z}),$$

where the function G is a neoclassical human capital production function with $G' > 0$ and $G'' < 0$. $\mathbf{Z}$ denotes other factors such as previous household investments, innate ability, and other school inputs that are exogenously determined. These inputs include quality of personnel, school infrastructure, and others that are determined by the government. I do not explicitly state those parameters in the functional form so as to make the presentation clear. I assume that institutional and information changes associated with the external transfers are neutral to voluntary contributions, that is, $G_{MI} = 0$, where I denotes a measure of institutional and information inputs provided by the program. The utility of the household U is assumed to be a concave function of consumption C so that $U' > 0$ and $U'' < 0$. Note that consumption is in this model a

simplified representation of the opportunity cost for household investment. The household allocates resources to human capital and consumption so as to maximize utility. Note that with a binding budget restriction, consumption equals remaining resources after investment on education. Therefore, $C = Y - M$. Let δ denote the subjective discount factor. Then the household problem is:

$$\max_{\{M\}} U(Y - M) + \delta\Phi(G(n(1+\gamma)M + B)) \quad (1)$$

where Φ is a terminal value function that incorporates the benefits to the household of having educated children. These benefits can be consumption or pecuniary benefits related to education. The function Φ is assumed to be increasing in human capital at decreasing rates, so $\Phi' > 0$ and $\Phi'' < 0$. Certainty of future outcomes is assumed. Assuming uncertainty, the household maximization problem would be $\max_{\{M\}} U(Y - M) + \delta E_0[\Phi(G(n(1+\gamma)M + B))]$ where E_0 is the expectations operator with respect to information available to the household at time zero. In this scenario, parents are potentially uncertain about future values of Φ and G. Uncertainty does not play a role in the conclusions, and therefore certainty is assumed. This problem is maximized subject to the borrowing constraint $Y \geq 0$ and non-negativity conditions, $M \geq 0$ and $C \geq 0$.

The first-order condition for the solution to the problem described in equation 1 implies that the marginal returns to lifetime utility through consumption must equal the marginal returns to lifetime utility through investment in human capital after the schooling period is over:

$$U' = \delta n(1+\gamma)\Phi' G' \quad (2)$$

3.3 Changes in Private Transfers to the School

The model allows for the prediction of the effects of external school transfers on private investment. Using the implicit function theorem, it is possible to predict whether voluntary contributions increase or decrease as a result of the program.

For ease of exposition, assume that Φ(x) = x, then the cash transfer effect is:

$$\frac{\partial M^*}{\partial B} = -\frac{\delta G'' n(1+\gamma)}{U''+\delta G'' n^2(1+\gamma)^2} \tag{3}$$

And the matching effect is:

$$\frac{\partial M^*}{\partial \gamma} = -\frac{\delta(G'' n^2(1+\gamma)M^* + G' n)}{U''+\delta G'' n^2(1+\gamma)^2} \tag{4}$$

Equation 3 states that households will substitute resources invested in human capital accumulation through the cash transfer provided by the program. Equation 4 models how the matching component of the program creates an incentive to increase voluntary contributions if $\frac{G'' n(1+\gamma)M*}{G'} > -1$. The total effect of a program with both components will be:

$$\frac{\partial M^*}{\partial B} + \frac{\partial M^*}{\partial \gamma} = -\frac{\delta n(G''(1+nM^*)+G')}{U''+\delta G'' n^2(1+\gamma)^2} \tag{5}$$

Assuming that returns are decreasing for both capital formation and utility, then a non-monotonic effect of the program on M *across household income would imply that the sign of G" (1+nM *)+G' will change as school resources change. A simple way to see this is to assume that G" = 0. In this scenario, the effect of a program with both a matching grant and a cash grant would result in an increase in voluntary contributions for all income groups.

4. The Context and Programs

This section describes the role of voluntary contributions in public schools in Mexico and the two SBM programs on which model's implications are tested.

4.1 Voluntary Contributions

Public schools in Mexico are free by law, as provided in the Constitution. In practice, voluntary contributions made by parents provide the necessary resources to cover the most basic needs not covered by the government, which are usually associated with maintenance and operating costs. Over 90 percent of government expenditure in education goes to the payment of salaries, and the remaining amount is used for books and administrative costs (OECD, 2006). Most schools are endowed with basic infrastructure, personnel, books, and utilities, such as water and electricity. In general, the principal and the parents meet annually and vote to set a voluntary contribution amount so that the school's basic expenses are covered. It is agreed before voting that all parents will commit to contribute the same amount to cover the school's expenses. The average voluntary contribution is about MXN$66 (about US$5.20) per child. Payment of the voluntary contribution is socially enforced. Parents know about the voluntary contribution at the beginning of the school year and choose whether to send their children to that school or not. The practice of private transfers by parents to cover school needs is well documented, and data on the total amount of the transfers are collected every year as part of the school census by the Education Secretariat. The practice is so widespread that the 2012 education reforms explicitly required transparency in the use of such funds and prohibited sanctions to be applied to families that choose not to contribute (*Diario Oficial de la Federación*, 2013).

4.2 PEC

This section describes the PEC program, its allocation rules, and previous evidence on its effects on student outcomes. PEC is the largest SBM program in Mexico. PEC

started in 2001 with over 1,900 pilot primary schools.

In 2006, Mexico invested approximately US$174 million in the program, which benefited 37,897 schools and 6.9 million students (PEC, 2006). PEC has two components. It grants up to MXN$50,000 to every school per year and matches US$2 for each peso that the school raises for a maximum of an additional MXN$200,000. According to the program's allocation rules, 80 percent of the funds should be allocated to infrastructure improvements and 20 percent to other expenditures such as books, school supplies and other didactic materials[1]. The resources obtained by the program do not substitute any transfers the government would have made to the school in the absence of the program. The transfer is important to the schools. In 2006, the average transfer made voluntarily by parents to each school was MXN$26,524.

PEC specifically targets primary and secondary public schools. Initially, only primary schools were able to participate. In the second year of the program, *telesecundarias* became eligible to participate. From the third year on, all public schools that provide education from preschool to secondary education, including those providing special education, are eligible to participate.

Participation in the program is voluntary and requires the principal to write an improvement plan, for which he receives training. The program promotes parental participation into the design of improvement plans and required parents to formalize the parents association in the school. The program requires the parent's association representative to oversee and sign on all school plan reports to the state. The principal and the parent's association representative administer program funds. The program aims to give parents a formal role in the school, a reason to observe school activities, and a voice in decision-making. Besides formalizing the parent's association and the role of the parent's representative, the program does not make any other specific additional demands on how parents should be involved. School allocation is made by a state-wide committee, which evaluates proposals and select schools to participate according to state criteria. According to Bracho and Martínez (2006), state criteria

[1] This allocation rule changed 25 percent and 75 percent, respectively, in 2003 and to 30 percent and 70 percent in 2013. One dollar is approximately equivalent to 13 pesos.

converge with national criteria; therefore, federal criteria should be a good approximate measure of actual selection. Federal criteria state that priority should be given to schools that are located in urban areas with high or very high marginality,[2] to schools that have not participated in the program before, and to schools that have benefited from the program for less than five years. A school may drop out of the program either voluntarily or because it does not properly meet the proposed improvement plan and cannot justify the use of funds.

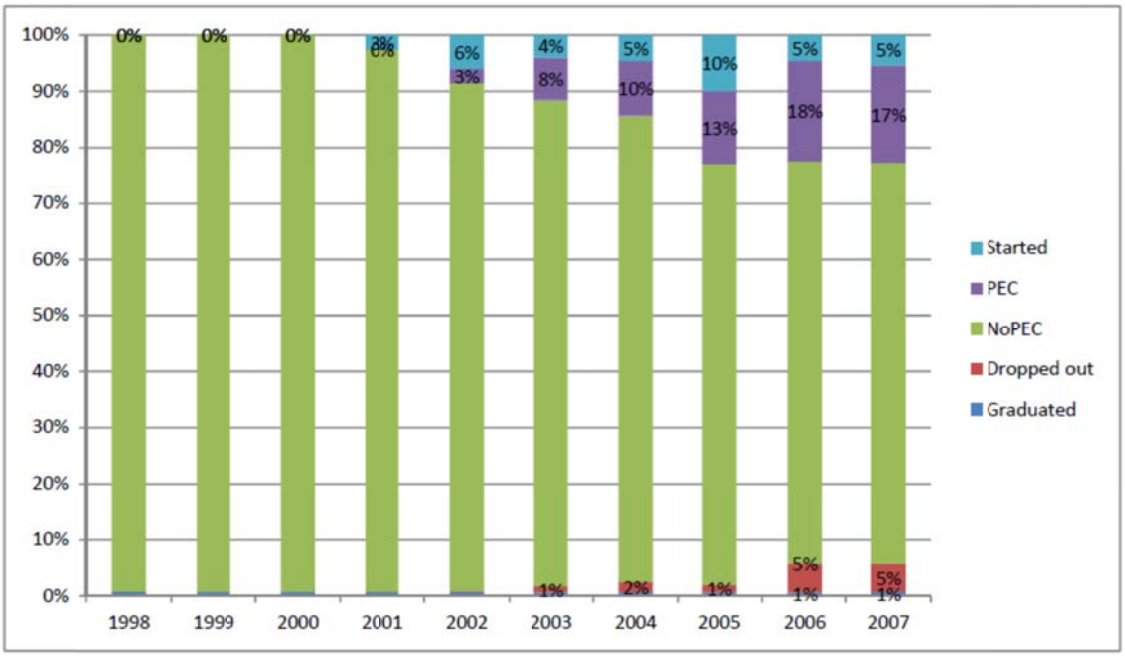
This study focuses on the evaluation of PEC for primary public schools which were eligible since the program started. Figure 1 shows school mobility by whether schools entered into the program, were already enrolled and continued receiving funds, dropped out of the program, or "graduated" because it stopped receiving funding after the fifth year. School participation increased with time as schools became better informed, became eligible, and federal funds increased. It also shows that the number of schools that started receiving the program peaked in 2005, with over 10 percent of schools entering the program. The number of schools dropping out of the program increased from 2005 to 2006 and graduation started in 2006. Forty-five percent of general public elementary schools participated in PEC at some point.

There have been two impact evaluations on PEC, by Skoufias and Shapiro (2006) and by Murnane and Cardenas (2006). Skoufias and Shapiro (2006) use both matching estimation and difference in differences estimation to evaluate the impact of the program using data from 2000 to 2003. The authors find that PEC significantly decreases dropout rates by 0.24 percentage points, failure rates by 0.24 percentage points, and repetition rates by 0.31 percentage points. The study by Murnane and Cardenas (2006) uses an extra year of data. The authors also find that PEC improved institutional organization and had a

[2] The marginality index measures differences in localities according to the global impact of the population's needs as a result of lack of access to education, inadequate housing, and the lack of goods. It is a weighted average of the following locality characteristics: percentage of illiterate population 1and above, percentage of the population 15 and above without completed elementary education, percentage of private homes without piped water, percentage of private homes without sewage or toilets, percentage of private houses with dirt floors, percentage of private home without electricity, percentage of private houses with overcrowding, and percentage of employed population with income of less than two times the minimum salary established by the government. Weights are determined by principal component analysis.

positive impact on dropout rates but they find no effect on repetition rates. T. Bracho and Martínez (2006), T. Bracho and Camacho (2005), T. Bracho and Reyes (2004), and Bracho (2001) provide detailed analyses on program implementation.

Figure 1: Share of Elementary Schools that Started, Continued, Left or Graduated from PEC by Year



4.3 AGEs

This section describes the AGEs program, its allocation rules, and previous evidence of its effects on student outcomes. This information is relevant to understand the context and how results are interpreted.

The Support to School Management program—AGEs—was introduced in 1996 to encourage parental participation by involving them in the management of school grants. There have been different versions of the program where the amounts transferred and the training provided to parents differs. Patrinos (2007) and Santibañez (2007) provide detailed reviews on different SBM programs and variations. The version of the program on which this study focuses provides each school with MXN$6000 per year and trains parents how to manage and administer those resources. Parents receive funds to improve the school. Allowed expenditures exclude pay for unskilled labor, utilities, and construction of new classrooms. The program requires the parents' and student associations to be formalized. Parents submit an improvement plan upon completion of training for this purpose.

The program was introduced in 125 *telesecundarias* in the state of Veracruz administered by the National Council for Educational Promotion (*Consejo Nacional de Fomento Educativo*—CONAFE). CONAFE is a division of the Mexican Secretariat of Education that serves rural communities with fewer than 30 children in a given level (preschool, primary, or secondary) in localities with fewer than 500 inhabitants. In most cases, a recent high school graduate is trained for six weeks to serve as a teacher and stays in the community. CONAFE provides materials to the students and teacher, and the community provides room and board for the teacher. *Telesecundarias* are secondary public schools that provide education through TV-based lessons and a teacher to lead them. *Telesecundarias* are an especially interesting education modality because educational achievements are low when compared to other modalities and given the marginalized conditions of the communities; changes in provision tend to be costly. A sample of 250 *telesecundarias* was randomly selected to evaluate the program among those administered

by CONAFE that were not participating in PEC in the 2007-2008 school year[3]. 125 schools were randomly selected to serve as treatment and receive AGEs, and 125 remained as controls to overcome the self-selection problem that was present in most previous evaluations.

There have been three evaluations of AGEs in Mexico, most of which focus on educational outcomes. In the most recent study (Gertler and Rodríguez-Oreggia, 2013), a randomized control trial was implemented in 250 CONAFE *telesecundarias* in the states of Chiapas, Guerrero, Puebla, and Yucatan. The authors find improvements of more than 0.20 standard deviations on student test scores and that training without cash transfers also leads to improvements. They also find that parental participation did not change significantly. A previous study by Gertler et al. (2008) uses panel information at the school level from 1998 to 2002 to estimate impact effects using difference in differences. The authors find a positive impact on failure and repetition rates but no effect on dropout rates. Another study by Lopez-Calva and Espinosa (2006) uses data from the 2003-2004 school years and finds a positive impact on test scores.

5. Data

Since 1998, the Ministry of Education has conducted a school census (Censo 911, SEP) at the beginning and the end of each school year. The census collects information on school characteristics, including voluntary contributions. Data on both the PEC and AGEs programs are provided by the administrative divisions. We create two data sources: one to assess the effects of PEC, and another to assess the effects of AGEs.

For PEC evaluation, the school census enabled the construction of a panel of 69,700 primary schools observed from 1998 to 2007 of all the schools in the country that were listed in the CENSUS all 10 years and offer morning or afternoon shifts.[4] Out of the

[3] At the time, 25 percent of secondary schools in the state were participating in PEC.

[4] [5] In all 10 years, 753,529 schools reported in the school census in at least one year. Therefore, the sample represents 92.5 percent of all schools ever reporting in the census. The sample excludes communal and

69,700 schools observed all 10 years, 1.1 percent of voluntary contributions are imputed, with the school average for other years if a year or data are missing or misreported. PEC participation data cover the intervention period 2001 to 2007. For AGEs evaluation, the school census allows for the construction of a panel for all 250 schools in the state of Veracruz that participate in the experiment observed from 2007 to 2009. AGEs participation data are covers the intervention years of 2008 and 2009.

6. Econometric Models and Estimation Methods

An ideal evaluation would compare outcomes when a given schools benefits from the program to the counterfactual. Since a given school is never observed in both states—that is, with and without the program—this study explores two identification strategies for each program. Estimation of SBM programs may lead to bias if schools self-select into the program or if families enroll their children in participating schools (Patrinos, 2007).

For example, public schools in wealthy areas may have a larger administrative capacity and therefore may be both more likely to apply to the program and differ in education outcomes. In this case, the correlation between wealth and education outcomes would be confounded with the effects of program participation.

6.1 Estimation of PEC Effects on Voluntary Contributions

The effect of the PEC program on voluntary contributions is identified by comparing the average across participating schools to non-participating schools. This difference is then compared to the differences that existed between participating and non-participating schools before the program started. Differential exposure in time by schools was a result of program expansion. Program expansion was motivated by the increase in program funds. Self-selection of schools into the program is the main threat to identification. To

indigenous schools.

take this possibility into account, the proposed estimation equation includes both school and state-year fixed effects. A school fixed effect makes it possible to control for all time-invariant school characteristics. In particular, a school fixed effect will absorb many personnel and infrastructure characteristics that are approximately constant given the presence of the union and the lack of government funding for school improvements in that time period. The equation also includes a state year fixed effect to capture relevant institutional variation in time because decentralization in 1992 made states responsible for providing public education.

Let $DPEC_{ist}$ denote a dummy for program participation of school i in state s and year t. Let M_{ist} denote voluntary contributions and let $\mathbf{X}$ denote time-varying school characteristics that are not affected by PEC. The average impact of program participation on voluntary contributions is estimated by:

$$M_{ist} = \nu_i + \mu_{st} + \beta DPEC_{ist} + \gamma \mathbf{X_{ist}} + \varepsilon_{ist} \qquad (6)$$

where ε is an error term. After the introduction of school and state-year fixed effects, the main identifying assumption is that there are no unobservable time-varying school characteristics different from common trends across the state that determine both program participation and voluntary contributions. This assumption is tested using three years of data before the program was introduced. Bertrand et al. (2004) suggest allowing for an arbitrary auto-correlation process when computing the standard errors when the number of observations is large enough. Therefore, robust standard errors are clustered at the school level.

To test if the effects of PEC on voluntary contributions are different among poor and rich schools, schools are grouped in five groups according to the degree of marginality of the municipality where they are located. The differential effect across schools in different marginality categories is estimated with the following equation:

$$M_{ist} = \nu_i + \mu_{st} + \beta DPEC_{ist} + \sum_{I=2}^{4} \gamma_I DPEC_{ist} * DI_{is} + \boldsymbol{\delta} \mathbf{X}_{ist} + \varepsilon_{ist} \qquad (7)$$

where DI denotes a dummy for each of five marginality groups I: very low, low, medium, high and very high marginality. The null for no difference of impact of program participation among schools in marginality group I when compared to the omitted group is $H_0 : \gamma_I = 0$.

6.2 Estimation of AGEs' Effects on Voluntary Contributions

Random allocation to program participation creates two groups that are not different on average before program implementation. Table 1 shows balance on observable school characteristics before the AGEs program started providing benefits. AGEs was implemented once the 2007-2008 school year had started, and parents were not aware that the AGEs program would be implemented. Voluntary contributions in 2007 should have not been affected by the program, and the effects of AGEs may be observed in the 2008 and 2009 waves.

A comparison of means after the program was implemented shows that the voluntary contributions between the treatment and control groups were not statistically different in 2008 and 2009.[5]. Trends are compared between treatment and control schools because the effects may be smaller than baseline differences and more precision is needed to identify effects. The differential impact of the program in time can be assessed by introducing year interactions. The data available for evaluation of AGEs includes two follow-up rounds. The estimating equation is:

$$M_{st} = \nu_s + \mu_t + \beta DT_s D2_t + \gamma DT_s D3_t + \varepsilon_{st} \qquad (8)$$

where t denotes time and s denotes a school, M_{st} denotes voluntary contributions, DT denotes a dummy variable that indicates treatment, and D2 and D3 are dummy variables that indicate if the observation was made one or two years after the program was implemented.

[5] Differences of 27 and p=0.108 in 2008 and -11 and p=0.516 for 2009.

The identifying assumption for the estimation of the estimator is that the treatment group would have changed voluntary contributions in the same way as the control group if the program was not implemented, which is true under random assignment.

Table 1: Balance at Baseline of Voluntary Contributions and School Characteristics.

	Treatment	Control	Difference	p-value
Voluntary contributions	215.88	197.80	18.08	0.260
	(12.83)	(9.57)	(16.01)	
Changes in voluntary contributions	15.64	6.36	9.28	0.468
	(10.09)	(7.81)	(12.76)	
Marginality index	-0.04	0.04	-0.09	0.479
	(0.09)	(0.08)	(0.13)	
Failure rate	0.03	0.03	0.00	0.757
	(0.01)	(0.01)	(0.01)	
School size	82.64	80.02	2.62	0.739
	(6.42)	(4.47)	(7.83)	
Number of teachers	3.78	3.78	0.00	1.000
	(0.19)	(0.15)	(0.24)	
Teachers' education	15.78	15.75	0.03	0.882
	(0.17)	(0.08)	(0.19)	
Percentage of teachers in CM	0.17	0.22	-0.05	0.165
	(0.02)	(0.02)	(0.03)	
Administrative staff per student	0.33	0.12	0.21	0.130
	(0.11)	(0.08)	(0.14)	
Percentage of indigenous students	0.08	0.11	-0.03	0.463
	(0.02)	(0.03)	(0.04)	
Number of groups	4.00	3.97	0.03	0.887
	(0.18)	(0.14)	(0.22)	
Number of rooms	3.79	3.69	0.10	0.648
	(0.18)	(0.14)	(0.23)	
Observations	125	125		

Standard errors in parentheses. Source: Own calculations.

7. Results

This section presents estimates of the impact of the PEC and AGEs programs on voluntary contributions made by parents to the school. The PEC section starts with tests of the underlying identification assumption, presents results, and finishes with robustness checks. The AGEs section presents results and robustness checks. The identification assumptions for AGEs are shown in Section 7.2.

7.1 PEC

7.1.1 Validity of the Underlying Assumptions for Identification

The main assumption behind identification of the impact of PEC on voluntary contributions is that the dynamics in schools that first participated in PEC are no different from those that started later. This assumption makes it possible to use the average of schools not receiving the program to estimate the changes in voluntary contributions in the absence of the program.

If changes in voluntary contributions prior to program implementation in 2001 predict the year in which the school entered the program, then trends are not likely to be similar in the absence of the program. A test of differences in pre-intervention trends across groups of schools by year of entry is:

$$\text{ST ART}_{is} = \mu_s + \alpha \text{DM ARG}_{is} + \beta \text{DU RB}_{is} + \gamma \Delta Y_{is} + \boldsymbol{\delta} \Delta \mathbf{X}_{is} + \varepsilon_{is} \qquad (9)$$

where $\Delta Y = Y_{2000} - Y_{1999}$ is the pre intervention trend of the outcome, ΔX is the pre intervention trend of time-varying school observables, DM ARG is a dummy indicating whether the school is located in a locality with high or very high marginality, DU RB is a dummy indicating whether the school is located in an urban area, and μ_s is a state fixed effect. The subscript i denotes a school observation located in state s. Since schools in urban and highly marginalized areas were given priority to

benefit from the program, controls are introduced for this characteristic. Other time-varying controls are introduced to control for changes in observables. To test assumptions for the test of differences in voluntary contributions among rich and poor schools, the test is repeated by each marginality group:

$$\text{ST ART}_{is} = \mu_s + \sum_{I=2}^{4} \alpha_I \text{DI}_{is} + \beta \text{DU RB}_{is} + \gamma \Delta \text{M}_{is} + \sum_{I=2}^{4} \gamma_I \Delta \text{M}_{is} \text{DI}_{is} + \boldsymbol{\delta} \Delta \mathbf{X}_{is} + \varepsilon_{is} \tag{10}$$

where DI is a dummy indicating whether the school is located in a locality with marginality level I (high, low, medium or very low marginality).

Table 2 shows estimates of equations 9 and 10. The null hypothesis that changes in voluntary contribution do not predict program participation cannot be rejected either on average or by marginality groups. A second check is to test if average changes in voluntary contributions in schools that will enter PEC are different from those schools that will not enter and remain as counterfactuals for a given year. No differences are found, and results are listed in Appendix A. Given no evidence of differences in trends before program participation, the main assumption is that these trends would have continued to have no differences in the following five years in the absence of the program.

7.1.2 Estimates of the Effects of PEC on Voluntary Contributions

Table 3 presents the estimates of equation 7. Column (A) shows the effect size, column (B) shows the average voluntary contribution in the control schools in 2000, the year before the program started, column (C) presents the effect as a percentage of the voluntary contribution, and column (D) lists p-values for the coefficients of the omitted group and listed group being zero. Schools located in localities with very high marginality decrease voluntary contributions by 11 percent. Schools in high

marginality areas do not change voluntary contributions. Schools in medium, low and very low marginality areas increase voluntary contributions, with schools in localities with lower marginality increasing voluntary contributions more. Assuming that the marginality of the locality reflects the socioeconomic status of children attending school, then the heterogeneity in responses across groups is consistent with a model where the elasticity of marginal returns is a function of the income available to the school.

Table 2: Dependent Variable: Year in which School Started PEC

	(1)	(2)
Voluntary contributions (VC)	-.0003	-.0005
	(0.0004)	(0.0004)
VC * Very high marginality	-.0001	
	(0.0007)	
VC * Medium marginality	-.0008	
	(0.0007)	
VC * Low marginality	-.0003	
	(0.0006)	
VC * Very low marginality	0.0001	
	(0.0005)	
VC * Marginality index		-.00008
		(0.0003)
Urban	-.136	-.208
	(0.11)	(0.072)***
Obs.	22041	22041

Omitted group: high marginality. State fixed effects. Standard robust errors in parentheses. Includes the 22,401 schools that entered PEC between 2001 and 2007.

School controls include school size, percentage of indigenous students, percentage of students with special needs, percentage of students with foreign nationality, average teacher education, average education of principals, number of students per teacher, administrative personnel, percentage of teachers participating in the *Carrera Magisterial* teacher program. For column (3) it also controls for a dummy for the school located in a municipality with high or very high marginality. Source: Own calculations.

* significant at 90%, ** significant at 95%, *** significant at 9

Table 3: Dependent Variable: Voluntary Contributions (VC)

Marginality	Effect	Average voluntary contribution	Effect as a percentage (A)/(B) (C)	P-value
VeryHigh	-5.7	49.6	-11%	0.012
High	0.9	55.9	2%	0.275
Medium	9.9	59.2	17%	0.000
Low	14.2	69.9	20%	0.000
VeryLow	24.9	88.2	28%	0.000
Total	12.5	65.7	19%	0.000

Estimation made with a linear specification with school and state-year fixed effects and t-statistics calculated with robust standard errors. P-values correspond to F tests for the addition of the coefficient for the omitted group and group effect different from zero.
Source: Own calculations.

The effects of the program on voluntary contributions are also estimated using the voluntary contributions in 1999 two years before the program was implemented as a proxy for school income. Interpretations using this alternative measure must be made with care because parents that give more importance to education are likely to vote for higher voluntary contributions. Estimations show that voluntary contributions increase by $8.40 for the first quintile starting from no voluntary contribution, 27 percent for the second quintile, 21 percent for the third quintile, 19 percent for the fourth quintile, and 9 percent for the fifth quintile. Appendix B shows estimates. Threats to validity of findings are derived from the possibility of omitted time-varying factors, differential secular trends, and selective migration.

7.1.3 Robustness Checks

This section includes three robustness checks to the identification of PEC effects. First, estimates are checked taking into account the possible existence of omitted time-

varying factors. Second, estimates are calculated taking into account possible different secular trends after program implementation. Third, the importance of selective migration is assessed to rule out program effects being driven by changes in school composition. The main results are robust to these checks.

7.1.4 Omitted Time-varying Factors

A threat to the validity of the estimates is the existence of omitted time-varying factors that do not occur in all schools in the state that determine both program participation and outcomes. The existence of time-varying factors omitted after introducing a state-year fixed effect and a school fixed effect are unlikely because policy making is done either at the federal or the state level.

One concern is that there may be some local time varying factors such as environmental conditions that affect program allocation and outcomes. Therefore, the effects of the program, including municipality-year fixed effects, are estimated. Table 4 shows that the estimates are not statistically different from the estimates with state-year fixed effects.

Another check is to conduct a placebo test by estimating the effects of the program on the year previous to school participation. No effects of PEC participation on voluntary contributions are found on the year before entry. Appendix C shows estimates.

7.1.5 Differential Secular Trends

Another threat to the validity of the findings is that schools that benefit from PEC are different than those that do not and their dynamics are different after 2001. If so, the counterfactual of PEC is not a valid comparison. Therefore, schools similar in two dimensions—size and location—are compared. First, the sample is restricted to schools located in municipalities both with PEC and non-PEC schools for the last two years observed in 2006 and 2007. Second, the sample is restricted to the common

support of the size distribution in 2007. For this, schools smaller than 15 percent are dropped from the sample of treated schools, and schools larger than 85 percent are dropped from the sample of control schools. When repeating the analysis by marginality group, schools are grouped by having high or very high marginality or not because the schools in the first group have priority to enter PEC. Schools smaller than 5 percent of the group of treated schools with priority to enter PEC and smaller than 5 percent of the treated schools in the group with no priority are dropped. Schools larger than 95 percent of the control schools in each group are also dropped. Restricting the sample by larger shares would result in an artificial difference in groups that are statistically different. The resulting estimates are not statistically different from those that include all schools.

Table 4: Dependent Variable: Voluntary Contributions

	MAIN	BOTH	SIZE
Overall			
PEC participation	12.455	12.302	12.153
	(0.428)***	(0.43)***	(0.465)***
By marginality group			
PEC participation	0.881	0.713	1.510
	(0.807)	(0.813)	(1.119)
* Very high marginality	-6.562	-6.594	-7.429
	(2.389)***	(2.415)***	(4.457)*
* Medium marginality	9.017	8.961	6.050
	(1.188)***	(1.194)***	(1.413)***
* Low marginality	13.273	13.216	10.206
	(1.102)***	(1.107)***	(1.342)***
* Very low marginality	24.034	24.037	20.724
	(1.194)***	(1.198)***	(1.423)***
Obs.	697000	667175	492415

MAIN=Main specification, BOTH=Only includes municipalities with PEC and non PEC schools, SIZE=Common support in size with 15% for overall and 5% by marginality group, MUN FE= Municipality-year fixed effects

Omitted group: high marginality. Linear specification with school and state-year fixed effects. Robust standard errors in parentheses.

* significant at 90%, ** significant at 95% *** significant at 99%.

School controls include school size, percentage of indigenous students, percentage of students with special needs, percentage of students with foreign nationality, average teacher education, average education of principals, number of students per teacher, administrative personnel, percentage of teachers participating in the *Carrera Magisterial* teacher program. Source: Own calculations.

7.1.6 Selective Migration

Another concern related to identifying program effects is that the best teachers or students could have moved to PEC. Student or teacher migration could result in changes in voluntary contributions not related to a direct change in parental allocation of resources in or outside the school. The strategy suggested by S. Galiani (2005) applied to the PEC panel shows that migration is less than 0.1 percent for both teachers and students. Appendix C includes estimation.

7.2 AGEs

Table 5 shows estimates for equation 8. The average voluntary contribution in 2007 was MXN$207. Column (1) includes a year and a school fixed effect but no other controls. Time-varying school characteristics are introduced to explain variation in voluntary contributions and improve efficiency of estimation. Column (2) shows estimation with the inclusion of time-varying school characteristics. Taking the estimate in column (1), schools that receive AGEs decrease voluntary contributions by MXN$29, which represents 14 percent of the voluntary contribution in 2007. To illustrate the significance of the effect size, assume a school of average size of 171 students. The substitution effect decreases income to the school through voluntary contributions by MXN$-29*171=MXN$4959. In this example, and assuming parents use both voluntary contributions and program funds for the same school improvements, then about MXN$4959/6000=83 percent of the MXN$6000 transfer to the school by the program would substitute voluntary contributions. Columns (3) and (4) show analogous results introducing an interaction with the marginality index. Schools in localities with higher marginality may substitute in a way that is less consistent with the model. Note that the difference is not statistically significant, which may be a result of no effects or of the lack of power, given the sample size, to detect small differences. There is relatively little heterogeneity of school income as the

program focuses on CONAFE *telesecundarias*.

8. Conclusions

Transferring decision making on school fund allocation to their constituents has been proposed as a way to improve the provision and quality of education. Previous studies show that school constituents will mediate the use of resources when they have decision-making power given the institutional framework. This study proposes a framework to model changes in parents' choices between internal and external school investments motivated by the provision of external funds. It analyzes the effect of two school-based management programs in Mexico on voluntary contributions which are not directly comparable. Results provide evidence that parents adjust private transfers as a result of external transfers.

The observed changes are consistent with a model where parents face alternative uses of funds and both the human capital production function and the function of alternative uses are sensitive to income available to the school. The PEC program increases on average voluntary contributions by 19 percent and so increase funds raised by parents to the school. Schools in very highly marginalized areas decrease voluntary contributions by 11 percent, while those schools located in areas with very low marginality increase them by 28 percent. As a result, PEC results in higher inequality of resources available to the school across different income groups. AGEs decreases voluntary contributions by 14 percent. This effect is equivalent to saying that 83 percent of the external transfer was used to substitute voluntary contributions made by parents on a school of median size. As a result, involving parents in the decision making process of school resources will result in tradeoffs between in and out of schools inputs.

The findings and limitations in this study highlight the importance of future research on how variations on grants and matching rates change voluntary contributions, participation of parents and other inputs and their effects on student

learning. Parental participation is of special interest because it is a theoretical key factor to lead to the improvement of education outcomes through SBM. It is relevant to find out what is the use of program funds destined to substitute for voluntary contributions. If parents use program funds to provide complementary inputs to education such as nutrition and time, then substitution may lead to a more efficient use of resources to accrue human capital in students when compared to a centralized decision maker. Evidence in these areas could shed light on ways to increase the efficiency of programs that transfer both funds and decision-making power to school constituents.

Table 5: Dependent Variable: Voluntary Contributions

	(1)	(2)	(3)	(4)
Treatment* year 2009	-28.672	-31.881	-27.625	-31.038
	(15.844)*	(15.876)**	(15.697)*	(15.680)**
Treatment* year 2008	8.800	9.362	9.734	10.286
	(13.304)	(13.433)	(13.173)	(13.260)
Treatment*2009*marginality			7.350	8.464
			(16.215)	(16.789)
Treatment*2008*marginality			11.198	14.578
			(12.980)	(13.228)
Obs.	750	750	750	750
Average voluntary contribution in 2007:MXN$207				

Treatment denotes school receipt of the AGEs transfer. Year 2009 and 2008 denote year dummies. Robust standard errors in parentheses. Includes data from the 2007-2008 school year to the 2009-2010 school year. Column (1): Includes school and year fixed effects. Column (2): Includes school and year fixed effects and controls for the following school characteristics: school size, number of students per teacher, average teachers education, percentage of teachers participating in the *Carrera Magisterial* teacher program and percentage of indigenous students. Source: Own calculations.

* Significant at 90%, ** significant at 95%, *** significant at 99%

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Appendix A: Pre-intervention Trends

The effect of the program is calculated by comparing changes in outcomes when the school stays or joins the program to those schools that have not benefited from the program yet or that left it. To test whether the effect is just a difference in trends driven by unobservable differences, a test of whether or not trends in voluntary contributions in the year previous to program participation are statistically different or not is carried. Table 6 shows estimates for levels and differences in voluntary contributions $M_{t-1} - M_{t-2}$ of schools entering PEC in year t to those that do not enter PEC. Schools that had PEC at $t - 1$ are excluded. There is no evidence of differences in trends before program participation. Therefore, it is feasible to assume that no differences in trends would have been observed in the absence of the program.

Table 6. P-values for Differences in Means of Voluntary Contributions in the Previous Year by Marginality Group. Entering PEC and Not PEC so far

Marginality level:	Very high	High	Medium	Low	Very low
		Trends			
2001	0.939	0.855	0.823	0.440	0.673
2002	0.833	0.346	0.890	0.291	0.668
2003	0.270	0.424	0.455	0.637	0.412
2004	0.719	0.843	0.483	0.749	0.593
2005	0.349	0.749	0.746	0.423	0.893
2006	0.677	0.309	0.969	0.907	0.867
2007	0.370	0.897	0.844	0.432	0.702
		Levels			
2001	0.890	0.772	0.807	0.550	0.618
2002	0.931	0.640	0.476	0.237	0.314
2003	0.843	0.897	0.609	0.297	0.256
2004	0.814	0.767	0.519	0.334	0.307
2005	0.911	0.871	0.428	0.181	0.435
2006	0.917	0.847	0.714	0.561	0.418
2007	0.895	0.925	0.886	0.572	0.588

Source: Own calculations.

Appendix B. Estimation of PEC Effects on Voluntary Contributions by Quintiles

Table 7 shows that voluntary contributions increase by $8.40 for the first quintile, 27 percent for the second quintile, 21 percent for the third quintile, 19 percent for the fourth quintile and 9 percent for the fifth quintile. Table 8 summarizes the results and compares them to the average voluntary contribution. The second column shows the interaction of program participation with voluntary contributions in 1999.

Table 7: Dependent Variable: Voluntary Contributions (VC)

	GROUP	INDEX	AVERAGE
	(1)	(2)	(3)
Program participation	8.396	10.740	12.032
	(0.919)***	(0.669)***	(0.428)***
* 2nd quintile	-2.179		
	(1.231)*		
* 3rd quintile	1.653		
	(1.187)		
* 4th quintile	7.841		
	(1.190)***		
* 5th quintile	8.030		
	(1.596)***		
* Voluntary contribution in 1999		0.019	
		(0.009)**	
Obs.	697000	697000	697000

Estimation made with a linear specification with school and state-year fixed effects and t-statistics calculated with robust standard errors. School controls include school size, percentage of indigenous students, percentage of students with special needs, percentage of students with foreign nationality, average teacher education, average education of principals, number of students per teacher, administrative personnel, percentage of teachers participating in the *Carrera Magisterial* teacher program. Source: Own calculations.

The interpretation of the coefficients is different than the interpretations using marginality as a measure for school income. Voluntary contributions reflect the

economic status of the household but they also reflect other characteristics such as parents' degree of interest in education. Therefore, the effects across quintiles reflect differences in both the economic status of the school and other unobservable characteristics that determine voluntary contributions. Consistent with the analysis by marginality groups, schools in the higher quintiles of the distribution increase voluntary contributions more. The heterogeneity of responses across groups is also consistent with non-constant elasticity of marginal returns.

I test for identifying assumptions and make robustness checks analogous to those used for the marginality index and find that estimates for this specification are unlikely to be driven by unobservables. Table 9 shows that pre-intervention trends predict program participation for the lowest quintile. Pre-intervention trends and trends interacted with voluntary contributions in 1999 do not have predictive power on year of entry to the program.

Table 8: Dependent Variable: Voluntary Contributions (VC)

Quintile of voluntary	Effect	Average voluntary contribution	Effect as a percentage	P-value
1	8.4	0		0.000
2	6.22	23.25	27%	0.000
3	10.05	47.46	21%	0.000
4	16.24	85.54	19%	0.000
5	16.43	185.5	9%	0.000

Estimation made with a linear specification with school and state-year fixed effects and t-statistics calculated with robust standard errors. P-values correspond to F tests for the addition of the coefficient for the omitted group and group effect different from zero.
Source: Own calculations.

Table 9: Dependent Variable: Year of Entry to PEC

	GROUP	INDEX
Voluntary contributions	-.001	-.0004
	(0.0005)***	(0.0003)
2nd quintile	0.0009	
	(0.001)	
3rd quintile	-.0007	
	(0.0006)	
4th quintile	0.0004	
	(0.0007)	
5th quintile	0.0005	
	(0.0007)	
VC in 1999		-1.09e-06
		(1.22e-06)
Urban	-.744	-.845
	(0.09)***	(0.097)***
Obs.	22041	22041
R^2	0.057	0.05

Estimation made with a linear specification with school and state-year fixed effects and t-statistics calculated with robust standard errors. School controls include school size, percentage of indigenous students, percentage of students with special needs, percentage of students with foreign nationality, average teacher education, average education of principals, number of students per teacher, administrative personnel, percentage of teachers participating in the *Carrera Magisterial* teacher program. Source: Own calculations.

Appendix C. Robustness Checks

I test false treatment on pre intervention outcomes. I check whether ever participating in the program has an effect on pre-intervention outcomes. The estimating equation is:

$$\Delta M_{is} = \mu_s + \alpha_I M ARG_{is} + \beta DU RB_{is} + \gamma DEVERPEC_{is} + \gamma_I DEVERPEC_{is} * M ARG_{is} + \delta \Delta \mathbf{X}_{is} + \varepsilon_{is} \quad (11)$$

where $\Delta M = M_{2000} - M_{1999}$ is the pre-intervention trend of the outcome, DEV ERP EC is a dummy indicating whether the school ever participated in the program, ΔX is the pre-intervention trend of time-varying school observables, DMARG is a dummy indicating whether the school is located in a locality with high or very high marginality, DU RB is a dummy indicating whether the school is located in an urban area, and μ_s is a state fixed effect. The subscript i denotes a school observation located in state s. Table 10 shows estimates for false treatment. Program participation does not have an effect on changes in voluntary contributions.

Another concern could be that the best teachers or students moved to PEC schools. In this case, the effects of PEC would be attributed to a change in student and/or teacher composition and not to the program itself. Teachers moving to PEC schools is unlikely. PEC does not allow direct benefits to teachers, like changes in salaries or labor conditions. Nor does PEC allow school decision makers to hire new personnel. Moreover, PEC benefits a school for up to five years. After five years, the school no longer has priority to receive benefits. Since the government and the union control the allocation of teachers, moving to a different school involves a time cost to the teachers to deal with bureaucracy.

Changes in student composition are more feasible. Therefore, it is informative to estimate both teacher and student migration. Estimation follows the methodology proposed by S. Galiani (2005). This methodology proposes to check whether the

program affects the distribution of students in participating and non-participating schools. If there are no changes in relative enrollment rates, then changes in composition are unlikely. The unlikely scenario of strong and weak student mobility offsetting each other is possible. The estimation equation for the effect of the program on the share of students in a given school is the following:

$$Share_{ist} = \nu_i + \mu_{st} + \alpha Y\ P\ EC_{ist} + \gamma \mathbf{X_{ist}} + \varepsilon_{ist} \qquad (12)$$

where $Share_{ist}$ is the share of students in a municipality enrolled in school i.
The null hypothesis for no changes in student composition is $H_0 : \alpha = 0$

Table 10: Dependent Variable: Voluntary Contributions

	GROUPS	INDEX	AVERAGE
	(1)	(2)	(3)
Participated in PEC	1.508	1.152	1.892
	(0.919)	(0.927)	(1.162)
* Very high marginality	-1.675		
	(2.399)		
* Medium marginality	0.0009		
	(1.692)		
* Low marginality	1.338		
	(1.363)		
* Very low marginality	1.195		
	(3.250)		
* Marginality index		-.676	
		(1.220)	
Obs.	69700	69700	69700

State-year fixed effects. Standard robust errors clustered at the state level in parentheses.
School controls include school size, percentage of indigenous students, percentage of students with special needs, percentage of students with foreign nationality, average teacher education, average education of principals, student/teacher ratio, administrative personnel, and percentage of teachers participating in the *Carrera Magisterial* teacher program.
* significant at 90%, ** significant at 95%, *** significant at 99%. Source: Own calculations.

To check for possible changes in teacher composition, equation 12 is estimated, replacing the dependent variable with the share of teachers in the municipality that work in the school. Results are shown in Table 10. The effects of the program on migration are less than 0.01 percent. It is unlikely that the effect of the program is confounded with that of students or teachers migrating to PEC schools.