Evaluating the impact of closing a community managed schools programme in El Salvador

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Note to readers

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Contents

Executive summary

Importance of research topic and questions.

School-based management (SBM) is considered a low-cost way of making public spending on education more efficient by increasing the accountability of the agents and empowering clients to improve learning outcomes. By putting power in the hands of the end users, SBM can lead to better school management that is more responsive to the needs of end users. Yet, countries around the world are struggling to understand whether SBM models contribute to student learning and advancement in schools. Moreover, there are few impact evaluations that provide us with concrete data on the effectiveness of SBM.

In 1992, the Community Managed Schools Program (EDUCO) in El Salvador created schools that were based on the idea of SBM. Parents were given the power and responsibility for schools, including hiring and firing teachers. After 20 years of success in increasing student advancement, the Ministry of Education changed the SBM model, effectively ending EDUCO school autonomy as it relates to managing teachers. This evaluation is important because it contributes to international understanding of the role and impact of SBM models and contributes to the Salvadorian Ministry of Education's planning and design around teacher development and accountability.

The purpose of this impact evaluation is to understand whether different school management models have an impact on student advancement. Evaluation questions include:

1. To what extent has the decision to end EDUCO affected decentralized management of rural schools in El Salvador?
2. To what extent has student advancement in the EDUCO schools changed since the government's decision to end the program?

Key findings

The policy choice to change the school-based management model was the appropriate and most cost-beneficial policy choice. The following are the main findings of this evaluation.

1. The change in school management models has reduced affected the ability of local SMCs to hold teachers accountable for being present at the former EDUCO schools. Community perceptions suggest that teacher absenteeism has increased and that it is contributing to the decrease in student advancement.
2. The results from the hierarchical growth models showed that there was no statistically significant impact on student advancement in the former EDUCO schools that resulted from changing the SBM model.
3. Closing the EDUCO program was cost beneficial from the standpoint of per pupil costs. It was not accompanied with a negative impact on student advancement and provided a more stable employment situation for teachers.
4. Closing the EDUCO program did not come without losses. For 20 years, the program enrolled and helped students who would otherwise not be in school to complete primary education. The advancement rates and learning outcomes improved faster than those in the non-EDUCO schools, which demonstrates its clear value in providing a strong model for education in rural areas.
5. In terms of school management and accountability in El Salvador, MINED centralized control of SBM.

The new Teacher Directive Law has led to improvements in the role and dignity of teachers, empowered school directors and increased the equality of resources at schools. It has, however, substantively decreased the role that communities, particularly SMCs, play in increasing accountability at the school.

Theory of Change and Evaluation Design

The theory of change behind this evaluation is that if the government removes the power of SMC to directly manage the school, then the lack of school autonomy and accountability will impact student advancement negatively. Our evaluation design included the following components.

1. Quantitative component, which uses a regression-based framework to estimate the differences in school performance between a constructed counterfactual condition and what was observed among formerly EDUCO schools during the post-closure period.

2. Qualitative component, which draws on interviews and focus groups with teachers, SMC members and school directors to understand the school and community perceptions of the change SBM.

3. Cost-effectiveness analysis which determines the cost effectiveness of access and student advancement in school.

Sampling

The sampling for the hierarchical growth model included 3,755 schools. We employed restrictive criteria for our population of interest such that schools that were not consistently identifiable as an EDUCO or non-EDUCO school over the pre-closure period (2005−2010) where excluded from the population of interest. Because this study largely involves secondary data analyses, our strategy for determining sample size requirements was to estimate the minimum detectable effect size (MDES) given a fixed number of treatment (EDUCO) and comparison (non-EDUCO) schools, a pre-specified level of power (1-β), a fixed number of measurement occasions and a pre-specified type I error rate (α). The MDES was estimated in a Monte Carlo simulation study that involved repeated simulated draws of a fixed size from a hypothetical population of national test score results, aggregated to the school level. Post-closure results were examined for the years 2010 − 2012.

The sample size for the qualitative component included 40 schools that were selected using maximum variation sampling based on performance on the national student assessments.

Internal validity

Concerns related to internal validity include the following factors.

1. Availability of learning data.
2. Decline in student advancement in both sets of schools.
3. Limited data on current interventions.
4. Change in government.
5. The ecological fallacy.
6. Within district confounding.

External Validity

The generalizability of our findings face the following key issues.

1. Our identification strategy, particularly with respect to the formulation of the propensity score weights (ATT), means that our findings may not be generalizable to the larger set of public schools that were not formerly operated under the EDUCO program.
2. One of the unique features of the current study is that we are assessing the impact of a school management model when it is removed. From the standpoint of

external validity, it does not necessarily follow that the impact of ending a program/model can tell you much about the likely impact of starting the same program/model in the future – when the context of its implementation may be quite different.

3. Conditions such as donor investments, targeted technical assistance, and direct support that the EDUCO schools received may have impacted how the SMCs functioned, student outcomes and community participation. As a result, it is important to consider the sensitivity of the program's impact to the contextual factors associated with its emergence, including things such as the political environment that drove the program's creation; and the communities where the program initiated.

Abbreviations

ACE	*Asociaciones Comunales para la Educación* (EDUCO schools)
ATT	Propensity score weights
CDE	*Consejos Directivos Escolares (*Non-EDUCO schools*)*
CECE	*Consejos Educativos Católicos Escolares*
CIE	Institutional Educational Councils
EDUCO	The Community Managed Schools Program
FEDISAL	*Fundación para la Educación Integral Salvadoreña*
FHI 360	Family Health International 360
FMLN	*Frente Faraundo Martin para la Liberación Nacional* (left-wing party)
HLGM	Hierarchical growth model analysis
ICC	Intra-class correlation coefficient
M&E	Monitoring and Evaluation
OIRE	FHI 360's Office of International Research Ethics
PAP	Pre-Analysis Plan
SAAS	World Bank's School Autonomy and Accountability Assessment Scale
SAR	Student advancement rate
SBM	School-based management
SMC	School management committee
SIMEDUCO	*Sindicato de maestros de EDUCO*
USAID	United States Agency for International Development
MINED	Ministry of Education of El Salvador

ISSS	Salvadoran Social Security Institute
DD	Difference-in-difference
GER	Gross enrolment
MDES	Minimum detectable effect size
SABER	School Accountability and Benchmarking of Educational Results

1. Introduction

After the Salvadoran Civil War in 1992, El Salvador created a new model of school-based management (SBM) to serve primary school students in the most rural and remote areas. The Community Managed Schools Program (EDUCO) aimed to decentralize the management of public education by increasing parents' involvement in and responsibility for schools. To address accountability, the EDUCO program hired teachers and principals on annual contracts. At the end of each year, the school management committee (SMC)—made up of parents—evaluated teacher performance to determine whether contracts would be renewed.

SBM-type reforms have been introduced in countries such as Australia, Canada, Israel, and the United States, some going back 30 years. The World Bank has been an advocate for SBM-type reforms. The majority of SBM projects in the Bank's portfolio in the late 2000s included Argentina, Bangladesh, Guatemala, Honduras, India, Mexico, Sri Lanka, Macedonia, Serbia, Montenegro, Philippines and Lebanon (World Bank, 2010).

SBM is considered a low-cost way of making public spending on education more efficient by increasing the accountability of the agents involved and by empowering the clients to improve student advancement outcomes (as a proxy for learning outcomes). By putting power in the hands of the end users of the service (education), SBM eventually leads to better school management that is more cognizant of and responsive to the needs of those end users, thus in creating a better and more conducive learning environment for the students. The main benefits of these reforms include more input and resources from parents (whether in cash or in kind); better quality education as a result of the more efficient and transparent use of resources; a more open and welcoming school environment since the community is involved in its management; increased participation of all local stakeholders in decision-making processes, leading to a more collegial relationship and increased satisfaction; and improved student performance as a result of reduced repetition rates, reduced dropout rates and (eventually) better learning outcomes (World Bank, 2007).

Following the end of the civil war in El Salvador, the donor community invested in creating schools for the rural regions of El Salvador, which had been neglected over the course of nearly 20 years. From 1999 to 2009, EDUCO's impact on expanding primary education established more than 2,000 schools in rural areas—a third of El Salvador's schools. These schools have received international recognition and influenced the development of similar programs in other countries, including Honduras and Guatemala. The creation of the program helped ensure that more than 300,000 children were enrolled in first grade between 2004-2009 through the existence and expansion of the EDUCO program. Moreover, the World Bank considers the program strong SBM reform that has changed school dynamics; reduced repetition, failure and dropout rates; and improved learning outcomes (Jimenez and Sawada, 1999, 2003; Sawada and Ragatz, 2005).

In 2010, after two decades of investment in EDUCO, the newly elected Salvadoran government reviewed the program's labour relationship between teachers and communities, and decided to close the program. The program's closure has raised concerns about changes in the local management of rural schools—school autonomy—and teacher accountability, measured here through teacher attendance. Since 2006, no rigorous impact evaluations have examined the impact of EDUCO on school management (or other models) or the consequences of its elimination on the local community and the student advancement outcomes of children. The decision to close the program, along with the lack of rigorous impact evaluations, presented the opportunity to undertake an impact evaluation to inform decision making in the mist of political changes after 2011.

FHI 360, in partnership with Salvadoran organization *Fundación para la Educación Integral Salvadoreña* (FEDISAL) and with the support of a local consultant in the final phase,

conducted this evaluation to examine the early consequences of closing the EDUCO program on school autonomy, teacher accountability, and student performance. This is not an evaluation of the EDUCO program itself.

The purpose of this impact evaluation is to understand whether different school management models have a significant impact on student advancement. The evaluation questions include:

1. To what extent has the decision to end EDUCO affected decentralized management of rural schools in El Salvador?
2. To what extent have student advancement outcomes in the EDUCO schools increased or decreased since the government's decision to end the program?

To help answer these general questions, the following sub-questions were addressed:

1. How are school councils functioning after EDUCO's closure?
2. Has the social norm of community participation in making school decisions been sustained after EDUCO's closure?
3. What were the conditions that affected the extent or level of community participation in schools upon the end of EDUCO?
4. How has an increase or decrease in teachers' absenteeism affected students' advancement rates?
5. How has the change in participation of parents in school councils affected students' advancement rates?

The following main impact variables were analysed to help us understand the range and depth of the effects.

1. School–community and institutional structures surrounding EDUCO schools: school councils' size, structure and level of organization and teachers' attendance.
2. Political and social resources reflecting the distribution of power authority among parents, teachers and the MINED.
3. Individual educational variables: students' advancement rates in EDUCO schools and repetition, failure and dropout rates.
4. School level variables: enrolment and investment in education to understand how EDUCO worked and under what circumstances.
5. Participation of parents and communities in school. To what extent did funding EDUCO contribute to increased accountability and did the role of the ACE continue when funding was terminated?
6. The extent to which teacher migration and movement affected student advancement and completion rates.

Our hope is that the knowledge gained from this evaluation will first and foremost inform the policy debate around rural education, school autonomy and teacher accountability in El Salvador. The current government is interested in teacher professional development and accountability—something that school management councils can help support and plan a role in improving. The results of this evaluation will provide a comprehensive examination of the role and reactions of teachers, the government and parents who lived through the change in SBM. It will also inform discussions and decisions around the Systems Approach for Better Education. The results will also highlight the impact that similar decisions may have for other ministries in the region that have used the EDUCO SBM model, including those in Guatemala and Honduras.

Our evaluation approach is a mixed methods case study. There are three main components to this evaluation.

1. Hierarchical growth modelling is used to estimate the differences between projected student advancement over two different growth phases, before and after the closing of the EDUCO program. The analysis compares the trends to the government supported non-EDUCO schools (CDE) that were matched to the EDUCO (ACE) schools.
2. The qualitative component draws on teacher and school director interviews and focus groups to understand the school and community-level effects of ending the EDUCO program and removing the local decision-making power.
3. The cost and cost-effectiveness analysis is used to determine the cost effectiveness of access and student advancement in the EDUCO schools compared to the non-EDUCO schools.

Pre-analysis plan

The quantitative analyses reported herein differs in several respects from the pre-analysis plan (PAP): 1) the mathematical identification of the treatment effect, 2) the choice of the primary outcome variables, 3) the propensity score matching approach and 4) the inclusion of an exploratory analysis of teacher transfers.

With respect to the first, a routine, internal review of the PAP revealed an error in the way we delineated the identification of the causal effect of the EDUCO program's closure. The identification strategy described in this report is the corrected version.

With respect to the second issue, we discovered soon after assembling the data for the impact evaluation that student test score data were only available from the MINED for the years, 2005, 2008 and 2012. Furthermore, although the years 2005 and 2008 cover the population of all (rural) EDUCO and non-EDUCO schools, for 2012 student test score data were only available for a randomly selected subset of schools. Given how sparsely the testing data were sampled over the study window, in particular considering that 2012 is the only year post-closure, we decided to switch our focus to the student advancement rate (SAR) as the key outcome. The SAR was constructed from student enrolment data and was available for all schools in the population of interest for every year within the 2005–2012 study window. Details regarding the construction of the SAR are provided in a later section of the study (See Section 2). We also examine the correlation between the SAR and the originally proposed school-level testing data for the limited years that both types of outcomes are available.

Third, with respect to the propensity score matching approach, we elected to adjust the approach based on further consideration of the matching problem. Our decision to adapt the approach was not influenced by an examination of the outcome data, but was in response to a mixture of theoretical and practical concerns that arose during the preparation of the analytical data base. In the original PAP, we listed a handful of school-level covariates to be used for matching. Rather than use these covariates, we opted instead to calculate a propensity score based on the probability of "treatment" (that is, EDUCO versus non-EDUCO) conditional on each school district represented in our sample of schools.

To provide some theoretical justification for this change, we are essentially using longitudinal data from the non-EDUCO schools in order to estimate a "deflection" in their rate of growth that coincided with the closing of the EDUCO time period. We then apply this deflection to the counterfactual condition, essentially assuming that if the EDUCO program had not closed, EDUCO schools would have continued to grow along the trajectory they did before the closure, but modified by the deflection estimated from the non-EDUCO schools.

For this approach to be valid, we need equivalence across measured factors that influence a deflection in growth in the outcome during the post-EDUCO time period. This task is much simpler if we limit ourselves to factors that are stable over the entire study window (2005–2012); the only variable available that meets this criterion is geographic location or the school district. There is no other evident practical approach for matching on variables that is likely to change over time in the given context (for example, the percent of teachers with a college degree or higher). For instance, it is *a priori* not clear from which year we should draw our matching variables or which one we should match on variables that capture change or level of the potential confounders. The lack of definitive answers to these questions motivated us to adopt a simpler approach. In any case, our statistical model acknowledges that EDUCO and non-EDUCO schools are not equivalent on all sorts of potential factors related to the outcome; the differencing approach adjusts for these factors so long as these unmeasured factors do not influence the deflection in the outcome trajectories after 2010. Differences in the geographic distribution of EDUCO and non-EDUCO schools across the school districts in El Salvador, on the other hand, seem to offer sensible, convenient and plausible proxies for unobserved confounding factors that condition the deflection in the rate of change in the outcome during the post-EDUCO closure period.

As a further modification of the matching approach, we replaced the 1:1 matching in favour of a simpler and more flexible propensity score weighting approach. The weights were formulated so that the resulting estimates have an average treatment effect on the treated (ATT) interpretation. Thus, we are estimating the effect of the EDUCO closure for the population of formerly EDUCO schools. Details regarding the construction of these weights are also provided in a later section of this report.

Fourth and finally, in an exploratory analysis that was not described in the original PAP, we examined changes in teacher transfer patterns across EDUCO and non-EDUCO schools. The purpose of this investigation was to: (1) Address concerns by 3IE researchers that teacher movements could affect or influence student advancement rates and therefore, raise concerns over the internal validity of the study; (2) Prior to 2010, EDUCO teachers were not able to transfer to non-EDUCO schools, so we wanted to understand whether the change in school management, which allowed teachers to more easily move around, influenced student advancement rates; and finally (3) To investigate the possibility the impact of the closing of the EDUCO program had spillover effects into the population of schools that were not formerly operating under the EDUCO program.

All of these alterations to our analytical strategy were made in advance of any detailed examination of outcome data. For this reason, we believe that the objectivity of the findings and our conclusions have not been significantly compromised.

This draft final report summarizes activities and deliverables completed between August 15, 2014, and March 31, 2015, and is divided into 10 main sections: intervention, theory of change and research hypothesis; context; timeline; evaluation: design, methods, and implementation; program or policy; impact analysis and results of the key evaluation questions; discussion; specific findings for policy and practice; and appendices.

Members of the FHI 360 Research Team—Ms. Ana Flórez, Dr. Audrey Moore, Dr. Jochen Kluve, and Dr. Samuel Fields—were the main authors of this report and are referred to as "we" throughout the report.

2. Intervention, theory of change and research hypothesis

El Salvador has different types of school administration bodies for its more than 6,000 schools—public and private, rural and urban: the *Consejos Directivos Escolares* (CDE: School Administration Boards) for government regular schools; *Asociaciones Comunales*

para la Educación (ACE: Community Education Associations) for EDUCO schools; *Consejos Educativos Católicos Escolares* (CECE: Catholic School Educational Councils), which are government-subsidized private schools; and *Consejos Institucionales Educativos* (CIE: Institutional Educational Councils), which operate in prisons. These bodies have similarities and differences among them; they are mainly differentiated by their membership and responsibilities. For the purposes of this evaluation, we will compare the EDUCO (ACE) school-based management model with non-EDUCO (CDE) SBM model, since they account for the vast majority of schools available to the public. Table 1 shows the differences between the EDUCO and non-EDUCO schools and highlights the difference in how the SMCs functions in the two sets of schools.

Table 1. Differences and Similarities between EDUCOs and Non-EDUCO

	EDUCO	**Non-EDUCO**
Legal framework	ACE Regulations. Not mentioned in any law	General Education Law, Teaching Profession Law, and CDE Regulations
School organization	ACE Governing Board, comprised solely of parents	Governing Council, comprised of school principal, parents, teacher representative, and student representative
President of school organization body	A parent	School principal, acts as legal representative
Administrative and financial functions	Planning and implementing school budget	Planning and implementing school budget
Maintain good functioning of sections of the educational level under their responsibility	Responsibility of the ACE	Not the responsibility of the CDE
Unified teacher career ladder for all teachers	Yes	Yes
Teacher selection	ACE Board and MINED	Court of the Teaching Profession
Teacher hiring	ACE Board and MINED	MINED (Wage Law)
Transfers	Not applicable	Court of the Teaching Profession and MINED
Unified accrual of service time for all teachers	Applicable	Applicable
Pension	Not applicable	Applicable
Life insurance / Employee credit union	Applicable	Applicable
Health insurance	Salvadoran Social Security Institute (ISSS)	*Bienestar Magisterial* (Teachers' Welfare health system)
Rural incentive	Applicable	Applicable
Year-end bonus	Applicable	Applicable
Annual severance payment	Applicable	Not applicable
Teacher retirement	ACE Board and MINED	Board of the Teaching Profession, Court of the Teaching Profession and MINED

Source: Gillies, Crouch and Flórez, 2010

The EDUCO program operated in 55 percent of all Salvadoran rural public schools from 1990 to 2010. Of the more than 6,000 schools in El Salvador, close to 4,000 are public schools in rural areas. In 2009, more than 2,133 EDUCO schools were identified. The program's main beneficiaries included more than 8,000 teachers, 10,500 parents and community leaders and 389,000 students nationwide (MINED, 2009). The distinguishing feature of this program is the Community Education Association (ACE), a form of school council in each EDUCO school consisting of five elected parents. EDUCO schools received funds directly from the MINED for school management, which included enacting and implementing ministry and community policies for hiring, firing and monitoring teachers. Table 2 shows the EDUCO implementation timeline.

Table 2. History of EDUCO

	1990-1994	1995-1999	2000-2004	2005-2009
ACEs	1,334	1,722	2,098	2,133
Teachers	2,316	4,703	7,381	8,020
Students	74,112	237,280	378,208	389,554
Access	1st to 3rd, progressively adding grades to 6th	Increased to 9th grade	Coverage continues	Increased to high school
School administration	ACE Governing Board with a parent as president (teachers and students do not participate)	CDE and CECE (principal presides over councils), students participate	ACE continues together with CDE and CECE with other models	CIE (for prison schools)
Parent education	1 ACE training per year, 40 hours Frequent parents' school	1 ACE training per year, 40 hours Frequent parents' school	Training sporadic and not for 100% of ACEs Intermittent parents' school	2 ACE trainings Intermittent parents' school
Teacher status	Adult literacy Annual contract No transfers or exchanges Do not accrue service time; no promotions Life insurance ISSS health insurance Annual severance payment Year-end bonus No rural incentive	No data Annual contract No transfers or exchanges Do not accrue service time; no promotions Employee Credit Union ISSS health insurance Annual severance payment Year-end bonus $40 rural incentive	No data Annual contract No transfers or exchanges Do not accrue service time; no promotions Employee Credit Union ISSS health insurance Annual severance payment Year-end bonus $40 rural incentive	No data Annual contract No transfers or exchanges EDUCO teachers' career ladder created Employee Credit Union ISSS/ Teachers' Welfare health system Annual severance payment Year-end bonus $40 rural incentive
Teacher training	Teacher training 1-2 times/year, 40 hours	Teacher training 1-2 times/year, 40 hours	No exclusive teacher training for EDUCO	EDUCO teachers integrated into teacher professional development system
Materials for ACE	Simple materials	Simple materials	Updating of materials (making them complex)	Updating of materials, attempt to "return" to simple

MINED support for schools	Supervisors	Supervisors	Change to Pedagogical Guidance System	Quality monitoring system developed with the 'What Route Should We Take?' strategy, and with it the monitoring teams that include pedagogical advisers, management advisers, and middle school supervisors.
Targeting of rural, remote schools	The most remote schools are visited	The most remote schools are visited	Far-away schools visited less	Creation of Effective School Networks Program
MINED organization	Coordinators of pilot project under direct supervision of Education Minister	Creation of National Education Office	MINED downsized	Creation of Office for Education with Community Participation
Financial administration	Creation of National Administration Office	National Administration Office and departmental offices	National Administration Office and departmental offices	Processing agents at departmental level to aid modernization of payment Modernization of banks
Funding	External funds	Government of El Salvador funds	Own funds and IBRD (International Bank for Reconstruction and Development) funds	Government of El Salvador funds and trust fund
School budget	Nonexistent, transferred from projects or programs	Nonexistent, transferred from projects or programs	Nonexistent, transferred from projects or programs	School Budget for ACEs and CDEs. $12 more per student, covers ACE transportation support for a total of $25 (CDEs receive $12 per student)
Complementary support	School snack	Integrated classroom, accelerated classroom, libraries, school snack	Integrated classroom, accelerated classroom, libraries, school snack	PEI (School Education Project) and PEA (Annual School Plan), 'What Route Should We Take?', school snack, and all preceding items
Boost	Role of women	World prize for excellence		15th anniversary celebration with support of President

Source: Gillies, Crouch and Flórez, 2010

The philosophy behind the EDUCO program was that local communities could run the schools more effectively than a centralized bureaucracy. To promote accountability, the EDUCO program hired teachers and principals on annual contracts. At the end of each year, the school council—representing the interests of parents—determined whether to renew each contract (based mainly on teacher and principal attendance), which was the most hard-hitting way of evaluating teacher performance (Gillies, Crouch and Flórez, 2010; Sawada and Ragatz, 2005). Many of the teachers that were hired by the EDUCO program lacked the proper certification to transfer to non-EDUCO schools, so it increased the importance and desire to remain employed at the EDUCO school.

The EDUCO program was implemented to accomplish the following primary outcomes:

1. Expand enrolment and educational opportunities for the poorest in El Salvador
2. Increase involvement of parents in rural schools, creating a culture of community participation as a social norm
3. Enhance school autonomy and teacher accountability

Although the program's outcomes never changed, the EDUCO schools went through four historical phases, captured in the history of EDUCO referenced in Appendix A.

In 2010, a team of evaluators examined the effectiveness of the EDUCO and non-EDUCO schools. Based on the data available at the time, it was argued that the ACE, EDUCO schools were at a disadvantage (in terms of poverty and resources) in relation to non-EDUCO, CDE schools, but that the schools nevertheless achieved more or less the same outcomes, at least in the lower grades (See Appendix K). This implies that EDUCO schools achieved a slightly better "value added."

It is important to note that the EDUCO schools are typically smaller (150 students on average compared to 280 in the non-EDUCO schools), so there are more resources to support the EDUCO schools, relatively speaking.

The current government in El Salvador is in the process of initiating a series of new interventions focused on improving teacher professional development and accountability. The government is also creating school networks where the role of school councils is being redefined. Although the government and teacher's union oppose the EDUCO SBM model, there are lessons that can be learned from decentralized management and its impact on teacher and community accountability. The opportunity to provide the government with data and information that can influence their new policies made the timing of this evaluation opportune.

Primary outcomes of the evaluation

Our evaluation hypothesis states that *if the government removes the communities' ability to manage schools and make decisions about school management locally, student advancement outcomes will decline.* Based on this hypothesis, the outcome and impact measures include:

- Student learning outcomes based on the *Paesita* learning test administered by the MINED*.* The *Paesita* comprises standardized test scores for mathematics and language exams taken at the end of the year in grades 3, 6 and 9. We reviewed the data for 2005, 2008 and 2012, but given the lack of data for the other years, chose to use student advancement rates rather than the learning outcomes data.
- Student advancement rates, calculated based on enrolment over time in each grade, adjusting for repetition and dropout.
- Use of World Bank School Autonomy and Accountability Assessment Scale (SAAS) to measure teacher, school director and SMC member perceptions of authority and accountability. This tool and its accompanying assessment scale is used to determine the depth of autonomy and accountability in an education system.

For the qualitative analysis, the team ensured construct validity of the interview and focus group protocol in two ways. First, the instruments were developed based on the SAAS tool and rubric, which the World Bank has used in a number of countries. Second, the instruments were pilot tested in non-EDUCO and EDUCO schools in the rural areas to ensure that the instruments were valid and reliable. Following the pilot test, a number of changes to the instruments, including (1) rewording of questions, (2) use of more colloquial Spanish that was easier for parents and community members to understand and (3) reduction of

redundant questions. The instrument was then tested one more time prior to use in the field.

For the quantitative analysis, the primary outcome to be used in the impact evaluation was originally going to be student test score data aggregated to the school-level by school year. During the data collection phase, however, we discovered that the MINED did not have consistent data on student test scores over our sampling window. As described in the section on the fidelity to the PAP, this motivated us to look for alternative outcome measures that would appropriately capture school performance. Ultimately we decided to focus on student advancement through the education system since we had consistent data for all schools for the 2005−2012 school years. Moreover, student advancement is a key measure of school performance specifically in rural areas of developing countries, because it captures the schools' capacity to retain students in the education system, in a context in which there are ample centrifugal factors that cause youths to drop out.

The student advancement rate (SAR) was constructed for grades 1−5. The SAR captures the rate at which students advanced a grade level over the course of a year. Let I_{igt} = initial enrolment (that is, count of students) at school *i*, grade *g*, and school year *t*. R_{igt} = number of repeaters at school *i*, grade *g*, and school year *t*. The school, grade, and year specific retention rate equals

$$P_{igt,} = (I_{i,(g+1),(t+1)} - R_{i,(g+1),(t+1)})/I_{igt}$$

P_{igt} captures the rate at which students advanced a grade level over the course of a year. We subtract the number of repeaters because they were not part of I_{igt}. This rate is effected by at least three sources—grade repetition, school drop-out and student transfer. Considering the first two factors, we hypothesize that the closure of the EDUCO program will be associated with a *decrease* in the student advancement rate among former EDUCO schools. As an indicator of school performance, the SAR has plausible face validity since El Salvador does not apply automatic promotion. We can assume, therefore, that children who advance a grade are doing so because they learned enough to pass to the next grade. Given the measure's resemblance to a Poisson rate with exposure parameter I_{igt}, the data were log transformed (natural log). In cases where the data indicated that zero students advanced (6.3 per cent of the grade-by-year-by-school observations), the natural log was undefined. We, therefore, added a 1 to the numerator of the SAR measure to prevent the occurrence of the zero advancement rate. In cases where the denominator was zero, however, indicating no students in a particular grade, year, and school were eligible to advance, we coded the outcome as missing.[1] The following primary hypothesis was tested.

P1: For each grade examined, the SAR in the population of formerly EDUCO schools will decline over the post-EDUCO time period (2010−2012) relative to what they would have been had the EDUCO program remained in place (that is, the counterfactual).

To evaluate the validity of our alternative primary outcome—the SAR—we examined pair-wise associations between SAR and our original primary outcome—student test data aggregated to the school level. These associations are shown in a correlation matrix that appears in Table 3 below.

[1] 93.23 percent of all observations of the student advancement rate began with a positive number of students and, based on aggregated enrolment information, a positive number was indirectly observed to advance to the next grade level over the course of a school year. The bulk of the remaining observations (4 percent) involved cases where zero students of a particular grade began the school year and zero were observed in the next highest grade at the beginning of the subsequent school year. In only 2.29 percent of cases was a positive number of students observed and initially and zero appeared to have advanced. The addition of 1 to all observations prevented these cases from being treated as missing as well.

Table 3. Correlations between Advancement rate and Testing Data.

		Advance Rate		Language Test		Math Test	
		2005	*2008*	*2005*	*2008*	*2005*	*2008*
	2005	1.00	0.05	**0.04**	-0.01	**0.01**	0.00
Advance Rate	*2008*	0.05	1.00	-0.02	**0.00**	-0.01	**-0.01**
	2005	**0.04**	-0.02	1.00	0.13	0.72	0.13
Language Test	*2008*	-0.01	**0.00**	0.13	1.00	0.10	0.69
	2005	**0.01**	-0.01	0.72	0.10	1.00	0.11
Math Test	*2008*	0.00	**-0.01**	0.13	0.69	0.11	1.00

In general, the association between the *Paesita* test and SAR calculated from the enrolment data was very low. This suggests that the two evaluation criteria reflect different dimensions of aggregated school performance.

Although we expected that both evaluation criteria would be related to the same latent construct—school performance—it is important to note that each measure is aggregated across slightly different, within-school populations. Although the SAR is calculated using the total enrolment at the beginning of the school year as the denominator, the *Paesita* testing results are only observed among those students who were still enrolled at the end of the school year. This would likely result in upward bias in the testing data as an indicator of school performance since only the higher performing students are likely to remain in the school for the entire school year. Furthermore, schools that are good at retaining and advancing students with low academic ability (that is, the SAR is high) may actually experience lower aggregated test scores at the end of the school year when compared to similar schools that are not as good at retaining and advancing students. The inability to observe (or impute) the test scores among students who drop out of school suggests that the aggregated SAR measure might actually be a better measure of school performance than the testing data. However, this also suggests that the testing data cannot not help us evaluate the validity of our primary outcome since the relationship between these two measures is complicated by the issue of student attrition from the within-school populations. We must, therefore, rely on the face validity of our primary outcome measure SAR.

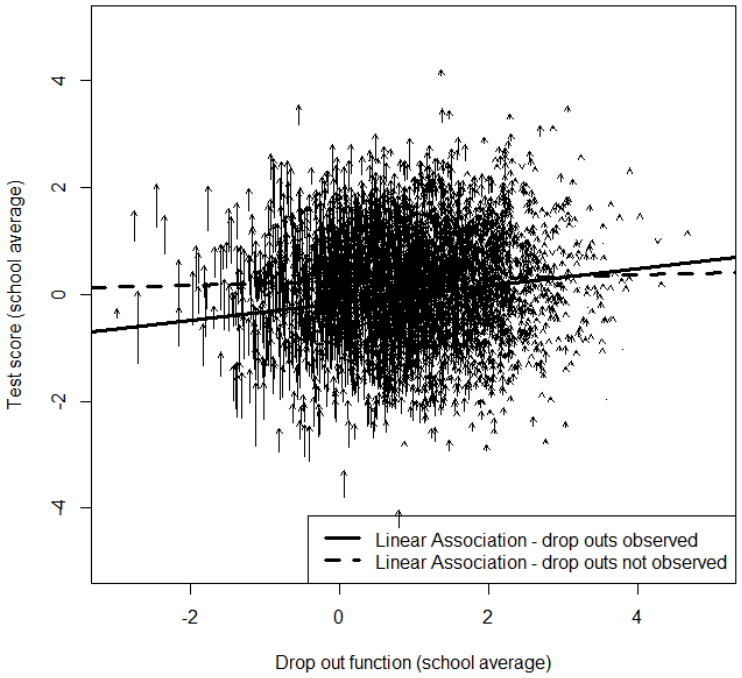
We investigated the above consideration in a small scale Monte-Carlo study. The goal of the study was to identify/illustrate the conditions in the population that are necessary to produce a zero correlation between the student advancement rate and an aggregated [school-level] test score. The simulation requires specifying a number of parameters that determine a) the school-level correlation between the dropout rate and the average test scores, b) the student-level correlation between a student's propensity to remain in school and their test score, and c) the intra-class correlation coefficient (ICC) for these two variables.

As an example, Figure 1 plots the average test score (school-level) against the average tendency to remain in school ("drop out function"). The location of each school from this single simulated draw is represented as two points with an arrow connecting each point. The two points represent the average test score (y-axis) excluding and including students from the school who drop out over the school year. The direction of the arrow indicates the direction in which a school's average test score changes as a result of restricting the calculation of the mean to those students who stay in school, while the x-axis depicts the average propensity to stay in school on the logit scale. Thus, schools to the right of zero on

the x-axis retain over 50% of their students over the school year. When one examines the pattern in the length and direction of the arrows, it is clear that schools which retain the smallest proportion of their students show the largest differences in the mean test score when drop outs are excluded from the calculation. The result is that the linear association between the average test score and the average propensity to stay in school is lower when drop outs are excluded (dashed line) than it is when the test scores from drop outs are included (solid line). The scenario depicted comes close but does not quite achieve a zero correlation between test scores and the drop out propensity when the test scores from drop outs are not observed.

We explored a number of different choices for the parameters of the simulation, and found that most scenarios resulted in only modest attenuation in the association between the aggregated test score and drop-out rate. Thus, in order to produce a zero correlation, the "true" correlation between test scores and drop-out rates would have to be fairly small and the "true" within school correlation between dropping out and testing would have to be large. Although the example depicted in Figure 1 comes close to attenuating the association, the scenario depicted assumes a modest correlation between school-level test scores and drop out propensities (r=.15) and a large within school correlation between a student's propensity to stay in school and their test score (r=.5). A low correlation between test scores and the propensity to drop out at the school level could mean that these two measures reflect different dimensions of school performance – i.e. schools that produce students who test "well" are not necessarily good at keeping students in school and visa-versa. In addition, it could be a reflection of measurement error - or instability in a school's test-taking performance and drop-out propensity from year to year. Regardless of the explanation for the low correlation, it is clear that the student advancement rate cannot be considered a good proxy for test-taking performance. This indicates that the sparse sampling of test scores over time represents an important limitation of the current study since we are unable to investigate the impact of the closing of EDUCO program on this critical dimension of school performance.

Figure 1. Linear association between the drop-out function and the test score: Example from single simulated draw of a Monte Carlo simulation



Theory of change

Evaluations conducted by the World Bank during the late 1990s and 2000s have shown that although students in EDUCO schools performed slightly less well than their non-EDUCO counterparts, EDUCO students closed the learning gap with non-EDUCO students over the two decades of EDUCO despite coming from worse socio-economic conditions. In 2010, as a result of debates and tensions with the teacher unions, the government closed the EDUCO program and converted the schools and the SBM model into regular public schools. This move took away the power that EDUCO had to hire and fire teachers and effectively gave the SMCs in both sets of schools the same responsibilities, which are mainly administrative.

Recognizing that many factors affect a student's ability to learn, the theory of change behind this evaluation is that if the government removes the power of SMC to directly manage the school (including hiring teachers), then the lack of school autonomy and accountability would impact student advancement (Figure 2).

Figure 2: Theory of change for the evaluation

As we will discuss in the findings section, the closure of the EDUCO program and the change in school-based management appears to have little impact on student advancement. In fact, results showed that even if the EDUCO program had never lost the ability to make decisions locally and the SMCs continued to monitor school quality and hire and fire teachers, we would have expected to see a decline in the student advancement rate, similar to what was seen among the non-EDUCO schools over the same time period. This decline is likely due to policy changes that happened simultaneously in 2009-2010 including a reduction of school fees that lead to increased enrolment [and larger class sizes across all schools]; a reduction in teacher professional development and support; and teacher migration. We speculate that these factors likely had a stronger effect on student advancement since the factors more directly impact students in the classroom than the SBM models. So while the change in the management model is likely to have contributed to the decline – it was not statistically significant. We speculate that the general decline can be attributed to other policy changes that coincided with the closure of the EDUCO program and that would have been present whether the EDUCO program was continued or not.

The finding that changes in SBM has no impact on student advancement directly conflicts with findings from studies conducted by the World Bank which concluded that the establishment of the EDUCO program in El Salvador in the late 90's was likely responsible for increases in student retention and advancement (Jimenez and Sawada, 2003). One possible reason for this discrepancy is that the impact of establishing the EDUCO program on student advancement could be quite different from the impact of closing the program. This would especially the case if the impact of the EDUCO program was cumulative and could be sustained for a few years after the program ends. In the case of this evaluation, we failed to reject the null hypothesis of no difference across the observed and counterfactual trends, a finding that is elaborated in the results section below.

3. Context

In 2010, the closure of the EDUCO national program in El Salvador occurred during the administration of the first President Mauricio Funes (2009–2014), representing the *Frente Faraundo Martin para la Liberación Nacional* (FMLN) left-wing party. The Vice President and Minister of Education *ad-honoren*, Salvador Cerén, a hard core member of the FMLN and a former teacher, was able to drive policy change through MINED and effectively change the SBM model of the EDUCO schools. The closure of the program responded to the demands of El Salvador's three teacher unions, including the *Sindicato de maestros de EDUCO* (SIMEDUCO), the teacher union that represented the EDUCO teachers. The EDUCO teachers were demanding the same labour conditions as teachers working in non-EDUCO schools. Specifically, they wanted access to the teacher welfare health system and the pension system. More importantly, teachers were unhappy with EDUCO's contractual mandate that allowed parents to hire and fire teachers using 1-year contracts, as they claimed parents were committing abuses and unjustified dismissals of EDUCO teachers. The ultimate decision was to eliminate the EDUCO program and to convert all EDUCO schools into regular non-EDUCO schools.

The former EDUCO schools are located throughout the rural regions of El Salvador, with no geographic variation. The EDUCO program started in 1990 with six schools self-organized by the communities. From these six rural schools, the program expanded to 130 and then to more than 2,000 in the early 2000s. In 2010, EDUCO had 2,133 schools nationwide, 389,554 students, and 8,020 teachers. All the EDUCO schools closed at the same time (See additional information about the history of EDUCO in Appendix A).

For this study, and through the MINED databases, we were able to get a list of all of the rural former EDUCO and current non-EDUCO schools dating back to 2005. For the quantitative analysis, we selected all former EDUCO schools and all public, non-EDUCO schools in the rural areas. Private schools and schools in urban areas were dropped since EDUCO targeted the rural population. Although both EDUCO and non-EDUCO schools were sampled, the population of interest is confined to the EDUCO schools, since these were the only schools that varied over time in their exposure to the EDUCO program. The non-EDUCO schools were only used to construct an estimate of the counterfactual under less restrictive assumptions (see section 5.1). For the qualitative analysis, we selected 40 schools throughout the country that represented both EDUCO and non-EDUCO schools to conduct focus groups and interviews (see section 5.2).

External validity

The generalizability of our findings to un-sampled EDUCO schools is not an issue. This is because our sample of EDUCO schools was a census of schools from the target population. However, our identification strategy, particularly with respect to the formulation of the propensity score weights (ATT), means that our findings may not be generalizable to the larger set of public schools that were not formerly operated under the EDUCO program, though there is certainly overlap in many school characteristics. The relevance of this point,

however, is not entirely evident, since it implies asking a very unusual question: whether the removal of an educational program from a set of schools that never operated under it would impact the performance of such schools.

Indeed, one of the unique features of the current study is that we are assessing the impact of a school management model when it is removed. From the standpoint of external validity, it does not necessarily follow that the impact of ending a program/model can tell you much about the likely impact of starting the same program/model in the future – when the context of its implementation may be quite different.

The EDUCO program—and its school management model rose out of the civil war with the impetus to bring education to underserved rural populations. A number of situations and characteristics made the program successful, including ongoing donor support, government support (prior to 2010), community support and international technical assistance. The conditions within the country were right, and the program was needed as a mechanism to expand access to education. These conditions may have impacted how the SMCs functioned, student outcomes and community participation. Before generating a set of expectations regarding the likely impact of a reintroduction of the EDUCO school management model, it is important to consider the sensitivity of the program's impact to the contextual factors associated with it emergence, including things such as the level of donor support and capacity building that was provided; the political environment that drove the program's creation; and the communities where the program initiated.

4. Timeline

This section lays out the EDUCO timeline and the timeline of events during this evaluation and identifies key challenges that caused delays in implementation

Table 4. Evaluation timeline

Date	Event Title	Event Description
November 2013	Initial meeting with FEDISAL	Travelled to El Salvador to launch the evaluation. Met with FEDISAL to finalize scope of work.
	Initial meeting with MINED to present evaluation and request data	Met with the Planning Unit to discuss the evaluation and discuss the availability of data. Submitted official data requests. Lack of access to data caused delays.
	Monitoring and evaluation (M&E) workshop for FEDISAL and MINED	Held a 3 day workshop on M&E, including quantitative designs. The purpose was to build the local capacity of our local partners.
January 2014	Development of pre-analysis plan (see Appendix B)	Began developing the pre-analysis plan.
March 2014	Political election changes personnel within MINED	The change in personnel, including the Minister, caused a significant delay in being able to finalize the quantitative data collection and initiating the field work.
May 2014	Initial efforts to build relationship with new Minister	Began working through the Director of Planning to re-establish a relationship with the Minister and obtain a second letter of support for the study.
October 2014	Training of FEDISAL data collectors	Travelled to El Salvador to train the FEDISAL data collectors on qualitative data collection methods.
November 2014	Pilot testing of qualitative instruments	Travelled out to rural schools to pilot test instruments at a former EDUCO school and a non-EDUCO school.
	Evaluation workshop for MINED	Delivered a 3-day workshop on designing indicators, designing baseline studies and quantitative evaluation designs.
February 2015	Evaluation workshop for MINED	Delivered a 2-day workshop for the Ministry on using data for decision making and communication of results.
March 2015	Policy dialogue with Ministry	Met with Minister of Education to deliver preliminary results

Timespan Dates	Timespan Title	Timespan Description
15th Jan, 2014 to 30th Oct, 2014	Quantitative data collection and verification	Worked with MINED to collect quantitative data for the hierarchical model.
1st Mar, 2014 to 30th Oct, 2014	Development of qualitative protocols	Developed protocols in collaboration with FEDISAL
15th Apr, 2014 to present	Relationship building with MINED	On-going meetings and teleconferences with MINED about data and future capacity building
15th Oct, 2014 to 31st Mar, 2015	Qualitative data collection	FEDISAL team travels to field and gathers data from 38 of 40 schools. Local consultant completed second phase of data collection
1st Dec, 2014 to 31st Mar, 2015	Qualitative data analysis and coding	Team used NVivo to code and analyse results.
15th Feb, 2015 to 1st Apr, 2015/July 2015	Capacity building and disseminations activities	Meetings with Ministry officials and representatives of the donor community

5. Evaluation: design, methods and implementation

This evaluation is a mixed-methods impact evaluation. Mixed methods evaluations focus on evaluation questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences. The approach employs rigorous quantitative research that assesses magnitude and frequency of constructs and rigorous qualitative research that explores the meaning and understanding of constructs. It uses multiple methods (for example, surveys, intervention trials and in-depth interviews) and intentionally integrates or combines these methods to draw on the strengths of each. Mixed methods increase the reliability and validity of the data and help to increase understanding of what is happening on a program that is being evaluated, which was critical for this evaluation.

This mixed methods evaluation has three main components.

4. Quantitative component, which uses a regression-based framework to estimate the differences in school performance between a constructed counterfactual condition and what was observed among formerly EDUCO schools during the post-closure period.

5. Qualitative component, which draws on interviews and focus groups with teachers, SMC members and school directors to understand the school and community perceptions on the closure of the EDUCO program and its effects on student advancement.

6. Cost and cost-effectiveness analysis which determines the cost effectiveness of access and student advancement in the EDUCO schools compared to the non-EDUCO schools.

The methodology and design for each component are described below.

Quantitative Component

The data provided by the MINED produced observations of the SAR across seven measurement occasions—five years before the end of EDUCO ($t \in (0,1,2,3,4)$), and two years after the end of the EDUCO program ($t \in (5,6,)$). Let Y_{it} equal the SAR for a single grade at time t for school *i*, where $i \in (1,2,\ldots,3755)$. The following is an example of a multi-phase hierarchical growth model.

$$Y_{it} = \beta_{0i} + \beta_{1i}\varphi_{1it} + \beta_{2i}\varphi_{2it} + \varepsilon_{it}$$

$$\varphi_{1it} = \begin{cases} t & \text{if } t \in (0,1,2,3,4) \\ 4 & \text{otherwise} \end{cases}$$

$$\varphi_{2it} = \begin{cases} t-4 & \text{if } t \in (5,6) \\ 0 & \text{otherwise} \end{cases}$$

$$\beta_{0i} = \gamma_{00} + \gamma_{01}x_i + \mu_{0i}$$

$$\beta_{1i} = \gamma_{10} + \gamma_{11}x_i + \mu_{1i}$$

$$\beta_{2i} = \gamma_{20} + \gamma_{21}x_i + \mu_{2i}$$

$$x_i = \begin{cases} 1 & \text{if EDUCO} \\ 0 & \text{otherwise} \end{cases}$$

The remaining terms are random effects that reflect within-school, residual variance and between-school variance in the level 1 growth parameters $\{\beta_{0i}, \beta_{1i}, \beta_{2i}\}$. We assume that they are uncorrelated with treatment assignment (x_i) and that their distributions approximate multivariate normal densities. Thus,

$$[\mu_{0i}, \mu_{1i}, \mu_{2i}] \sim \text{MVN}\left(\begin{bmatrix}0\\0\\0\end{bmatrix}, \begin{bmatrix}{\tau_{00}}^2 & {\tau_{01}}^2 & {\tau_{02}}^2 \\ {\tau_{10}}^2 & {\tau_{11}}^2 & {\tau_{12}}^2 \\ {\tau_{20}}^2 & {\tau_{21}}^2 & {\tau_{22}}^2\end{bmatrix}\right).$$

and,

$$\begin{bmatrix}\varepsilon_{i1}\\ \vdots \\ \varepsilon_{i8}\end{bmatrix} \sim \text{MVN}\left(\begin{bmatrix}0\\ \vdots \\ 0\end{bmatrix}, \begin{bmatrix}\sigma^2\rho^{|-1-(-1)|} & \cdots & \sigma^2\rho^{|(-1)-8|} \\ \vdots & \ddots & \vdots \\ \sigma^2\rho^{|8-(-1)|} & \cdots & \sigma^2\rho^{|8-8|}\end{bmatrix}\right)$$

The elements in the level 1 residual variance–covariance matrix are given by $\sigma^2\rho^{|\delta|}$, where δ is the pair-wise distance between outcome measurements in time. The diagonal elements are given by $\sigma^2\rho^{|0|}$, while the off-diagonal elements reflect within-school associations, which decay in magnitude at an exponential rate over time. This is equivalent to assuming a within-school autoregressive process in which the level 1 residuals have a constant (over-time) variance and are linearly dependent on their previous value (correlation = ρ.).

Figure 3. Illustration of the multi-phase of the hierarchical growth model analysis (HLGM)

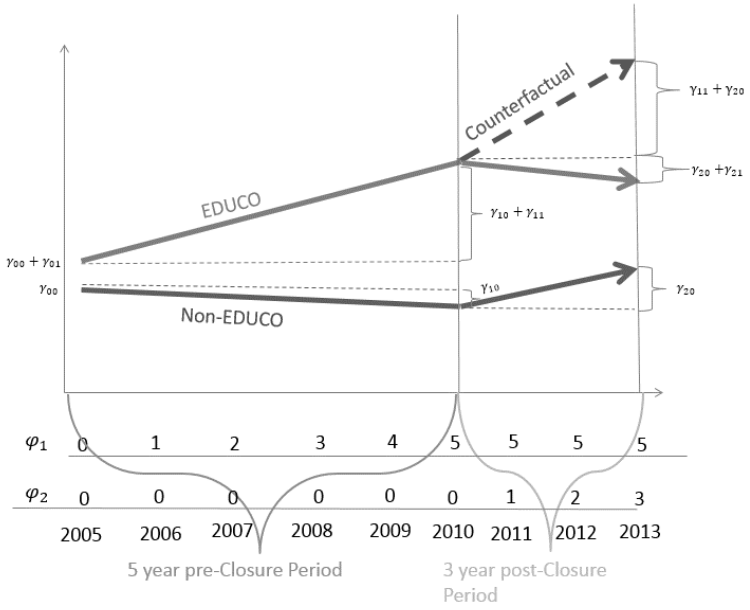


Figure 3 provides a guide for how to interpret the model parameters and illustrates our construction of the counterfactual for post-EDUCO growth in the outcome measures among former EDUCO schools. The parameters $\{\gamma_{00}, \gamma_{01}, \gamma_{10}, \gamma_{11}\}$ describe the phase of growth that occurs prior to the closing of EDUCO, and they summarize how the two populations of schools (EDUCO and non-EDUCO) begin the phase with different means (γ_{01}) and grow at different rates between the first and second measurement occasions. In the second phase, the growth in the SAR across both EDUCO and non-EDUCO schools is assumed to undergo a discreet shift in the rate of change that coincides with the closing of the EDUCO program. If we ignored the data from the population of non-EDUCO schools, then the magnitude of this deflection, or difference in the difference between measurement occasions, could serve as a difference-in-difference (DD) estimate of the impact of the closing of the EDUCO program. With this strategy, the counterfactual condition for schools that participated in the EDUCO program during the first phase would be continued growth at the rate observed prior to the closing of the EDUCO program (i.e. $\gamma_{10} + \gamma_{11}$). The DD estimator would thus be,

$(\gamma_{20}+\gamma_{21}) - (\gamma_{10} + \gamma_{11})$.

However, the assumption that growth estimated in the first phase would continue into the second phase had the EDUCO program never ended is too restrictive because it attributes the entire deflection observed over the two phases to the closing of the program. The government in El Salvador might have enacted other changes in education policy, however, or there may be other external events that coincided with the closing of the EDUCO program that affected the growth in the SAR across both types of schools (EDUCO versus non-EDUCO) in a similar manner. We relax this assumption somewhat by using the longitudinal data available from the non-EDUCO schools over both phases of growth. By observing a change in the growth rate among a population of schools that did not undergo a change in management structure over the two growth phases, we can identify the impact of unobserved time-varying confounders and adjust for these factors in our impact estimates. This is done by constructing a counterfactual that incorporates the deflection in the growth rate observed among non-EDUCO schools (that is, $\gamma_{20} - \gamma_{10}$) into our estimate of the counterfactual. In particular, the growth in the outcome among EDUCO schools under the counterfactual (*CF*) is assumed to be,

$$CF = (\gamma_{10} + \gamma_{11}) + (\gamma_{20} - \gamma_{10})$$
$$= \gamma_{11} + \gamma_{20} \ .$$

The estimated impact of the EDUCO closure among formally EDUCO schools, $\hat{\theta}$, is based on the difference between the estimated growth rate among these schools observed during the second phase and the estimated counterfactual rate of growth shown above. Thus,

$$\hat{\theta} = (\widehat{\gamma_{20}} + \widehat{\gamma_{21}}) - (\widehat{\gamma_{11}} + \widehat{\gamma_{20}})$$

$$= \widehat{\gamma_{21}} - \widehat{\gamma_{11}}.^{2}$$

Our impact estimates depend critically on the assumption that the deflection in the growth rate estimated for the non-EDUCO schools is directly applicable to the former EDUCO schools under the counterfactual condition. However, a school's participation in the EDUCO program was not randomly allocated, so the response and degree of exposure of these two populations of schools to unobserved events that coincided with the closing of the EDUCO program may not be similar.

To increase the plausibility of this assumption, we weighted our sample such that the distribution of non-EDUCO schools across all school districts in El Salvador matched what was observed in the EDUCO schools exactly. Let $P(S = s|D = 1)$ equal the probability that a randomly selected school from district s is an EDUCO school (D=1). EDUCO schools would receive weights that equal 1. The weights for non-EDUCO schools are given by

$$P(D = 1|S = s) \Big/ \big(1 - P(D = 1|S = s)\big).$$

Performing a weighted analysis using weights of this form produces impact estimates that have an average treatment effect on the treated interpretation (ATT). Our weighting approach is equivalent to a "many to many" matching technique, where multiple "treated" subjects are matched to multiple "control" subjects. In our case, the matching was exact since it was based entirely on belonging to the same school district. The result of the weighting procedure is that non-EDUCO schools have the exact same distribution across school districts in El Salvador as EDUCO schools. By achieving this equivalence through weighting, we insure that both non-EDUCO and EDUCO schools are similarly exposed to any unobserved and time-varying factors or events (for example, other policy changes) that operate at the district level and that might otherwise be confounded (that is, coincide) with the impact of the closing of the EDUCO program. It is important to note that the weighting does not adjust for any unobserved confounding that may exist within school districts.

Weights could only be formed for schools located in districts that have at least one of each type of school. Thus, schools from 30 districts in El Salvador were dropped from the analysis because they did not meet this criterion. Of these 30 districts, 13 contained exclusively EDUCO schools. Overall 87 EDUCO schools and 76 non-EDUCO schools were dropped from the sample because they were outside the region of common support. In both cases, the number of schools represent a very small fraction of the total number of schools that met are inclusion criteria (approximately 4 per cent).

In addition, the statistical model described above only applies to the SAR from a single grade, though each school supplied up to five SAR measures each year (grades 1, 2, 3, 4, and 5). We encountered difficulties when attempting to elaborate the above model, however, so that grade-specific estimates of $\hat{\theta}$ could be obtained simultaneously. Grade-specific impact estimates were, therefore, obtained by sub-setting the data by grade and estimating separate models. We were therefore unable to assess the joint significance of the grade specific model parameters. In addition, we did not correct the reported p-values

[2] After a review of the PAP, we discovered an error in the way we identified the causal effect of the EDUCO program's closure. This mistake does not compromise the objectivity of the report. We have included the correct identification strategy.

associated with each grade level for multiple comparisons. Thus, the statistical significance reported here maybe somewhat over-stated beyond the .05 level employed. Although we might have divided each p-value by the number of tests, the Bonferroni procedure can be quite conservative when the tests are positively correlated, and more accurate adjustments (e.g. bootstrapping) were deemed to be too complicated to implement. The grade-specific models were estimated in Stata using the XTMIXED procedure. Stata is the only statistical package of which we are aware that can correctly estimate multi-level models on weighted data (see .do file in Appendix L).

The exploratory analysis of teacher transfer patterns focused exclusively on schools in the target population—rural non-EDUCO and EDUCO schools. MINED provided our team with teacher data that allowed us to track teachers based on their ID number and cross reference their ID in a given year with the school ID. The data involved a very large n by n matrix, where n is the total number of schools in the population of interest (defined above).

The elements of this matrix were binary and indicated the transfer of one or more teachers from the sending school in 2008 to the receiving school in 2009. We did the same for the 2011 and 2013 time periods (post EDUCO closure). We used log-linear analyses to examine the relative frequencies of transfers (as compared to non-transfers) within and across the two different types of schools. We also expected that within-district transfers would be more common than between-district transfers and that EDUCO schools and non-EDUCO schools would tend to "cluster" within certain school districts. We, therefore, controlled for this in the analysis. We analysed the data separately by time period 2008–09 and 2011–13. We were looking for evidence that the pattern of transfers to and from EDUCO versus non-EDUCO changed after the closure of the EDUCO program. Examining the connections between schools formed by teacher transfers reveals how information flows about job vacancies and qualifications as well as teacher and administrator preferences might have been impacted by the closing of the EDUCO program. Although the resulting consequence of such a change (if observed) on the SAR is not entirely clear, it does point to a possible mechanism or, alternatively, the possibility that the impact of the EDUCO program's closure was not confined to formerly EDUCO schools. Such spillover effects would violate a key assumption regarding the identification strategy outlined above. In particular, if the impact of the closure extended to non-EDUCO settings then the deflection in the growth rate observed among non-EDUCO schools (that is, $\gamma_{20} - \gamma_{10}$) could not be interpreted as reflecting the impact of unobserved, time-varying factors that are spuriously associated with the closing of the EDUCO program.

Qualitative component

To gain a deeper understanding of the impact of closing the EDUCO schools on students, communities and teachers, we complemented the hierarchical growth model with an analysis of the depth of autonomy and accountability in the education system by applying an adaptation of the SAAS to groups of teachers, school directors and SMC members. This instrument is a diagnostic tool for classifying and benchmarking school-based management policies aimed at increasing autonomy and accountability at the school and system levels. The assessment of autonomy and accountability is based on the depth and scope of policies and programs linked to school-level of control of financial and human resources, the depth and scope of parent and community. The evaluation team used two sets of indicators for school autonomy: (1) school authority over the use of the school budget and (2) authority over school personnel.

To collect the data, we developed a set of interview and focus group protocols that aligned with the types of questions asked in the SAAS tool. Focus groups were conducted with members of the SMCs. School-level interviews were conducted with teachers and the school director, and key informant interviews were conducted with MINED stakeholders, both current and past.

In October, the FHI 360 team trained data collectors from FEDISAL on research and data collection protocols, including ethics and protection of human subjects. To ensure quality control, each field team consisted of two data collectors and a supervisor (that is, senior member of FEDISAL). The supervisors oversaw the focus groups, jointly conducted interviews, and reviewed the transcripts before the transcripts were uploaded in to the FHI360 online data platform. The enumerators were required to keep notes on each field visit, and we also uploaded and reviewed these notes. FEDISAL mailed the recorded focus group discussions and interviews to Washington, DC. We then spot-checked the transcripts against the recordings to ensure the quality of transcriptions. Once the data were transcribed and uploaded to the online system, we uploaded the transcripts to the qualitative software analysis program, NVivo.

The FHI 360 team developed a coding scheme, which included a two-part coding process. First, the focus groups and interviews were coded by question type. Second, within each question, the data were coded according to themes that came out across the interviews/focus group discussion. A second round of data collection took place in February 2015 to gather data from schools that were closed prior to the Christmas holiday as well as complete interviews with key stakeholders who were not available in November 2014 when the original round of interviews took place.

Cost-effectiveness analysis

Estimating the cost effectiveness of the EDUCO program when compared to the regular public schools was the final proposed evaluation component for this evaluation. Using an approach developed under the United States Agency for International Development (USAID)-funded Education Quality Improvement program, we estimated the cost effectiveness of access, and advancement in EDUCO and non-EDUCO schools. We used the MINED budget, enrolment, completion and learning data to estimate cost-effectiveness of the non-EDUCO schools. We examined recurrent costs as the costs of operating either the non-EDUCO schools or the EDUCO program in a given year. This categories of recurrent costs include:

1. Salaries and wages: Annual cost of paying the staff responsible for providing education.
2. Travel and transportation: Annual cost of visiting schools, travel to training workshops and travel to and from home to the schools.
3. Materials and supplies: Annual cost of providing learning materials.
4. Supervision and training: Annual cost of supervising and supporting teachers as well as additional training workshops.
5. General operational costs: Annual costs of items such as administration of the program, honoraria and costs of school nutrition programs.

To calculate the cost effectiveness, we used the following methodology:

Access: Access is defined as enrolment. The calculation will use the number of students enrolled in the corresponding years and levels of EDUCO schools and non-EDUCO schools in each case. The cost effectiveness of access of the public education system will be calculated by dividing the total recurrent costs of the primary education system by the gross enrolment (GER) (the total number of students enrolled in all grades) in primary education for a given school year.

SAR: The cost-effectiveness of SAR in the public education system was calculated by multiplying the total annual recurrent cost per student by the SAR. That number will then be divided by the completion rate (that is, total number of completers/total number of enrolled).

Learning: The cost effectiveness of learning will be calculated by multiplying the average cost per student by the number of years it takes for the student to reach the specific grade where the test if given (for example, $90/student X 4 years to reach grade 3). That number is then divided by the percentage of students who reach a specific threshold, such as "sufficient" or percentage correct on the test.

These data were drawn from secondary data, including project and government budgets. The data allowed us to estimate the per-dollar investment in the EDUCO program and compare how cost effective the intervention was in terms of the number of students the program reached, and how many students completed primary education compared to the regular government schools.

Sample size and determination

Quantitative component

Using databases provided by the MINED in El Salvador, we identified all public schools (EDUCO and non-EDUCO) in the country that met the following eligibility criteria:

1. School must have appeared in the 2005 database of schools provided by the MINED.
2. School must have been consistently identified as an EDUCO or non-EDUCO school over the pre-closure period (2005−2010).
3. School must be identified as rural in 2010.
4. Schools must be in a school district with at least one EDUCO and one non-EDUCO public school (that is, within the region of common support with respect to the formation of the propensity score weights).

Based on our analysis, 3,592 schools met the above criteria and were included in the analyses described above. We employed restrictive criteria for our population of interest such that schools that were not consistently identifiable as an EDUCO or non-EDUCO school over the pre-closure period (2005−2010) where excluded from the population of interest. Schools that did not meet this criterion may have closed and or merged with another school. Since this exclusion was based on events that occurred prior to the hypothesized impact, the omission of these schools likely does not result in endogenous selection. Schools that were missing outcome data after the closure of the EDUCO program might have closed, or failed to enrol any students during a particular year and a particular grade. This involved a very small percentage of cases (< 4%) and the random effects models employed in our analyses used whatever outcome data are available for every school in the population and assumes that any missing outcome data are missing at random (MAR).

In a more detailed examination of school attrition during the post-closure period (2011 − 2013), we found that 88.5% of the non-EDUCO schools and 87% of the EDUCO schools provided student advancement data for all grades and all years. Only 3% (51 schools) of the non-EDUCO schools and < %1 of the EDUCO schools (12 schools) failed to provide any data for any grade during this period. The remaining schools were inconsistent in the reporting of the advancement rate - either because they closed at some point between 2005 and the present or because they did not consistently have positive (> 0) enrolment for all grades and all years − a situation that is most common among the smallest schools. The extent of attrition during the post-closure period appears to be quite small, and its effect on bias is minimized due the inclusion of all schools in the estimation of the random effects models − regardless of the amount of outcome data they provide over the pre and post closure periods.

Because this study largely involves secondary data analyses, our strategy for determining sample size requirements was to estimate the minimum detectable effect size (MDES) given a fixed number of treatment (EDUCO) and comparison (non-EDUCO) schools, a pre-specified level of power (1-β), a fixed number of measurement occasions and a pre-

specified type I error rate (α). The MDES was estimated in a Monte Carlo simulation study that involved repeated simulated draws of a fixed size from a hypothetical population of national test score results, aggregated to the school level. Unfortunately, the original power calculations that we conducted during the study design phase of the project were of limited validity for at least two reasons. First, during the course of the project, we had to change our primary outcome due to the limited availability of testing data. Second, a routine, internal review of the PAP revealed an error in the way we described the identification of the causal effect of the EDUCO program's closure. This error was only discovered after the power analyses were conducted and the MDES was calculated. Although we include details regarding the original power calculations performed for this study in the pre-Analysis plan shown in Appendix B, and although the empirical approach outlined there is similar, the results may not directly apply to the actual identification strategy undertaken.

Qualitative Component

We used purposeful sampling techniques to select schools for the qualitative component. In purposeful sampling, subjects are selected because of some characteristic (Patton, 1990). In this case, we wanted participants to have worked—or currently work in—the EDUCO and non-EDUCO schools so that they could provide insights into the accountability structures before and after 2010. Within the purposeful sampling technique, we used maximum variation sampling to select 40 schools that would participate in the qualitative component. The sample included:

- 10 former EDUCO schools with the highest learning scores
- 10 former EDUCO schools with the lowest learning scores
- 10 non-EDUCO schools with the highest learning scores
- 10 non-EDUCO schools with the lowest learning scores

We used the MINED databases that contained the results of the *Paesita* test to sort the schools from best to worst performing and then selected the top and bottom 10 from each category. Following selection of the schools, we met with members of MINED to obtain written consent to visit each of the schools and to coordinate the access to the schools.

The EDUCO program provided a natural assignment into treatment and control groups since the SMCs had different authority over the schools prior to 2010. Our assignment strategy was to examine the EDUCO schools as a treatment group and the non-EDUCO schools as the control group to determine whether differences occurred once the government equalized the two groups.

Data collection or dataset construction

For the quantitative portion of this evaluation, FHI 360 worked with the MINED to acquire data for all the schools in the country (including all EDUCO and non EDUCO schools). We received the following MINED data:

1. Enrolment Database: First Release—Excel spreadsheet contained counts of students (enrolment) in each school for grades 1–6. The spreadsheet also included a classification variable that allowed us to identify non-EDUCO schools and EDUCO schools. This database was used to select the sample according to the eligibility criteria as specified in the section 2.
2. Enrolment Database: Second Release—These data provided two enrolment figures for each school for grades 1–6—initial enrolment and final enrolment. The initial enrolment equals the enrolment reported in the first release of the Enrolment Database. The second release also contained the number of repeaters in each grade for that specific year, as well as the total number of repeaters that have accumulated in each grade. It is presumed that both enrolment databases

were constructed by the MINED from the publically available student census data that can be found on the MINED website.

3. Testing Data: We also received the results of from the *Paesita* test, aggregated to the school level. These data were only available for the 2005 and 2008 school year and apply to grades 3, 6 and 9. Although the same data were also provided for the 2012 school year, they were only provided for a randomly selected subset of schools. Although we had initially planned on conducting an impact evaluation using test score data as our primary outcome, the lack of annual testing data motivated us to change our primary outcome to an alternative that was derived from the enrolment data (details provided above).
4. Teacher Data: MINED also provided our team with detailed teacher data for all the years in the study. The teacher databases provided us with teacher and school ID numbers, teacher education levels, grades taught and school type. The databases allowed us to merge the years and examine teacher movement both within EDUCO schools and between EDUCO and non-EDUCO models. This analysis helped us address validity issues, including spillover and contamination effects.

The original data from MINED was imported into SAS. The programming that produced the final analytical data sets was performed by two junior statisticians. We did not conduct any formal verification of the data sets or analyses (for example, independent replication of tables and analyses), although the SAS programs were independently reviewed by the lead statistician, Samuel Field. The authors of this report take full responsibility for the accuracy of the results reported herein,

Strategies to reduce interviewer effects, positionality, and Hawthorne effects in the qualitative component

Interview Effects. Interviewer effects were mitigated in the following ways.

- The data collectors were hired based on their previous experience conducting qualitative data collection in rural areas of El Salvador. A week-long training workshop was provided to the data collectors where they reviewed the best practices in conducting interviews and focus groups, role played, conducted mock interviews and critiqued one another.
- The data collectors travelled to the field with Dr. Moore to pilot test the instrument. During the pilot, Dr. Moore was able to observe the data collectors conducting interviews and provide additional coaching to improve their interviewing techniques.
- The data collectors were randomly assigned to schools. Working in pairs, the data collectors took turns conducting interviews and focus groups.

Positionality. Positionality was mitigated by hiring local Salvadorans as data collectors, several of whom has experience working in the education system, particularly in schools.

Hawthorne Effects. We believe that the Hawthorne effects were mitigated since we clearly communicated to participants that the purpose of the study was not to evaluate the EDUCO schools, but to better understand the management models and how these changed over time. The types of questions were grounded in participant experiences and used the *critical incidence* technique were participants were asked to ground responses in examples. No school or classroom observations were conducted.

PHSC ethics approval

FHI 360 has an internal Office of International Research Ethics (OIRE) that is responsible for ethical and regulatory oversight of research involving human subjects. One of OIRE's main responsibilities is to support the functions of the Protection of Human Subjects Committee

(PHSC). FHI 360 prepared and provided all required forms, protocols and certifications to meet the human subjects requirements for this study.

6. Program or policy: design, methods and implementation

In this section, we expand on the intervention information provided in section 2 and then describe how the intervention was implemented in practice, with the purpose of explaining the treatment/program under investigation.

Key program elements and programmatic activities

As mentioned in section 2, the EDUCO program operated in 55 percent of all Salvadoran rural public schools from 1990–2010. The program's main beneficiaries included more than 8,000 teachers, 10,500 parents and community leaders and 389,000 students nationwide (MINED, 2009). The distinguishing feature of this program is the Community Education Association (ACE), a form of school council in each EDUCO school consisting of five elected parents. EDUCO schools received funds directly from the MINED for school management, which included enacting and implementing MINED and community policies for hiring, firing and monitoring teachers.

At the beginning of the program in the 1990s, parents of the SMC received trainings from the MINED on how to administer the school. Teachers were hired by the SMC using yearly contracts and were not paid through the national payroll; were not part of the teacher career ladder; but did had access to benefits such as health insurance, a year-end bonus and annual severance (which regular teachers did not received). The EDUCO teachers also received the equivalent of US$40 rural incentive. Non-EDUCO schools received $12 dollars per student while EDUCO schools received $12 and transportation incentives for a total of $25 dollars per students (Gillies, Crouch and Florez, 2010).

Since this impact evaluation used primarily secondary data from a program that closed in 2010, and was not related to an on-going program, there was no recruitment strategy. There were no adverse or unexpected events that affected the interview or focus group process with the former EDUCO and current non-EDUCO schools. The MINED provided all relevant quantitative data to the researchers.

For the qualitative component, we used school learning performance to sort schools from highest performing to lowest performing. Based on the sorting process, we then selected the 10 best EDUCO and non-EDUCO schools and the worst 10 performing EDUCO and non-EDUCO schools to visit and conduct interviews and focus groups—40 schools total. The MINED contacted the schools to arrange for the data collection teams to visit the schools. No incentives or compensation was provided to interview or focus group participants.

Weak links in implementation of activities that were otherwise necessary for the impacts to be achieved

Our theory of change assumes that the benefits of the EDUCO program rest entirely on the presence and immediate activities of well-functioning SMCs. When these entities cease to function, we assume there must be an immediate impact on school performance. However, a weak link in this causal diagram relates to the degree to which past and present actions of the SMC impact future school performance. This is particularly the case with respect to the SMC role in hiring and firing teachers. Since the transfer of teachers from one school to another imposes costs on both the teacher and the schools involved in the transfer, hiring decisions tend to have lasting impacts on a school performance. We only use a three-year post-EDUCO study in which to gauge the impact of the program's closure. This may not be adequate given the "stickiness" of hiring and firing decisions. Nonetheless, we are confident that the nature of the EDUCO program's closure did result a prompt removal of the SMCs

role in hiring and firing teachers in each school's operation. This was clear in interviews and focus groups we conducted with MINED staff, school principals, teachers and local stakeholders.

A second potentially weak link has to do with the ability of the SBM model to actually impact student advancement. While the EDUCO model ensured teacher attendance and presence in the classroom – attendance alone is not sufficient to ensure children learn and advance through the grades. In 2009-2010, in addition to changing the SBM model, MINED made shifted investments to focus on helping to ensure that children enrolled and stayed in school. The result was that enrolment increased (leading to bigger class sizes); teacher transfers increased with the change in SBM; and to fund the new programs, MINED reduced their investments in teacher training and support. These factors, according to the literature, tend to have a greater impact on the classroom and student advancement than SBM. So, the link of SBM to student advancement is indirect and therefore, less likely to show a statistically significant impact than these other factors.

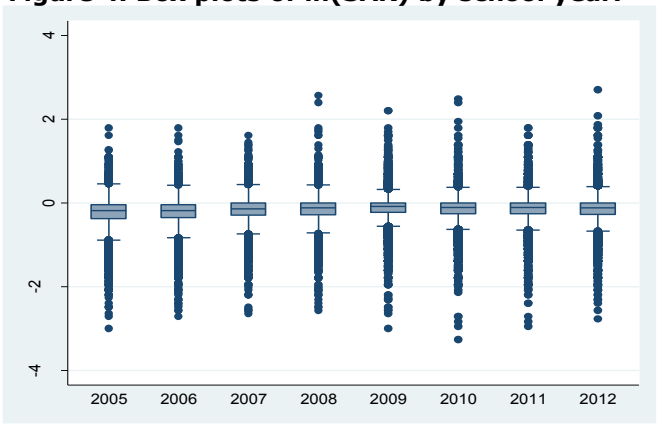
7. Impact analysis and results of the key evaluation questions

In this section, we present the results of the quantitative data analyses. The first sub-section focuses on the findings from the hierarchical growth model analysis (HLGM) and the exploratory analysis of teacher transfers. This is followed by the qualitative analysis and results of the cost-effectiveness exercise. The final sub-section discusses the integrated findings, including issues of internal validity and reliability.

Findings from the primary impact evaluation using HLGM

Prior to any analysis, we checked for outliers in our primary outcome measure using box and whisker plots, constructed separately by year. The box plots, shown in Figure 4, reveal a largely symmetric distribution with thick tails. These plots indicate that the observed SAR is subject to wide fluctuations when looking across the population of schools included in our analyses. The means, sample sizes, and the first and third quartiles by grade, year, and school type are in Appendix C. In many cases, the third quartile enters positive territory, which means that in a substantial proportion of cases the SAR observations exceed 1. In contrast, when exponentiated, the first quartile never falls below (0.5). This indicates that in most years most schools will see at least half of their students advance to the next grade.

Figure 4. Box plots of ln(SAR) by school year.



When examining the statistics, two things should be kept in mind. First, the grade-specific enrolment at the beginning of the school year for many of these rural schools is typically very low such that in many years 25 percent of the schools have 10 or fewer students in a particular grade. This means that the addition or loss of only a couple of students across school years could produce large fluctuations in the advancement rate. Our statistical models (discussed above) do not account for this potential dependence of the outcome variance on the mean number of students expected to advance in each school. Secondly, the SAR, as it is constructed from the available data, is impacted by students who might be transferring into or out of the school. This not only provides an additional source of both between- and within-school variability in the SAR measure but also explains how the SAR is often observed to be greater than 1.

The estimated, grade-specific impact estimates, along with the associated regression parameters, are shown in the following Tables 5a – 5c.

Table 5a: Parameter estimates from multi-phase HLGM (First and Second Grade)

Parameter	Description	Grade 1 Est.(Std. Err)	Grade2 Est.(Std. Err)
Fixed Effects			
$\widehat{\gamma_{01}}$	EDUCO indicator	0.016(0.015)	-0.018(0.012)
$\widehat{\gamma_{10}}$	phase 1 growth	0.045(0.003)***	0.025(0.002)***
$\widehat{\gamma_{20}}$	phase 2 growth	-0.012(0.006)*	-0.016(0.006)**
$\widehat{\gamma_{11}}$	interaction: EDUCO X phase 1 growth	0.002(0.004)	0.004(0.003)
$\widehat{\gamma_{21}}$	interaction: EDUCO X phase2 growth	-0.01(0.008)	0.009(0.008)
$\widehat{\gamma_{00}}$	Intercept	-0.346(0.012)***	-0.152(0.009)***
		Est.(95% C.L.)	Est.(95% C.L.)
$e^{3\times(\widehat{\gamma_{21}}-\widehat{\gamma_{11}})}$	Impact: Three years post-Closure	0.96(0.91-1.02)	1.015(0.961-1.073)
Random Effects			
τ_{11}	Standard deviation: phase 1 growth	0.04(0.03-0.05)	0.036(0.029-0.046)
τ_{00}	Standard deviation: intercept	0.24(0.2-0.28)	0.199(0.166-0.238)
$\tau_{01}/\tau_{00}\tau_{11}$	Correlation(phase 1,intercept)	-0.68(-0.78--0.53)	-0.56(-0.718--0.346)
ρ	Auto regression parameter	0.12(0.07-0.16)	0.078(0.039-0.117)
σ	Residual	0.32(0.31-0.34)	0.294(0.282-0.307)

Table 5b: Parameter estimates from multi-phase HLGM (Third and Fourth Grade)

Parameter	Description	Grade 3 Est.(Std. Err)	Grade 4 Est.(Std. Err)
Fixed Effects			
$\widehat{\gamma_{01}}$	EDUCO indicator	0.012(0.015)	0.003(0.018)
$\widehat{\gamma_{10}}$	phase 1 growth	0.022(0.003)***	0.026(0.003)***
$\widehat{\gamma_{20}}$	phase 2 growth	-0.007(0.005)	-0.006(0.007)
$\widehat{\gamma_{11}}$	interaction: EDUCO X phase 1 growth	-0.002(0.003)	0.001(0.004)
$\widehat{\gamma_{21}}$	interaction: EDUCO X phase2 growth	-0.001(0.007)	-0.007(0.008)
$\widehat{\gamma_{00}}$	Intercept	-0.135(0.013)***	-0.188(0.015)***
$e^{3\times(\widehat{\gamma_{21}}-\widehat{\gamma_{11}})}$	Impact: Three years post-Closure	1.001(0.949-1.056)	0.975(0.916-1.038)
Random Effects			
τ_{11}	Standard deviation: phase 1 growth	0.047(0.037-0.06)	0.056(0.046-0.067)
τ_{00}	Standard deviation: intercept	0.285(0.239-0.339)	0.34(0.295-0.392)

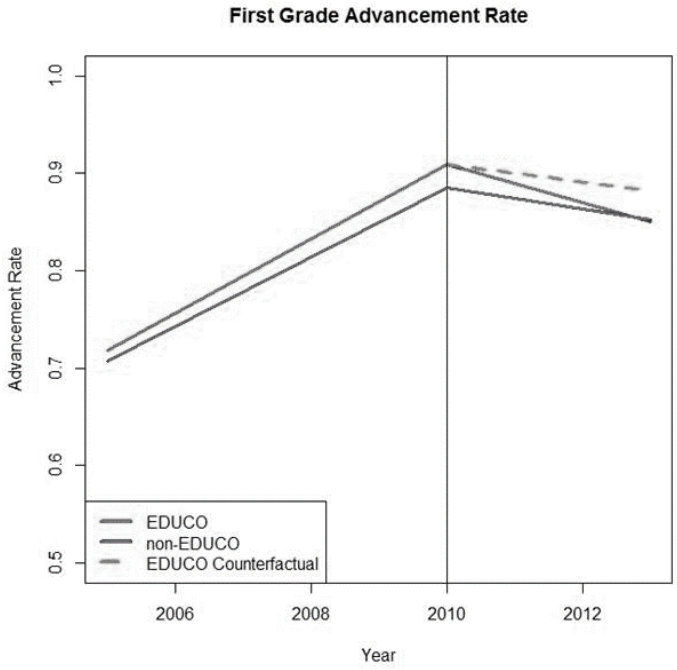
$\tau_{01}/\tau_{00}\tau_{11}$	Correlation(phase 1,intercept)	-0.815(-0.888--0.702)	-0.84(-0.896--0.758)
ρ	Auto regression parameter	0.083(0.042-0.123)	0.113(0.073-0.151)
σ	Residual	0.308(0.294-0.322)	0.326(0.313-0.341)

Table 5c: Parameter estimates from multi-phase HLGM (Fifth Grade)

Parameter	Description	Grade 5 Est.(Std. Err)
Fixed Effects		
$\widehat{\gamma_{01}}$	EDUCO indicator	0.027(0.022)
$\widehat{\gamma_{10}}$	phase 1 growth	0.033(0.004)***
$\widehat{\gamma_{20}}$	phase 2 growth	-0.007(0.009)
$\widehat{\gamma_{11}}$	interaction: EDUCO X phase 1 growth	-0.007(0.005)
$\widehat{\gamma_{21}}$	interaction: EDUCO X phase2 growth	-0.013(0.011)
$\widehat{\gamma_{00}}$	Intercept	-0.244(0.019)***
$e^{3\times(\widehat{\gamma_{21}}-\widehat{\gamma_{11}})}$	Impact: Three years post-Closure	0.981(0.908-1.059)
Random Effects		
τ_{11}	Standard deviation: phase 1 growth	0.051(0.036-0.072)
τ_{00}	Standard deviation: intercept	0.373(0.331-0.42)
$\tau_{01}/\tau_{00}\tau_{11}$	Correlation(phase 1,intercept)	-0.736(-0.836--0.589)
ρ	Auto regression parameter	0.176(0.091-0.258)
σ	Residual	0.386(0.359-0.416)

Based on our analysis, none of the impact estimates were statistically significant, which leads us to retain the null hypothesis that the closing of the EDUCO program had no impact on the student advancement rates among formerly EDUCO schools. As a detailed example of the results were obtained, Figure 5 below contains a plot of the mean response of the outcome over the pre- and post-EDUCO period for first grade classrooms. The counterfactual estimates in this figure are also shown in these plots (dotted lines), while the estimated trend lines for EDUCO and non-EDUCO schools are shown respectively. In this figure, we exponentiated the mean response prior to plotting in order to display the results using the original metric of the outcome variable. However, due to the log-transformation of the dependent variable, the means plotted correspond to the geometric rather than the arithmetic mean.

Figure 5. First grade advancement rate plot



To take the first grade as an example, we observe the SAR to be increasing at a faster rate among EDUCO schools than non-EDUCO schools prior to 2010. This finding is consistent with the faster increase in learning outcomes prior to 2010 noted at the beginning of this report. If EDUCO had never closed, we expect that EDUCO schools would have continued to grow apart from non-EDUCO schools, all things being equal. Our models also acknowledge that both types of schools might be impacted by unmeasured factors that are unrelated to the closing of EDUCO but that coincided with EDUCO's closing (that is, concurrent policy changes or dynamic economic factors). The dotted line in Figure 5 incorporates the impact of these time-varying confounders and represents where we estimate EDUCO schools would have been had the program remained in place.

As seen in Figure 5, even if the EDUCO program had never closed and the SMCs had continued to monitor school quality and been able to act by hiring and firing teachers as they had in the past, we would have expected to see a decline in the SAR similar to what was seen among the non-EDUCO schools over the same time period. The actual observed trend, estimated among formerly EDUCO schools was steeper than the estimated counterfactual trend. This would be consistent with the hypothesis that the EDUCO program's closure was detrimental to school performance among formerly EDUCO schools. However, in this case, we failed to reject the null hypothesis of no difference across the observed and counterfactual trends. This was also true for grades 2−5; the mean plots for these grades are shown in Appendix E.

As we noted earlier in our discussion of the box and whiskers plots shown in Figure 4, there was considerable variability in the outcome measure. A high level of idiosyncratic, within school (i.e. year to year) variation in the outcome may have adversely impacted the precision of our impact estimates, and in order to investigate this possibility we turn to the grade specific estimates of the variance components shown in the parameters tables. Of particular interest is the decomposition of the total residual variance into its between and within school components. The within school component can be found on the bottom line of the random effects table while the primary between school component can be found on the second line. These two components can be used to calculate the ICC, or the proportion of

the total variance that is attributable to unobserved and temporally stable school-level factors. The calculation of this statistic is made somewhat complicated due to the inclusion of a random phase 1 growth parameter, which causes the ICC to vary over the first phase of growth. We therefore restrict our attention to the ICC estimated for 2005, where the phase 1 time regressor equals zero, and the standard deviation of the random growth parameter (line 1) and its correlation with the intercept (line 3) can be ignored. Across the 5 grades, the ICC varied from .29 to .52 reflecting a low to moderate level of over-time stability in the natural log of the student advancement rate from a single school. Given the large sample size of 3,592 students, we do not believe ICCs in this range raise too many concerns about the potential adverse impacts of measurement error on the precision of our impact estimates.

A more direct assessment of precision can be gleaned from the width of the 95% confidence intervals reported for our impact estimates shown in Tables 5a – 5c. The largest estimate that is consistent with our hypothesis regarding the impact of the closure of the EDUCO program is associated with the 1st grade student model. The 95% confidence interval ranges from a 9% reduction to a 2% increase in the student advancement rate measured 3 years after the closure of the EDUCO program. This appears to be a fairly narrow range, especially when one compares it to the year to year fluctuations in the student advancement rate observed for a single school. The average distance of an observation from its school specific mean can be obtained by exponentiating a negatively and positively signed variance component of the residual. For the first grade, this would range from a decrease of 37% (i.e. $1 - e^{-.32}$) to an increase of 37% ($e^{.32}$). We therefore conclude that a lack of precision (i.e. low statistical power) does not explain why we failed to detect a meaningful impact of EDUCO's closure on the student advancement rate.

As a final comment on this topic, we note that excessive measurement error might also explain why the aggregated test scores did not correlate well with the data on the student advancement rate (reported in a previous section). However, assuming that the student advancement rate and testing are determined by the same latent factor (i.e. school performance), the magnitude of measurement error indicated by the ICC statistics reported above does not appear to be sufficient to drive the association between testing and the student advancement down to the low levels shown in the correlation matrix reported in Table 3 – even when we consider the additional role student attrition might have played (see discussion in section 2). At best, student advancement and testing are weakly correlated in the population, suggesting that they are separate dimensions of school performance that might be differentially impacted by the closure of the EDUCO program. For this reason, generalizing the findings reported here regarding the impact of EDUCO's closure on the student advancement rate to the impact of EDUCO's closure on student testing is unlikely to be warranted.

Analysis of teacher transfer patterns across EDUCO and non-EDUCO schools

Table 6 presents the estimated parameters from a log-linear analysis of four-way contingency tables that count the number of potential, pair-wise linkages formed between all schools in the target population. The potential linkages are disaggregated by whether a transfer occurred, whether the sending school is an EDUCO school whether the receiving school is an EDUCO school and whether the pair of schools are in the same district. We created separate tables depicting linkages between schools for two time periods—before and after the closure of the program. The number of cells in each table is $2^4=16$, and there are 16 estimated parameters in the log-linear model, so the model for each period is saturated.

Looking at the pre-closing data (2008 -> 2009) and focusing specifically on the linkages that involve a transfer of teachers, the log-linear analysis does indicate that teachers

tended to transfer *within* school types at a greater rate than between school types. The coefficient for main effect of transfer is strongly negative (-9.27), which indicates that non-Transfers are far more common than transfers. This effect applies to the reference category and thus when exponentiated can be interpreted as a ratio of transfers to non-transfers among pairs of schools where a) both schools are in different districts, and b) both schools are non-EDUCO.

The main effects for sending EDUCO schools and receiving EDUCO schools are both strongly negative, indicating that both transfers from EDUCO schools to non-EDUCO schools and transfers from non-EDUCO schools to EDUCO schools are far less common than the reference category. Transfers between schools in the same district are the most common, and the lack of any substantial interaction effects indicate that is equally true for most kinds of transfers. The most interesting result from our point of view is the strongly positive three-way interaction among transfers, sending EDUCO schools, and receiving EDUCO schools (2.01). This finding reveals a strong tendency for teachers from EDUCO schools to remain in the EDUCO program when transferring to a different school. Together, this pattern of results suggests that there was very little circulation of teachers across the two different programs prior to the closure of the EDUCO program—a finding that we would expect given that many teachers in the EDUCO schools might not have had the appropriate qualifications to enter non-EDUCO schools prior to the closure of the EDUCO program.

Table 6: Log-linear analyses of teacher transfer patterns

	2008 -> 2009			2011 -> 2013		
	β	e^{β}	p-value	β	e^{β}	p-value
Non-Transfers (intercept)	14.90	296563	<.000 1	14.90	295526	<.000 1
Sending EDUCO	0.16	1.18	<.000 1	0.16	1.18	<.000 1
Receiving EDUCO	0.16	1.18	<.000 1	0.16	1.18	<.000 1
Same District	-5.56	0	<.000 1	5.56	0	<.000 1
Sending EDUCO X Receiving EDUCO	0.00	1	0.006 7	0.00	1	0.008 5
Sending EDUCO X Same District	-0.23	0.79	<.000 1	0.24	0.79	<.000 1
Receiving EDUCO X Same District	-0.23	0.79	<.000 1	0.23	0.79	<.000 1
Sending EDUCO X Receiving EDUCO X Same District	0.50	1.65	<.000 1	0.50	1.66	<.000 1
Transfers (main effect)	-9.27	0	<.000 1	9.38	0	<.000 1
Sending EDUCO	-1.22	0.29	<.000 1	0.12	0.89	0.173 6
Receiving EDUCO	-1.93	0.15	<.000 1	0.90	0.41	<.000 1
Same District	4.23	68.48	<.000 1	4.32	75.02	<.000 1
Sending EDUCO X Receiving EDUCO	2.01	7.48	<.000 1	0.12	1.13	0.424 8
Sending EDUCO X Same District	0.51	1.67	0.031	0.48	1.62	0.007 6
Receiving EDUCO X Same District	-0.01	0.99	0.982 8	0.50	1.65	0.023 6
Sending EDUCO X Receiving EDUCO X Same District	-0.32	0.73	0.484 5	0.31	0.73	0.279 1

After EDUCO closed, the tendency to transfer to schools within the same district remained (at nearly the same magnitude), but the tendency to transfer within the same school type nearly evaporated. The three way-interaction discussed earlier changes from 2.01 to .12 over the post-EDUCO closure period. This finding suggests that the close of the EDUCO program coincided with a wider circulation of teachers among the two different types of schools that used to have different administrative structures.

With respect to the potential magnitude of the impact of teacher transfers on student advancement, in a separate analysis we found that approximately 35% of non-EDUCO schools in the population experienced at least one transfer out of the school between the years 2008 and 2010 while the percentage of EDUCO schools experiencing at least one transfer out over the same time period was quite a bit less, approximately 16%. These transfers were almost exclusively EDUCO to EDUCO or CDE to CDE transfers for two reasons, (1) Teachers in the government system were more highly certified and had long-term contracts; and (2) Teachers in the government system did not want to live and teach in the rural areas and were more likely to transfer out of rural schools in favour of being placed in urban schools. Teachers for the EDUCO schools were often recruited from communities and lacked the qualifications to obtain employment in the government schools. In fact, the uncertainty of long term employment and the inability to transfer to the non-EDUCO schools were two factors that contributed to the change in management model that was driven by the teacher's union.

After the closing of EDUCO, the proportion of schools experiencing transfers out increased appreciably for both school types. Among non-EDUCO schools, 40% of the schools experienced transfers out of the school over the 2011 and 2013 time period. Among EDUCO schools, this figure was 22%.

The observations above do suggest that changes in transfer patterns did have a potentially wide-spread impact on the student advancement across the population of both EDUCO and non-EDUCO schools. Even within a school, the impact of a single transfer on the student advancement rate could have been substantial − particularly among EDUCO schools, which only have an average of 4 teachers per school. Non-EDUCO schools, on the other hand, may have been less impacted since they are twice as large on average (i.e. 8 teachers per school). What is not known, however, is the magnitude and size of this impact. While this question could be addressed if we were able to incorporate longitudinal data on teacher transfers into the quantitative analyses of the student advancement rate, the analytical and data management challenges that this presents go beyond the scope of this research.

To better understand the magnitude of teacher transfer patterns on students' advancement and learning, FHI360 recommends that MINED undertake a separate evaluation that looks at (1) the magnitude of teacher transfers; (2) if specific regions are more prone to movement; and (3) the reasons teacher choose to relocate. A qualitative analysis could compliment the quantitative analysis and delve deeper into the reasons teachers are choosing to relocate and identify strategies and incentives for stabilizing the teaching force.

Qualitative findings

The SAAS accountability tool was developed in 2001 by staff at the World Bank who sought a better way of measuring school autonomy and accountability as part of the World Bank *School Accountability and Benchmarking of Educational Results (SABER)* program. This tool and its accompanying assessment scale was used by our team to determine the depth of autonomy and accountability in the education system and whether that has changed since the former EDUCO schools lost the power to make decisions locally.

School and budget management autonomy

An important factor in educational policy is the division of responsibilities among national, regional and local authorities, as well as schools. Placing more decision-making authority at lower levels of the education system has been a key aim in educational restructuring and systemic reform in many countries since the early 1980s. Yet, simultaneously, there have been frequent examples of strengthening the influence of central authorities in some areas (OECD, 2004, p. 34).

Between 1999 and 2010, two models of school management existed in El Salvador. In the first, MINED determined budget allocations based on the school enrolment census and then vertically decentralized resources to the public schools where SMCs (including the school director) had some decision-making power on how to spend that allocation (that is, use allocations for school feeding, purchasing additional materials, fixing the school). The second model was represented by the EDUCO education program where SBM was completely decentralized. Donors and communities provided schools with resources and the president and treasurer for the SMCs were responsible for managing the school budgets, which included the power to hire, fire and pay teachers. In 2010, the government passed a National Decree, which formally incorporated the EDUCO schools into the government management model. The following analysis looks at (1) the impact and change on accountability and management in the EDUCO schools and (2) diagnoses of the current state of school management and accountability in El Salvador with the purpose of drawing strengths from both models to provide lessons and recommendations to MINED that might lead to improved school performance.

Managing the school operating budget

In El Salvador, management of operational budgets are handled at two levels—the MINED and school levels. At the national level, MINED analyzes and allocates resources to schools based on the number of students that were enrolled in the previous year. The resources are then distributed vertically through the 14 departments that operate in the country. Once the allocation of resources has been distributed to the schools, the school director has the legal authority to manage the budget.

Prior to 2010 there were two systems for managing school budgets—one for the EDUCO schools and one for the non-EDUCO, government-managed schools. In the EDUCO schools, the SMCs received resources from donors and community members to manage the schools. The SMCs paid teacher salaries, purchased materials for the school and made decisions about how the resources were spent. The School Director served an administrative function (for example distributing materials, resolving problems at the school, bringing school needs to the SMC). The budgetary decision-making power in the EDUCO schools was concentrated in the SMCs with the school director taking on a purely administrative function.

"*There was a certain model…the president of the SMC in EDUCO was responsible for signing checks and making payments….including paying teacher salaries…the president, parents and other members would meet and work to determine the needs of the school and how to allocate budgets.*"

Focus group, SMC former EDUCO school

Another member of the current SMC who served under the previous EDUCO school management model noted:

"The director?...no…no….no…he did not have the ability to manage funds. These were provided directly to the Consejo Educativos (SMCs) to manage."

Since 2010, all the schools in El Salvador have the same decision-making system where the MINED allocates budgets to the school and the school director set spending priorities, usually in consultation with the SMCs. The School Director then managed the annual budget, overseeing and being accountable for spending at the school level.

In almost every interview conducted with school directors, they indicated:

"We meet between January and February each year and determine the needs of the school…obviously, didactic and learning materials are the most important…but, it depends on our budget…if there are small repairs like painting the school, fixing hallways, allocating funds for school feeding….These are important too and it all depends on the amount of resources we have….We come to agreement together on how to spend it and I manage the process."

School Director, CDE school

For the EDUCO school management model, the change in 2010 has led to less decision-making authority when it comes to a broader "basket" of responsibilities, which included hiring and firing their own teachers. So, based on the SAAS tool, the SMCs have lost power while the school director has gained power to manage the aspects of the school budget within his control. For the non-EDUCO schools, the model remains—schools have some ability to manage resources locally, but the annual budget for each school is controlled centrally by MINED.

Establishing and managing staff and teacher salaries

Another key characteristic of decentralized education systems deals with the ability of local actors to hire and manage school staff. Under the EDUCO program, teachers applied for teaching jobs at the EDUCO school and the community would select and pay the teachers. The teachers were given one-year contracts and the community could decide at the end of the year whether to renew the contract for the following year. Ideally, selection of the teacher and renewal of the contract was based on teacher and student performance, including the presence of the teacher at the school on a consistent basis. The ability to hire and fire local teachers was one of the key differences in the two school management models prior to 2010

In the non-EDUCO schools, wages were, and continue to be, centrally established through a ladder system that rewards seniority to public service. Teachers enter the system after they have completed the educational requirements and are then allocated to appropriate schools. In the cases of larger government schools, school directors can use their annual budget to hire additional teachers if the money exists. This usually happens only when all the positions have been filled, however, and the school still needs additional support.

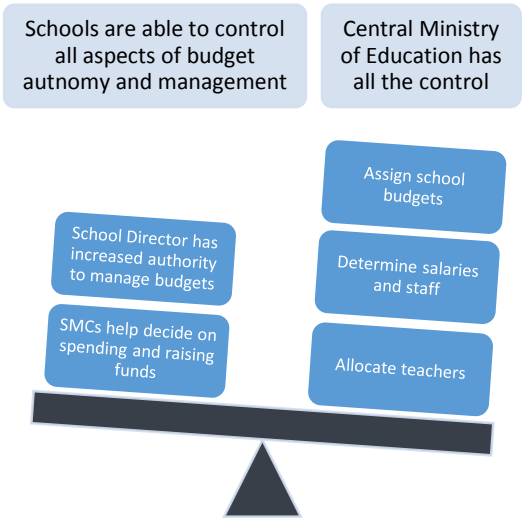
In terms of school accountability, the EDUCO schools lost the power to hold teachers accountable since they no longer can hire and fire teachers. Based on the SAAS tool and interviews conducted with teachers, they believed that this change was for the best since teachers often felt the SMCs abused the power by forcing teachers to do favours or withholding salaries for long periods of time. From the SMC perspective, they also feel they have lost power. When they had the ability to manage the teachers, they ensured that the teacher was present in the school every day since presence was one of the key factors that influenced the renewal of the teaching contract. Under today's system, SMCs provide input into the needs of the school but they have no mechanism for holding teachers accountable and ensuring that they are present and teaching children. This is one factor that may have impacted the declining advance rates since 2010.

Raising funds to supplement the school budget

The change in the Teacher Directive has had little impact on whether schools pursue additional funds to supplement the annual budget. School Directors have the legal authority to raise funds and they usually work closely with members of the SMCs to make specific efforts within their municipalities to do this.

The main conclusion of this analysis is that under the EDUCO school management models, the SMCs had the autonomy and power to manage school budgetary resources, which included the hiring and firing of teachers based on performance. As the graphic below shows, the new Teacher Directive Law has tipped the power balance back toward MINED. Today, schools have a more equal distribution of resources and teachers that are considered qualified through the educational system. School Directors have gained the ability to actually manage the school budget; although all the schools in the sample indicated they have functioning SMCs, the SMCs have less power over what and how resources are spent at the schools. Based on the SAAS rubric, school autonomy is low to medium. Prior to 2010, under the EDUCO model, school autonomy was considered high.

Figure 6. The school autonomy in the management of staff



School autonomy in the management of staff

The second indicator in the SAAS tool deals with the school authority to hire and fire personnel, as well as the authority to set teacher salaries. The third indicator focuses on the role of the SMCs in school finance. We combined the second and third indicators because the answers differ slightly. Having schools manage personnel should reinforce the notion of local accountability. When teacher salaries and incentives are set centrally or through rigid collective agreements, teachers may be less responsive to the community because they may perceive that the entity paying their salaries is their real client (Arcia *et al*., 2010).

As is discussed in the previous section, under the EDUCO school management model, school autonomy to hire and fire teachers was high. The *Consejo Educativos* could place advertisements for an open teaching position and select the person they felt was best to teach in their school. At the end of the year, the committees could reassess the teacher's contract based on performance (that is, mainly attendance) to determine whether the teacher would stay or go. Overall, most EDUCO teachers remained at their schools for an average of seven to eight years so the teaching population was fairly stable. This evidence

is supported by our analysis of the teacher transfer data. When teachers did transfer, it was between EDUCO schools and usually because they wanted to be closer to home, not as a result of problems with the SMCs or communities.

"The teachers would present their resume, area of specialty and would be hired all within the management parameters of the SMC….Usually it was based on a vote by members of the committee. In terms of firing the teachers, usually the teacher would request a transfer to be closer to home….We never asked a teacher to leave."

SMC member, former EDUCO school

Throughout the interview process, SMC members—particularly those that worked under the EDUCO model—preferred this model of school autonomy, having the ability to hire and fire their own teachers.

"MINED doesn't always understand the reality of rural education and occasionally they send teachers whom they know or are their friends. When the SMCs had the ability to manage staff, we were able to ensure that the teachers we hired were present every day and teaching our children. Now, we have no way to hold the teachers accountable."

SMC member, former EDUCO school

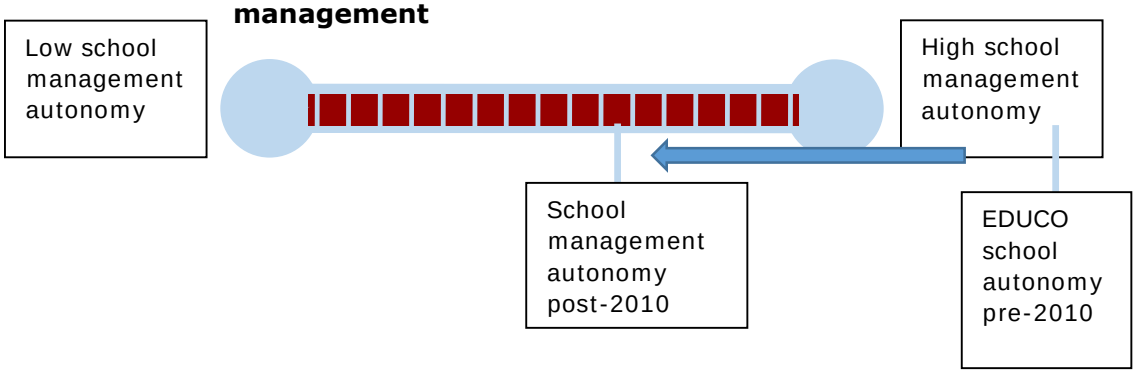
From the teacher's perspective, the majority of teachers we interviewed (more than 80 percent) prefer the current system of school management where MINED controls and manages teacher placement. Based on teacher interviews, many who had worked under the EDUCO model felt that they were often in an "unstable" situation. In other words, since the contract was year to year, they never knew if they would be employed the following year. For many, their families depended on the teacher's livelihood, so the lack of a commitment to long-term employment added stress.

"For example…a colleague of mine had been teaching at an EDUCO school and no one told her that she would not be hired again at the end of the year….In January, she presented herself to the school ready to teach and the president of the SMC told her they already had a new teacher. So, she didn't have a job because no one told her they were not going to hire her."

Teacher, Former EDUCO school

Although these examples were uncommon, issues such as these surfaced enough that the teacher union became more engaged with the government and pushed for the policy changes that led to the new Teacher Directive Law. Now, teachers are hired by MINED and feel that they have more long-term job stability and support. Schools do still have some autonomy to hire teachers; for example, if there is a vacancy due to maternity leave or covering vacancies yet to be filled by MINED, a school can use its own budgetary resources to hire temporary teachers directly to fill those positions.

Figure 7. School autonomy in teacher management



Evaluation of school and student performance

The fourth indicator under the SAAS tool relates to the regular measurement of school performance—either through teacher evaluations, the evaluation of learning outcomes, or both. Measuring school performance is a key precondition for ensuring accountability (Arcia *et al.,* 2010).

In El Salvador, both before and after the implementation of the new Teacher Directive, the measurement and reporting of student and school performance is low. Although the majority of participants in this evaluation (70 percent) were familiar with the *Paesita* test and knew that students had taken the national assessment in previous years, most didn't understand the purpose of such tests in terms of how they are used for student improvement. In many cases, the results of the learning tests are not shared back with schools; if they are, it is usually by subject and an aggregate number. The results mean little to school directors and teachers since there is no information and training on how to use the results.

At the local level, the SMCs across both sets of school management models indicated that schools use school report cards to report back to parents at least every three months. They indicated that the teachers provide the information to the committee, who then meets to discuss and share the results. The SMC members further indicated that teachers do tend to meet with parents and discuss student performance and address problems as they arise.

"*In our case, the teacher has the information and keeps us informed as well as the parents….So that she can inform each one how their child is performing and if there is a problem, how they can solve it."*

SMC member, CDE school

Overall, participants in the focus groups and interviews (including key stakeholders) recognize the importance of educational assessments and the role these can play in improving school and student performance. They indicated that MINED could do a better job of linking results of the national tests to pedagogical practices and improved training for teachers. Key informants also felt that the national assessments needed to be given more consistently. Currently, the *Paesita* was last applied in 2012 and only as a sample-based assessment.

"I had an experience, but not at this school……in my example, when the results of the Paesita were published nationally it was only the averages and at the departmental level, we were given averages for each of the subjects and an average for the school, but nothing at the student level."

School Director, former EDUCO school

At the local level, interviews and focus groups seem to suggest that there is more knowledge of student performance based on assessments done at the school level. SMC members and teachers indicated that they do provide the information to parents on how their child is advancing and the results are often discussed at SMC meetings. In terms of the autonomy and accountability aspects, it seems that information on assessments and student performance locally is high; however, the vertical sharing of information from national assessments and its application to improved pedagogical practices could be improved.

School accountability

The final indicator of autonomy and accountability deals with the mechanisms in place to render accounts to parents, local governments and society at large. These items include the use of manuals to regulate the use and results of assessments, the use of national and regional student performance assessments and SMC/school ability to hire auditors to verify financial spending.

Use of manuals to guide the use of assessment results

Participants in the focus groups and interviews were not aware of any manual to guide the use of assessments and results at any level of decision making. The idea of using data to inform decision making is new to many members of MINED and they are eager to learn how to do a better job. It is not something that has been done well in the past, however. This issue presents both a challenge and an opportunity for the current administration under the goals of the new Social Education Plan—to build the capacity of its citizens to graduate from school with the proper skills to enter the workforce in a more productive manner. MINED is interested in learning to use data to drive decision making; we provided capacity building in this area during the purview of this evaluation. However, there is still a need for additional support and training to help them institutionalize a system of data use and to change the disconnected nature of data collection and analysis that currently exists in MINED.

Use of assessment results for school comparisons and improvement

Similar to the process discussed above, though MINED has a national performance system in place and teachers at the local level measure student performance, it is still an area that needs more attention from MINED. Although MINED has gained experience in designing, implementing and disseminating information in recent years, the *continuous learning cycle* is still not fully in place. In other words, results of the evaluation show that many MINED staff at all levels (national to school) do not have an approach and plan that demonstrates how to use data to both improve their decisions and measure changes in the system related to those decisions. Empirical data can help improve MINED decisions in terms of allocation and management of resources and assessment inputs, processes and results. These items combined can help support improvements in student advancement, or at the very least better inform MINED regarding which factors most impact student advancement in a given time period.

Legal authority to hire outside auditors to conduct financial audits of schools.

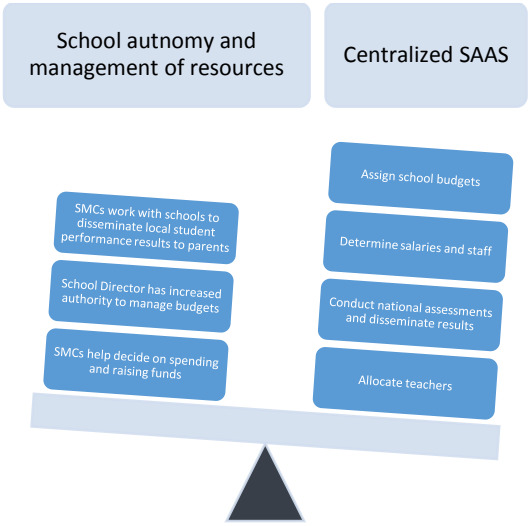
The results from the SAAS indicate that school autonomy and accountability in this area is low. Through school boards have legal authority to request financial audits, SMC members and school directors had little, if any, knowledge of how to initiate such a process in the post-2010 education system. SMC members indicated that they had received some training that explained the roles, functions and administrative and pedagogical procedures they use on the committee, but nothing that would help them hire someone to conduct such an audit. This finding serves as an important alert for MINED as it signals the need to provide more guidance on how SMCs can better support MINED in the management and accountability of schools.

Conclusions from the qualitative results

Today, in the post-2010 school management and accountability world of El Salvador, the scales are tipped toward less school autonomy and accountability and toward more centralized control through MINED. The new Teacher Directive Law has brought about improvements in the role and dignity of teachers, empowered school directors and increased

the equality of resources at schools. It has, however, substantively decreased the role that communities, particularly SMCs, can play in increasing accountability at the school level.

Figure 8. Unbalanced scales: school autonomy vs. central authority



Communities can and should be partners with MINED in ensuring that schools are held accountable for building the human resource base of El Salvador. As has been demonstrated by several studies on the opportunity to learn (DeStefano et. Al, 2008; SMC perception data on teachers from this study), ensuring that the school is open every day, that teachers and students are present and ready to learn, and that children have concentrated time on task are key factors in improving both student advancement rates and subsequently learning outcomes. Under the EDUCO management model, the SMCs played a strong role in holding teachers accountable for being present and teaching their children. Local accountability—giving SMCs the power to manage teacher attendance and the like—can help MINED ensure that students have an opportunity to learn, as noted in related studies focusing on decentralized decision-making in schools, including School Based Management, Making Schools Work, SABER (World Bank, 2009, 2011). In this way, the SMC can partner with MINED. SMCs can be trained to ensure that third-party audits take place at the school, reducing the leakage and loss of school resources and can ensure that the funds are spent on the basic school needs—a role most SMCs currently play.

Findings from the cost-effectiveness analysis

New research on the cost effectiveness of community-based programs indicates that policy changes can have a significant impact on the effectiveness of education, particularly for those populations least served by the formal system. For example:

- Policies on school organization and management that promote the placement of small schools within villages can dramatically increase enrolment and attendance.
- Local control over the timing of the school day and calendar can make attendance easier because the school schedule is tailored to local needs and customs.
- Local recruitment of teachers with less formal pre-service education and training can expand the pool of available teachers, especially in hard-to-reach areas.
- Partnering with networks of nongovernmental actors to provide frequent, regular support services to schools can help teachers with less formal training improve their practice and enable communities to effectively manage their schools.

These policy considerations are based on a nine-case analysis of complementary models (DeStefano and Moore, 2008). These case studies examined the effectiveness of programs designed specifically to complement the formal public system by reaching out to underserved populations in eight countries. The programs rely on nongovernmental organizations to promote and support establishing schools as community-based institutions, in a similar way to the EDUCO program. Based on this previous research, we analysed the effectiveness and cost effectiveness of the EDUCO program in serving the rural populations of El Salvador.

The cost effectiveness analysis sought to answer the following two questions:

1. To what extent was the EDUCO program (compared to regular government schools) able to increase access to education for the rural populations of El Salvador?
2. If access increased, did the EDUCO schools accomplish this in ways that are more/less cost effective than regular government, non-EDUCO schools?
3. What was the cost-benefit of closing EDUCO and centralizing school management in MINED?

Each model was examined to see how effectively it provided access and student advancement commensurate with those achieved in non-EDUCO schools. We compared the unit costs[3] of reaching the EDUCO students to the per-student cost for the public education system. The analysis was based on recurrent costs of the programs.[4] The cost effectiveness of access for the EDUCO model and government schools is based on a comparison of the annual per-student costs. The cost effectiveness of student advancement for both public and complementary program schools was based on the annual recurrent cost per-student and the number of years to complete a given education level.[5] The table below provides data on the per student recurrent costs for both education models beginning in 2005. As the table shows, the EDUCO program tended to be approximately 25 percent more costly than the non-EDUCO schools. EDUCO was more expensive, in part, because the program had to pay for its own teachers, which increased its recurrent costs. Once the program was converted to the government management model, costs equalized since MINED now provides school budgets to all schools. Although the EDUCO program was more expensive, from 2005–2009 it successfully expanded access to education for 389,554 children who would not have otherwise been able to go to school. The result is that in terms of its effectiveness in expanding access, this objective was reached.

Table 7 El Salvador
Cost per Student[6]

	2005	2006	2007	2008	2009	2010	2011
Basic Education (CDE)	$263.00	$280.00	$290.00	$292.00	$324.00	$342.00	$404.00

[3] The cost per student for the non-EDUCO schools includes all MINED costs, including teacher salaries. The EDUCO costs were drawn from previous studies and include income generated by communities.

[4] The costs for the non-EDUCO schools were provided to us by the MINED. The unit costs for the EDUCO program was based on a 2005 publication and then escalated accordingly to present data in line with changes that occurred in the per unit cost of the non-EDUCO schools.

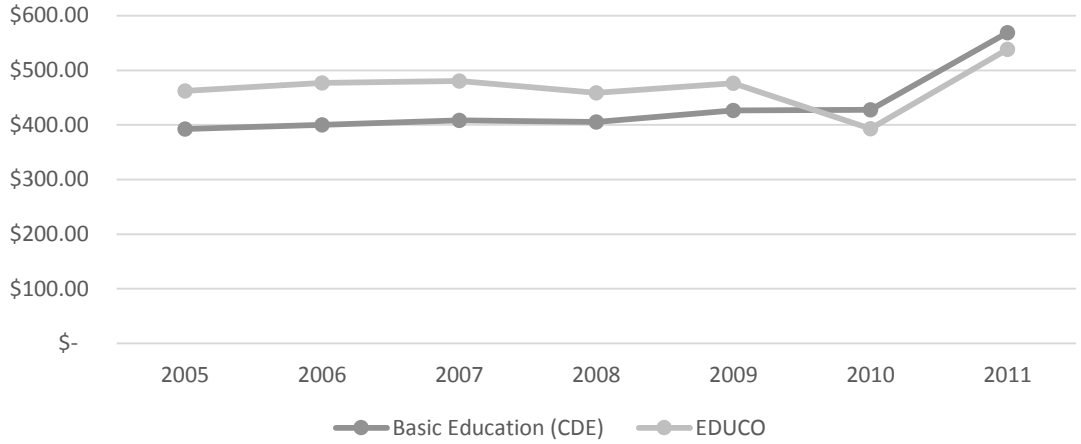
[5] Cost effectiveness of completion is calculated by multiplying the annual recurrent cost per student by the number of years to complete a given level of education (this varied from one case to the other). That number was then divided by the completion rate, defined as the percentage of initial enrolees that survive to the given level of education.

[6] EDUCO costs based on the assumption that costs per students increase similarly in both types of schools.

EDUCO	$330.00	$353.00	$365.00	$367.00	$400.00	$342.00	$404.00

In terms of the cost-effectiveness of student advancement, the non-EDUCO schools were also more cost effective until 2009. As the graph below shows, the EDUCO schools were closing the gap over time as their SARs improved; the cost per student advancement became less. Since the change in governance occurred in 2010, the former EDUCO schools have been more cost effective than the non-EDUCO schools because they have been able to keep students in school at a higher rate and advance them through the grades.

Graph 1: Cost-effectiveness of student advancement



8. Discussion

The results from the hierarchical growth models show that the rate of growth in student advancement did decline, and that the observed decline was similar across both non-EDUCO schools and EDUCO schools. The regression analysis shows that the decline had no statistically significant impact on student advancement in the former EDUCO schools as a result of the change in the SBM model.

We also found that while the former EDUCO schools remained more cost-effective in terms of student advancement, the overall cost-benefit to the government of closing the program was high. Closing the EDUCO program saved money and was not accompanied with a statistically significant negative impact on student advancement rates. Therefore, the policy change made sense from the cost-benefit perspective.

It is important to note that the absence of a negative impact of the closing of the EDUCO system does not imply that EDUCO schools did not lead to initial gains. The impact of closing a program does not necessarily equal the opposite of the impact of starting a program. In fact, EDUCO might have allowed one-shot gains in terms of opening new schools, etc., and once those are in place and established, converting them to Non-EDUCO does not come with a loss. Whereas the initial effects of starting EDUCO have been addressed in previous studies, it is a strength of our study – and a focus rarely seen in impact evaluation – to specifically address the impacts of discontinuing the program.

In terms of explaining the declining student advancement results, we speculate that several factors may help explain these results. First, teachers who worked in the EDUCO schools generally had lower certification levels, but received greater levels of technical support from

the donor community. As previously discussed, prior to 2010, teachers migrate within the system where they were hired (i.e. within EDUCO schools and within government schools). After 2010, former EDUCO teachers were allowed to become certified and work in any of the schools. The policy change led to an increase in teacher transfers between the former EDUCO and government schools.

As a result, we hypothesize that this new teacher flexibility—and increase in teacher movement, coupled with an increase in enrolment (which we see through secondary data analysis) may have come together to reduce student advancement rates in the post-2010 years. These issues were supported by interview and focus group results, which discussed the changes in quality. It is important to note that we can only speculate the possible link between teacher transfers, enrolment and student advancement. In the policy section, we recommend that MINED undertake a separate evaluation of the impact of teacher transfers on student advancement and learn to deepen their understanding of the magnitude of this issue on the quality of education.

Second, the loss of authority of the SMCs to manage teachers in the EDUCO schools led to the unexpected consequence that teacher absenteeism increased (at least in the EDUCO schools). If teachers are not present, then students cannot learn. The two quotes below from SMC members in the former EDUCO schools highlight the change in the relationship and decline in teacher accountability.

> *"Things were different before and these things are not coming back. (Interviewer: What do you mean by before) before the change in responsibilities ... now ... the ACE [SMC] we realize that the director informs us - he says we are going to do this or that. We also cannot hold the teachers responsible – make sure they are here. Before we were partners – the President, Treasurer, everyone agreed on how to improve quality and then we did those things – including changing teachers if needed. Now, these things do not occur."* Member, SMC, Former EDUCO

> *Speaking of teachers ... as a parent I do not like how the teachers now interact with my son, "Here I am the one in charge, you close your mouth….. you do not have to talk….. "I do not like that. In the past, we worked together, but today, it is very one-sided. One day, she [the teacher] called us into a meeting and told us that we no longer could get rid of her because it was no longer EDUCO, and that they [teachers] would leave if they wanted – we [the SMC] did not have a say – they could come and go when they wanted.*

In summarizing the results of the focus groups and interviews, according to the principals, teachers and officials of the central and departmental education offices bring the former EDUCO teachers into the MINED system has dignified the role of teachers. Meanwhile, when speaking to members of the SMCs, they continually reiterated the important of having a "voice" in the performance of teachers especially since the change in school management model has led to a loss of their authority to ensure that the teacher meets the school calendar.

Nonetheless, despite the strength of the longitudinal study design and our efforts to obtain an appropriately matched comparison group there are several threats to internal validity associated with these analyses that should be discussed.

1. Limited student learning data: The MINED was very collaborative and helpful in providing all relevant learning data that had been collected through the *Paesita*. However, the government itself had limited data. The last census-based *Paesita* was in 2010. In 2012, the MINED, with help from international nongovernmental organizations, collected a sample-based version of the test; however, that was the last year the test was given. The challenge to our study that this situation presented was that we did not have annual data points for learning, which made it more

difficult to project the expected growth path had the program continued. Although we used the student advancement rate as a proxy for learning, the results varied slightly from the graphic representation of the learning data. In addition, the cross-sectional associations between the limited testing data that we did collect and our constructed SAR measure was very low. The result is that the outcomes of the evaluation are weaker and we are not able to concretely link the impact of the SMCs to student learning. However, even if student learning and student advancement are equally valid and equivalent indicators of school performance in the population, the association between these two indicators in our sample could be weaken if schools that are good at retaining low performing students also experience lower aggregated testing performance. We raised this point earlier in the report when discussing the formulation of our primary outcome variable. For this reason, it could be argued that the student advancement rate has better face validity than aggregated student testing data.

2. Decline in learning in both sets of schools: A second factor that weakens the results of this evaluation stems from our reliance on the assumption that any deflection in the rate of growth among CDE schools observed during the post-EDUCO closure period was due entirely to confounding factors that coincide, but are not related to, the closure of the program. This enables us to apply this deflection to the counterfactual of EDUCO schools when estimating the impact of the program's closure. There are two possible scenarios where this identification strategy would break down. First, even if the deflection observed among CDE schools does represent the impact of time-varying factors that are confounded with the program's closure, their actual influence on the ACE schools may not be equivalent the impacts experienced by non-EDUCO schools. Without a sample of ACE schools that continued to operate under the EDUCO program, we have no data that would allow us to relax this assumption. Second, it is possible that non-EDUCO schools were also impacted (positively or negatively) by the closure of the EDUCO program. Such spillover effects could cause us to over or underestimate the impact we sought to estimate. Indeed, this concern regarding spillovers partially motivated our investigation of changes in teacher transfer patterns over the EDUCO closure period. Since the analyses did reveal that transfer patterns were impacted by the closure of the EDUCO program, this possible source of spillover effects on the SAR should not be ruled out. Furthermore, auxiliary analyses reported here reveal that teacher transfers were fairly wide-spread across both EDUCO and non-EDUCO schools, indicating that some potential for impacts of teacher transfers on student advancement exists. In the policy section, we recommend a potential future evaluation that MINED could conduct to understand the impact of transfers on student advancement.

3. Limited or no data on current interventions: Related to the point above, we have little or no data on what changes (outside of the implementation of the new Teacher Directive) may have caused the decline in the outcome variables. This lack of data presents another potential weak link in the outcome analysis because we are unable to completely understand how much of the decline is related to the change in the Teacher Directive verses other factors.

4. Change in government. In 2014 an election in El Salvador ushered in a new government. This event changed many of the people we had been working with in the Ministry of Education. As a result, we spent several months rebuilding key relationships so that we could move forward in the analysis. This important process delayed our ability to travel to the field and collect qualitative data as well as gather additional data from the MINED that might have helped us to further explain the

declines we were seeing in the outcome data. Had the team had another month or two (based on the previous delay) to conduct further data collection and analysis, we would have been able to strengthen the quantitative analysis and link it more strongly to the qualitative results from the field.

5. Ecological fallacy. The lack of student-level data and the corresponding inability to distinguish between within- versus between-school associations among our policy, time and the outcome variables exposes our causal inferences to the "ecological fallacy." For example, if we observe an estimated negative impact of the policy change on the SAR, the lack of student level data means that we will not be able to distinguish between the situation in which the students within EDUCO schools do worse than expected over the post EDUCO period from the situation in which these same schools experience changes in enrolment that gradually lead to the reduction in the average SAR. This problem might be mitigated by the fact that most schools in El Salvador (especially those in rural locations) experience fairly stable enrolment patterns over time.

6. Parametric assumptions. We should also acknowledge our reliance on the parametric (linear) growth model to construct the counterfactual (see dotted line in Figure 2). The lack of data on any school in El Salvador that continued involvement in the EDUCO program during the post-EDUCO period means that the estimation of the counterfactual was not constrained by data but based on an extrapolation of regression-based (linear) trend lines. This introduced a strong dependence of our results on the parametric specification of growth in the SAR. Although we attempted to relax the assumption of strictly linear growth in the outcome means, allowing for non-linear (for example, quadratic) growth within each phase did not appear produce growth model that was sensible in a mathematical sense. Although we might have introduced additional inflection points or "phases" in order to relax the linearity assumptions, this was not considered in the original PAP and, therefore, was not pursued in our primary evaluation.

7. Within-district confounding. In addition, our efforts at matching the population of non-EDUCO schools to EDUCO schools did not take into account differences between the two types of schools that are present within the school districts. This was partly due to the lack of available school-level data, but it also reflects a strategic decision to assign greater importance to conditioning the analyses on unobserved time-varying confounders that operate between rather than within school districts. Nonetheless, the non-equivalence across the two samples of schools (EDUCO versus non-EDUCO) could result in biased estimates of the counterfactual and, consequently, biased estimates of the impact of the EDUCO program's closure.

9. Specific findings for policy and practice

Policy

The results of this evaluation are particularly relevant and important for MINED policy in El Salvador. In light of the Minister's desire to focus on teacher professional development and teacher accountability, the following findings and recommendation should be taken into account as MINED moves forward with its planning.

The unintended consequences of policy decisions. One of the surprising findings in this evaluation was that student advancement in both the former EDUCO and the government schools declined—and declined steeply after 2010. We further know that in 2010, MINED

made a series of different policy choices which included changing the SBM model of the EDUCO schools. The objective of the policy changes was to reduce school fees and increase student enrolment and attendance in schools. Although these policy choices have clear benefits, the choices may also have had unintended consequences on student advancement rates. For example, international research on school fees indicates that while reducing school fees increases enrolment, there is often a decline in quality. As class sizes increase, teachers are often less able to provide students with more individualized attention, leading to declining outcomes. If these policy changes were not complemented by an increase in teachers and teacher support, it could be contributing to the decline in student advancement rates that we see in the findings from this evaluation. However, the extent and cause of the impact would need to be measured through a separate study. The implication for MINED practice is that it becomes critical for policymakers to use data to drive decision making and ensure that they have analysed both direct and indirect consequences.

SMCs and teacher accountability. Teacher absence reduces instructional time. Reduced instructional time impacts student advancement. A study conducted by Moore, Destefano and Adelman in 2011 found that in some countries teachers on average had missed more than 30 days of school in the first four months of the school year. Though the reasons for teacher absenteeism varied across the countries, the result was that high numbers (upwards of 70 percent) of children couldn't read and underperformed on learning assessments, a result that was statistically significant in all cases. One of the key findings from this evaluation is that the SBM model under the EDUCO program helped hold teachers accountable by ensuring that they were present and teaching every day. There were clear consequences for not being present—the potential non-renewal of their contract at the end of the year. We know from interviews with SMC members and school directors that teacher absenteeism has increased since the change in policy in 2010. Although we are not advocating for a return to the EDUCO SBM model, the key lesson is that SMCs can, and should, play a key role in managing certain aspects of the school. Ensuring that the school is open and the teachers and school director are present is an important function that they can play. In Guatemala, SMC members used cell phones to report to the central ministry on teacher absenteeism by texting attendance to the Ministry on a daily bases. As MINED moves forward in planning and developing their approach to teacher development and accountability, they should consider SMCs as a partner that can help increase and oversee accountability locally for MINED.

Teacher transfers. Teacher transfer is an issue that plagues almost all developing countries. Most teachers want to work close to home, or in urban areas where they have better access to certain amenities. Although teacher transfers happened prior to 2010, what we see in the evaluation results is that teacher transfers increased both in frequency and between former EDUCO and non-EDUCO schools. The result, according to local SMC members and school directors, is that schools are left with vacancies that take time to fill. At a time when enrolments are increasing and SMCs can no longer hold teachers accountable for being present, the impact on the classroom may be that students are either being consolidated into larger classrooms with more students per teacher, or schools hire temporary teachers to fill vacancies, many of whom may not be qualified to teach. Teacher transfers impact student advancement, so MINED should consider looking at policies that can mitigate this issue and ensure that schools have not only sufficient teachers, but a stable schooling population. Research has shown that schools with a stable teaching population tend to have higher student assessment results over time. To better understand teacher transfer patterns and the impact on students' advancement and learning, FHI 360 recommends that MINED undertake a separate evaluation. This evaluation could be a mixed methods design, using the secondary data collected by MINED to track teacher transfers from year to year and correlate those movements with student enrolment, repetition, dropout and advancement

over time. The quantitative analysis would determine (1) the magnitude of teacher transfers; (2) if specific regions are more prone to movement; and (3) the reasons teacher choose to relocate. The qualitative analysis would use maximum variation sampling to gather data from teachers on the two ends of the spectrum – those who move often and those who remain at the school for extended periods of time. The qualitative analysis would delve deeper into the reasons teachers are choosing to relocate and identify strategies and incentives for stabilizing the teaching force.

Program implementation

Since this evaluation was not working with direct implementation of a program, this section is not applicable to this evaluation.

10. Appendices

Appendix A: EDUCO Tables

Appendix B: Descriptive Statistics

Appendix C: Cost Effectiveness Methodology

Appendix D: References

Appendix E: Descriptive statistics on enrolment and Student Advancement Rates (SAR)

Appendix A: EDUCO Tables

Table 1. Differences and Similarities between EDUCOs and Non-EDUCO

	EDUCO	Non-EDUCO
Legal framework	ACE Regulations. Not mentioned in any law	General Education Law, Teaching Profession Law, and CDE Regulations
School organization	ACE Governing Board, comprised solely of parents	Governing Council, comprised of school principal, parents, teacher representative, and student representative
President of school organization body	A parent	School principal, acts as legal representative
Administrative and financial functions	Planning and implementing school budget	Planning and implementing school budget
Maintain good functioning of sections of the educational level under their responsibility	Responsibility of the ACE	Not the responsibility of the CDE
Unified teacher career ladder for all teachers	Yes	Yes
Teacher selection	ACE Board and MINED	Court of the Teaching Profession
Teacher hiring	ACE Board and MINED	MINED (Wage Law)
Transfers	Not applicable	Court of the Teaching Profession and MINED
Unified accrual of service time for all teachers	Applicable	Applicable
Pension	Not applicable	Applicable
Life insurance / Employee credit union	Applicable	Applicable
Health insurance	Salvadoran Social Security Institute (ISSS)	*Bienestar Magisterial* (Teachers' Welfare health system)
Rural incentive	Applicable	Applicable
Year-end bonus	Applicable	Applicable
Annual severance payment	Applicable	Not applicable
Teacher retirement	ACE Board and MINED	Board of the Teaching Profession, Court of the Teaching Profession and MINED

Source: Gillies, Crouch and Flórez, 2010

Table 2. History of EDUCO

	1990-1994	1995-1999	2000-2004	2005-2009
ACEs	1,334	1,722	2,098	2,133
Teachers	2,316	4,703	7,381	8,020
Students	74,112	237,280	378,208	389,554
Access	1st to 3rd, progressively adding grades to 6th	Increased to 9th grade	Coverage continues	Increased to high school
School administration	ACE Governing Board with a parent as president (teachers and students do not participate)	CDE and CECE (principal presides over councils), students participate	ACE continues together with CDE and CECE with other models	CIE (for prison schools)
Parent education	1 ACE training per year, 40 hours Frequent parents' school Adult literacy	1 ACE training per year, 40 hours Frequent parents' school No data	Training sporadic and not for 100% of ACEs Intermittent parents' school No data	2 ACE trainings Intermittent parents' school No data
Teacher status	Annual contract No transfers or exchanges Do not accrue service time; no promotions Life insurance ISSS health insurance Annual severance payment Year-end bonus No rural incentive	Annual contract No transfers or exchanges Do not accrue service time; no promotions Employee Credit Union ISSS health insurance Annual severance payment Year-end bonus $40 rural incentive	Annual contract No transfers or exchanges Do not accrue service time; no promotions Employee Credit Union ISSS health insurance Annual severance payment Year-end bonus $40 rural incentive	Annual contract No transfers or exchanges EDUCO teachers' career ladder created Employee Credit Union ISSS/ Teachers' Welfare health system Annual severance payment Year-end bonus $40 rural incentive
Teacher training	Teacher training 1-2 times/year, 40 hours	Teacher training 1-2 times/year, 40 hours	No exclusive teacher training for EDUCO	EDUCO teachers integrated into teacher professional

				development system
Materials for ACE	Simple materials	Simple materials	Updating of materials (making them complex)	Updating of materials, attempt to "return" to simple
MINED support for schools	Supervisors	Supervisors	Change to Pedagogical Guidance System	Quality monitoring system developed with the 'What Route Should We Take?' strategy, and with it the monitoring teams that include pedagogical advisers, management advisers, and middle school supervisors.
Targeting of rural, remote schools	The most remote schools are visited	The most remote schools are visited	Far-away schools visited less	Creation of Effective School Networks Program
MINED organization	Coordinators of pilot project under direct supervision of Education Minister	Creation of National Education Office	MINED downsized	Creation of Office for Education with Community Participation
Financial administration	Creation of National Administration Office	National Administration Office and departmental offices	National Administration Office and departmental offices	Processing agents at departmental level to aid modernization of payment Modernization of banks
Funding	External funds	Government of El Salvador funds	Own funds and IBRD (International Bank for Reconstruction and Development) funds	Government of El Salvador funds and trust fund
School budget	Nonexistent, transferred from projects or	Nonexistent, transferred from projects or	Nonexistent, transferred from projects or	School Budget for ACEs and CDEs. $12 more

	programs	programs	programs	per student, covers ACE transportation support for a total of $25 (CDEs receive $12 per student)
Complementary support	School snack	Integrated classroom, accelerated classroom, libraries, school snack	Integrated classroom, accelerated classroom, libraries, school snack	PEI (School Education Project) and PEA (Annual School Plan), 'What Route Should We Take?', school snack, and all preceding items
Boost	Role of women	World prize for excellence		15th anniversary celebration with support of President

Source: Gillies, Crouch and Flórez, 2010

History of EDUCO

1990–1994

EDUCO started in the 1990s, as a joint government and society enterprise for the purpose of expanding the supply of basic and early childhood education for half a million children outside the school system, who were primarily in rural areas, and for over 7,000 unemployed teachers.

In April 1990, with support from UNESCO, a study was done to design a strategy to address the needs of the population. The results showed that models of school-community linkages already existed in many rural areas of El Salvador, especially in areas severely affected by the civil war. These communities were autonomously organized and had their own funds for hiring teachers, who were more committed to their work than government teachers. This model contrasted with the government's service provision management processes, where appointing teachers and opening a school would take years and where the teachers could request transfers and leave the school once again without educational services (MINED, 1991, 1994, 1997).

In November 1990, with funds from UNICEF, the Project to Expand Educational Services began as a pilot project that the community would manage at the local level. MINED created a Special Regulation for the establishment of community groups to be in charge of educational services at the local level, known as *Asociaciones Comunales para la Educación* (Community Education Associations—ACEs). The ACEs are made up of five officers, chosen from among parents and local leaders: president, vice president, treasurer, secretary, and

member at large, who could not be reelected for more than two consecutive terms. Likewise, a Ministerial Accord was created to grant legal status to the ACEs. It also established an agreement and charter between the ACEs and MINED that defined the responsibilities of the parties: MINED was responsible for training, monitoring, orientation, and funds; and the ACEs were responsible for management at the local level, hiring of teachers, purchasing of consumables, and ensuring enrollment and facilities.

MINED would transfer money for the teachers' salary, ISSS premiums, contribution to the Social Housing Fund, life insurance, year-end bonus for teachers, monthly consumables, required reserve for the ACE, labor liability, and non-recurring expenses for setting up new sections (MINED, 1994, 1997).

EDUCO was implemented in six rural communities, with support from 36 parents and an enrollment of around 200. An ACE was formed in each school via the democratic election of its members (primarily women). Three of its members (president, treasurer, and secretary) were trained by MINED at a 40-hour session initially. EDUCO materials were developed to cover topics included bookkeeping, settlement of accounts, and audits, which were designed to make the processes easy to do, with support from training and monitoring.

Teachers chosen by the ACEs were hired on annual contracts and a coordination office was set up in MINED. In short order, the pilot project expanded to 130 additional schools.

In 1991, with the negotiation of a World Bank loan, the groundwork was prepared for expanding the model in three of the country's 14 departments where MINED had high educational deficits. Schools were established in 263 communities and 263 ACEs were organized to cover preschool and first grade. To implement EDUCO in these 263 communities, MINED trained a group of supervisors to monitor it. It also trained a group of facilitators who would then train the parents who were members of the ACEs and who would receive support materials for training the ACEs. MINED also printed teachers' guides and the necessary legal documents, and designed and established a system for opening bank accounts to handle funds transfers.

By 1993, EDUCO had expanded to 1,009 sections and by 1997, it had 6,060 sections covering preschool through seventh grade, with 193,920 students and 4,196 teachers. That same year, MINED began implementing complementary programs in EDUCO. It developed "Parent Schools" in 1,759 communities and established a single curriculum for all the schools in the country. Schools were given libraries. Alternative, or multi-grade, classrooms were created in 1,043 schools, which taught two or more grades that had low enrollment. There were also special education classrooms for 258 children, accelerated education, and tele-learning (to offer 7th to 9th grade using television and print materials) for 473 seventh graders (MINED, 1997).

1995–1999

The expansion of EDUCO was accompanied by an internal reorganization of MINED. A National Education Office was created, which, together with the National Administration Office, created the groundwork for coordinating the administration of funds and the processes that had a bearing on the schools. Teacher salaries were covered by national funding sources and teacher benefits were improved: they were added to the Credit Union of Ministry of Education Employees, through which they had access to free life insurance and to optional burial insurance.

The first initiative to establish a rural incentive system was implemented. EDUCO and traditional teachers working in rural areas received a salary bonus. This benefit increased the average salary for EDUCO teachers to 7% above that of the rest of the teachers in the system. In 1997, EDUCO received the World Bank's Award for Excellence in recognition of its successful strategy for the provision of educational services by rural communities, with parent participation. This award opened a window of opportunity; many countries in Latin America, including Guatemala and Honduras, wanted to try El Salvador's experience in their own countries.

2000–2004

In 2000, EDUCO continued expanding coverage in preschool and basic education. However, the literature review showed that EDUCO did not continue its rising course, although it did remain as a program, which was important in offering educational opportunities in rural areas. It was not possible to clearly identify new contributions regarding policy-setting or modernization of the system. It appears that attention was not paid to the administrative issues related to the ACEs, pedagogical issues involving student learning, or benefits and improved conditions for teachers. The literature shows that the EDUCO teams were downsized in MINED, which might have contributed to the program's fragmentation.

Likewise, the training of the ACEs, which had been constant during the first 10 years, also appears to have stopped, and there was no training for teachers on issues related to conditions in the rural areas where EDUCO was in place. However, it does seem that one of the most significant changes during this period was to replace the existing supervision system with two different systems: one for pedagogical assistance and the other for administrative assistance. The first was to provide pedagogical support to school principals (independent of model), with the intention of the principal providing technical guidance to teachers, and the second was for providing administrative support to the local school administration systems. According to the interviewees, this change left the ACEs without assistance in the area of school administration. Technical specialists from the Departmental Education Offices had this responsibility; however, there were too few of them for the number of schools they were to serve, as some had to cover over 100 schools.

2005–2009

In 2005, EDUCO went from 11,293 sections to 12,489 sections in one year. MINED created the Education with Community Participation Division in order to oversee efforts at central and departmental levels to manage EDUCO. During this period, the decision was made to focus EDUCO's modernization and development efforts on human resources. According to the literature and opinions of interviewees, the idea was to strengthen EDUCO teachers so that they would not be at a disadvantage compared to teachers from the regular or Wage Law system. To this end, a career ladder was developed for EDUCO teachers so that they could accrue service time and be eligible for category advancement that would enable them to receive salary raises every five years, independent of their annual contracts. In addition, the payment system for teachers was modernized. Teachers in the traditional system were being paid by direct deposit into bank accounts tied to a network of automatic teller machines (ATMs). However, EDUCO teacher would be paid by checks that were delivered in the community and they often had to make several attempts to find the parents that had to sign the checks (ACE president and treasurer). Because of this, a direct deposit system was set up that enabled access to the money via ATM. In addition, the role of the Processing Agent was created. Most of these were accountants, who worked out of the Departmental Education Offices (one per department) and were responsible for administering the funds transfers and deposits into teachers' bank accounts.

As had occurred earlier, EDUCO schools were also subject to the same programs designed for the rest of the country's schools. MINED implemented an administration system similar to EDUCO called Effective School Networks. Each network was comprised of several ACEs and when necessary they partnered with other schools that had different types of school administrations. Likewise, flexible systems were established for providing education. During this period, several high school programs were established in rural areas.

For the research team, EDUCO's history shows that coverage increased over its more than 17 years of life. The growth in numbers of schools, teachers, and students confirms that the participation of communities in school management and the opportunity to hire teachers in a more flexible, effective manner than in the official system has been a fundamental factor in the expansion of educational coverage, especially in rural and low income areas. According to the literature reviewed, in the EDUCO system, a school can be created in two months and a teacher hired in one week, while in the official system, it take two to three years to open a school and an average of one year for a teacher to obtain a position.

Appendix B: Descriptive Statistics

Descriptive Statistics

Table 1: Descriptive statics for ln(SAR) by year, school type and grade.

		non-EDUCO				EDUCO			
			Percentiles				Percentiles		
grade	year	mean	25th	75th	n	mean	25th	75th	n
1st	2005	-0.37	-0.48	-0.15	1596	-0.37	-0.55	-0.14	1919
	2006	-0.30	-0.42	-0.12	1597	-0.28	-0.47	-0.07	1912
	2007	-0.23	-0.35	-0.04	1589	-0.19	-0.36	-0.01	1910
	2008	-0.18	-0.30	-0.01	1591	-0.16	-0.32	0.00	1910
	2009	-0.15	-0.27	0.00	1583	-0.12	-0.29	0.06	1915
	2010	-0.15	-0.29	0.00	1584	-0.14	-0.29	0.00	1908
	2011	-0.13	-0.27	0.03	1586	-0.14	-0.29	0.06	1901
	2012	-0.15	-0.26	0.00	1583	-0.13	-0.29	0.05	1890
2nd	2005	-0.15	-0.24	0.00	1587	-0.18	-0.31	0.00	1905
	2006	-0.14	-0.22	0.00	1580	-0.14	-0.27	0.00	1904
	2007	-0.10	-0.20	0.03	1586	-0.11	-0.22	0.05	1910
	2008	-0.07	-0.16	0.05	1586	-0.06	-0.18	0.09	1907
	2009	-0.04	-0.14	0.08	1584	-0.04	-0.15	0.10	1904
	2010	-0.04	-0.13	0.09	1579	-0.04	-0.16	0.10	1907
	2011	-0.05	-0.14	0.08	1578	-0.03	-0.17	0.13	1899
	2012	-0.06	-0.15	0.06	1573	-0.04	-0.16	0.13	1874
3rd	2005	-0.13	-0.19	0.03	1561	-0.11	-0.24	0.07	1873
	2006	-0.12	-0.18	0.04	1563	-0.11	-0.23	0.07	1885
	2007	-0.06	-0.16	0.05	1571	-0.07	-0.18	0.09	1899
	2008	-0.08	-0.15	0.06	1575	-0.05	-0.16	0.09	1899
	2009	-0.03	-0.11	0.10	1567	-0.03	-0.14	0.12	1896
	2010	-0.03	-0.11	0.08	1566	-0.02	-0.13	0.11	1885
	2011	-0.03	-0.12	0.08	1571	-0.04	-0.15	0.12	1892
	2012	-0.04	-0.13	0.08	1568	-0.03	-0.16	0.12	1871
4th	2005	-0.18	-0.23	0.01	1513	-0.17	-0.29	0.05	1812
	2006	-0.17	-0.24	0.00	1516	-0.18	-0.29	0.01	1848
	2007	-0.10	-0.20	0.04	1534	-0.09	-0.22	0.09	1859
	2008	-0.09	-0.17	0.05	1549	-0.07	-0.18	0.09	1874
	2009	-0.04	-0.11	0.09	1549	-0.04	-0.15	0.11	1877
	2010	-0.08	-0.14	0.05	1546	-0.07	-0.17	0.09	1873
	2011	-0.06	-0.15	0.06	1556	-0.08	-0.18	0.09	1880

	2012	-0.06	-0.15	0.08	1551	-0.06	-0.18	0.10	1858
		non-EDUCO				EDUCO			
		grade	year	mean	25th	grade	year	mean	25th
5th	2005	-0.21	-0.25	0.02	1463	-0.19	-0.31	0.05	1709
	2006	-0.19	-0.25	0.00	1464	-0.18	-0.29	0.05	1771
	2007	-0.14	-0.21	0.05	1478	-0.14	-0.25	0.08	1796
	2008	-0.16	-0.20	0.04	1505	-0.11	-0.22	0.09	1820
	2009	-0.09	-0.12	0.08	1513	-0.08	-0.18	0.11	1844
	2010	-0.07	-0.14	0.06	1516	-0.10	-0.18	0.09	1855
	2011	-0.05	-0.15	0.08	1533	-0.11	-0.20	0.10	1853
	2012	-0.10	-0.17	0.07	1537	-0.12	-0.23	0.08	1839

Appendix C: Cost Effectiveness Methodology

CLOSING EDUCO: THE ROLES, REACTIONS, AND IMPACT ON STAKEHOLDERS

Cost-effectiveness methodology

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One of the main goals of the evaluation is to also estimate the *cost-effectiveness of the EDUCO program when compared to the regular public schools*. Using an approach developed under the USAID-funded Education Quality Improvement program (EQUIP2), we will estimate the cost-effectiveness of access, completion and learning in EDUCO and non-EDUCO schools. We will use MOE budget, enrollment, completion and learning data to estimate cost-effectiveness of both the EDUCO and non-EDUCO schools. The access, completion and learning data has already been provided to FHI360 for the years 2005 – present. We will calculate the cost and cost-effectiveness for the two groups for the years 2005; 2009; and 2015 as there is learning data for all three years, which is important in the context of the overall evaluation of the school management models in El Salvador.

The following is a description of the costs and cost-components that we will examine.

1. Recurrent costs. Recurrent costs are the costs of operating either the government schools or the EDUCO program in a given year. We will examine the following category of recurrent costs:
    a. *Salaries and wages*: Annual cost of paying the staff responsible for provision of education.
    b. *Travel and transportation*: Annual cost of travel and transportation including, but not limited to the cost of visiting schools, travel to training workshops, and travel to and from home to the schools.
    c. *Materials and supplies*: Annual cost of providing learning materials.
    d. *Supervision and training*: Annual costs of providing supervision and support to teachers as well as additional training workshops.
    e. *General operational costs*: Annual costs of items such as administration of the program, honoraria, costs of school nutrition programs, etc.
    f. *Resources*: Monetary and/or in-kind contributions from parents and the community.

To calculate the cost-effectiveness, we will use the following methodology:

Access: Access is defined as enrollment and the calculation will use the number of students enrolled in the corresponding years and levels of the program schools and government schools in each case. The cost effectiveness of access of the public education system will be calculated by dividing the total recurrent costs of the primary education system by the gross enrollment (GER) in primary education for a given year. The cost effectiveness of access is calculated by dividing the total recurrent costs of the program by the total number of students enrolled (in all grades) in a given school year.

Completion: The cost-effectiveness of completion in the public education system will calculated by multiplying the total annual recurrent cost per student by the number of years it takes on average to complete the primary education cycle. That number will then be divided by the completion rate (i.e. total number of completers/total number of enrolled). This calculation takes account of inefficiencies in the system (i.e. repetition) and will thus allow us to examine whether one management model improved the efficiency and reduced the cost of getting students through the educational system.

Learning: The cost-effectiveness of learning will be calculated by multiplying the average cost per student by the number of years it takes for the student to reach the specific grade where the test if given (e.g. $90/student X 4 years to reach grade 3). That number is then divided by the percentage of students reaching a specific threshold such as "sufficient" or percentage correct on the test. This calculation also accounts for repetition and dropout in the system.

These data will be drawn from the secondary data that has already been provided to FHI360 by the Ministry of Education. The data will allow us to estimate of the per dollar investment in the EDUCO

program and compare how *cost effective* the intervention was in terms of the number of students the program reached, helped complete primary education and learn compared to the regular government schools.

The table below provides an example of the type of analysis that will be done for the programs in El Salvador.

EQUIP2 Cost Effectiveness of Complementary Education Programs Compared to Public Schools in 5 Countries

	Afghanistan COPE		Afghanistan IRC		Bangladesh BRAC		Egypt Community Schools		Ghana School for Life	
	Comp Ed	Public	Comp Ed	Public	Comp Ed	Public	Comp Ed	Public	Comp Ed	Public
Annual per pupil cost	$38	$31	$18	$31	$20	$29	$114	$164	$39	$27
Completion rate	*50%*	*32%*	*68%*	*32%*	*94%*	*67%*	*92%*	*90%*	*91%*	*59%*
Cost per completer	$453	$485	$132	$485	$84	$246	$620	$911	$43	$135
% students meeting learning outcome	*94%*	--	*99%*	--	*70%*	*27%*	*94%*	*73%*	*81%*	*9%*[7]
Cost per learning outcome	$482	--	$134	--	$120	$911	$659	$1,248	$53	$1,500

	Guatemala PRONADE		Honduras Educatodos		Mali Community Schools		Zambia Community Schools	
	Comp Ed	Public	Comp Ed	Public	Comp Ed	Public	Comp Ed	Public
Annual per pupil cost	$119	$155	$40	$102	$47	$30	$39	$67
Completion rate	*98%*	*62%*	*61%*	*68%*	*67%*	*56%*	*72%*	*72%*

[7] The learning outcomes for public school students in Ghana are based on Criterion Referenced Test (CRT), given to a 10% national sample of students at grade 6 each year and measuring learning performance in language and mathematics. On that test only 8.7% of the 6th grade students achieved the minimum competency level in English.

Cost per completer	$729	$1,500	$197	$803	$421	$322	$376	$655
% students meeting learning outcome	--	--	--	--	*51%*	*43%*	*40%*	*35%*
Cost per learning outcome	--	--	--	--	$825	$729	$939	$1,873

Appendix D: References

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Appendix E: Descriptive statistics on enrollment and Student Advancement Rates (SAR)

Figure I1

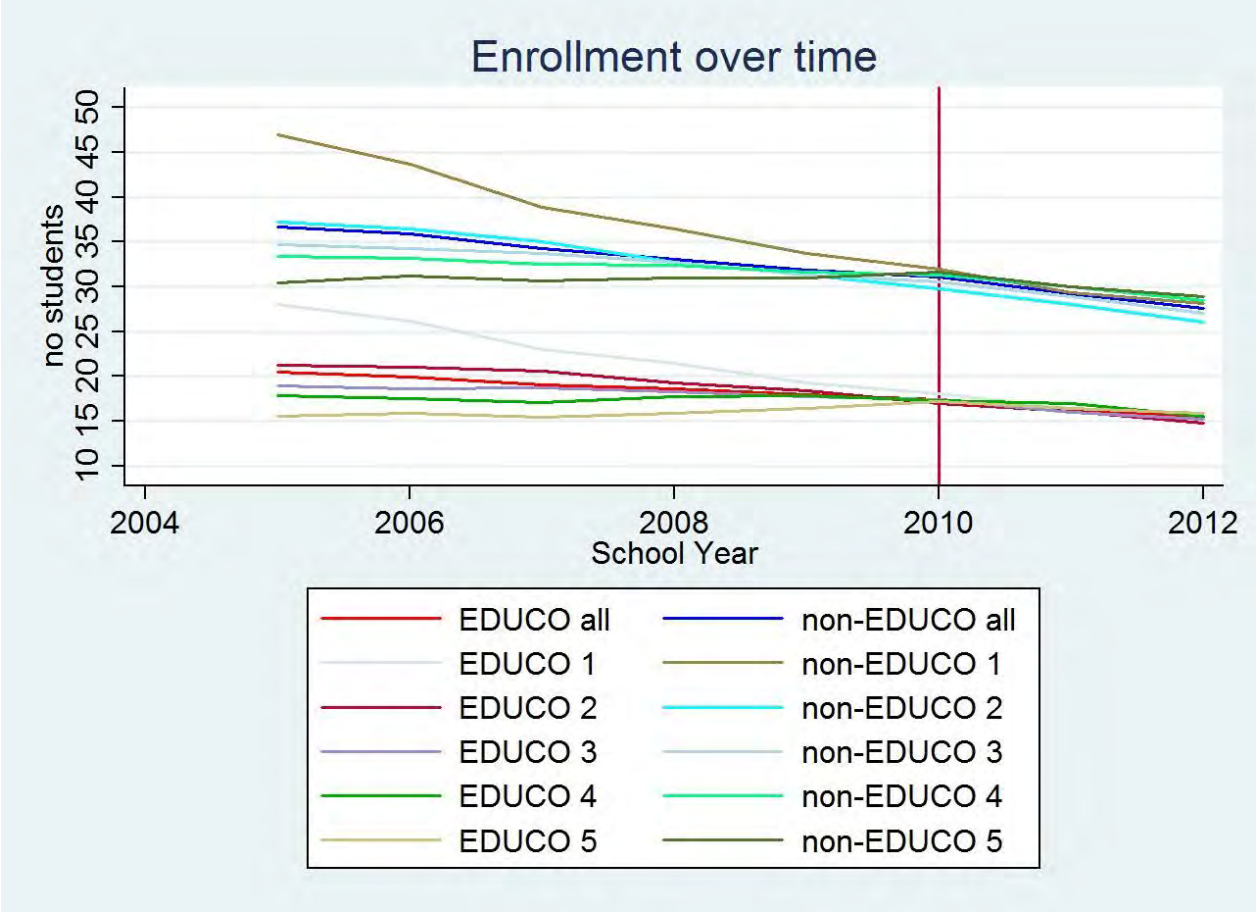

Figure I2

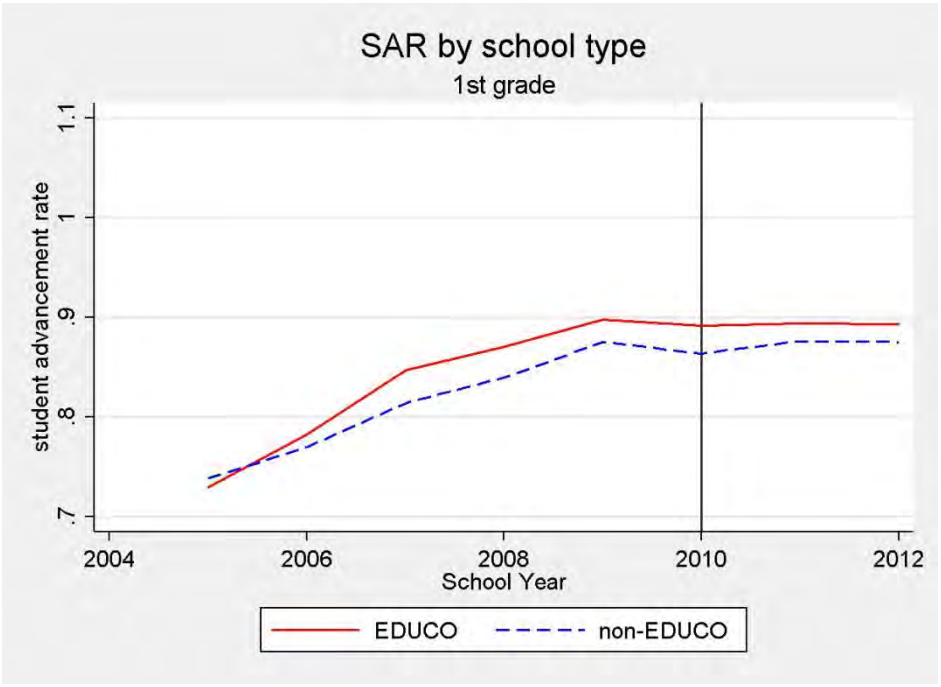

Figure I3

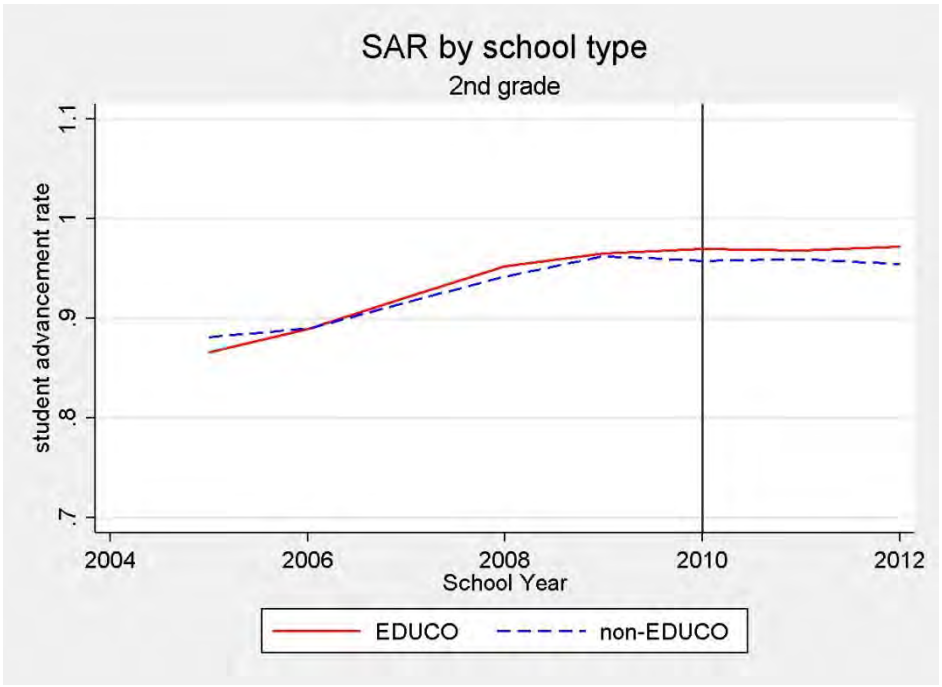

Figure I4

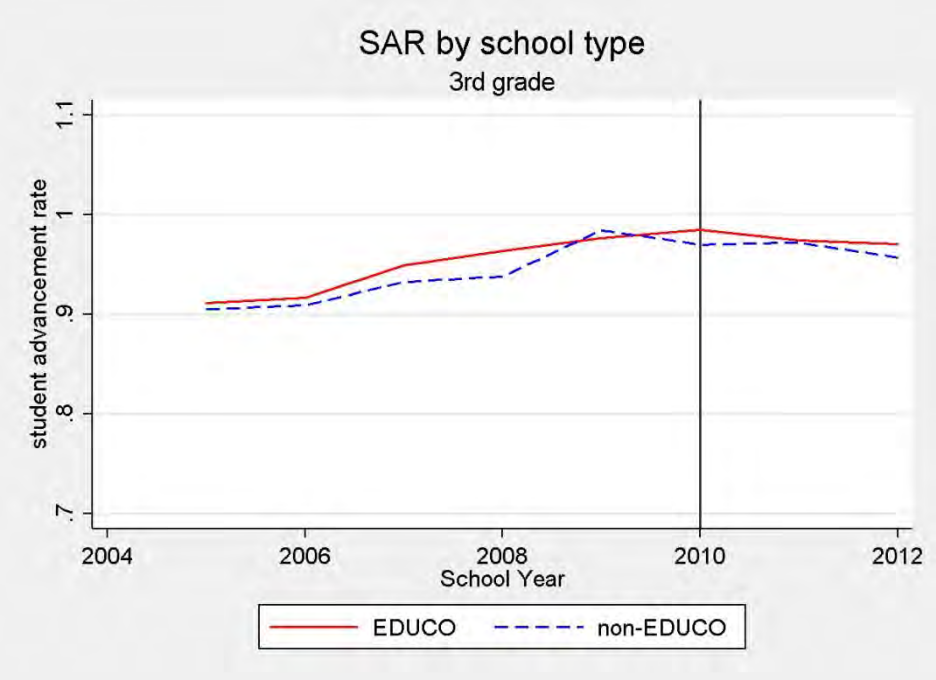

Figure I5

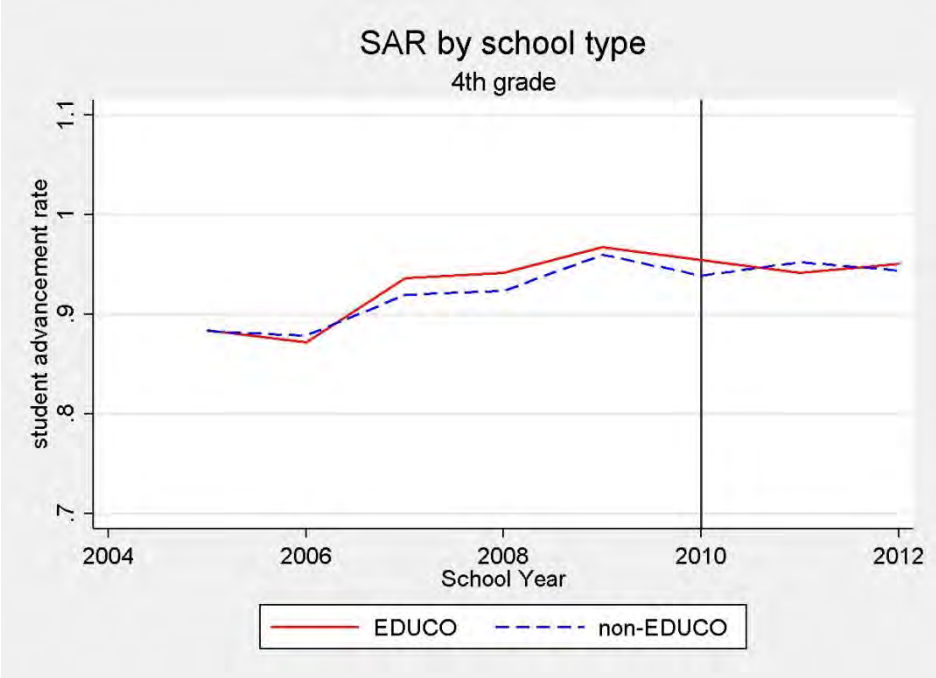

Figure I6

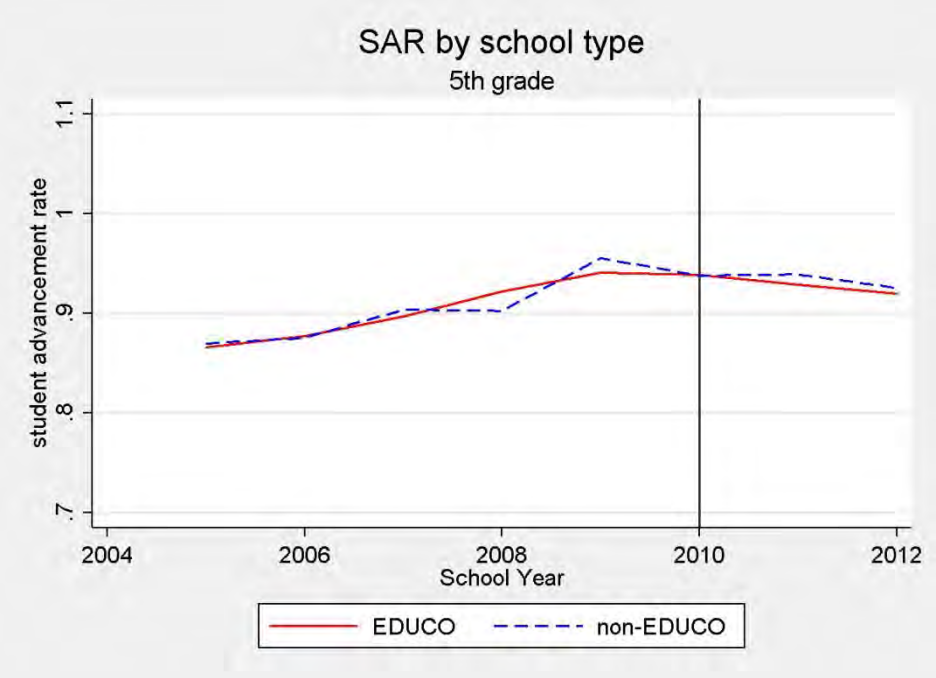

Figure I7