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Publicly Subsidized Private Schools in Developing Countries: Lessons from Colombia

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Abstract: Educational public–private partnerships (EPPPs) promise to increase education access and quality in developing countries, provided they have an adequate design that restricts the distribution of subsidies including targeted programs, centralized controlled enrolment, and accountability. This study investigates the effects of publicly subsidized private schools (PSPS) in Colombia—a type of EPPP program that follows all of these recommendations. We use propensity score and regression techniques to identify PSPS effects on student achievement, measured by national standardized tests. Our results show that Colombian PSPS serve vulnerable students, who are fairly similar to those attending traditional public schools (TPS). Nevertheless, students at PSPS underperform compared to TPS students. Our conclusion suggests that design restrictions may prevent student selection

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and self-selection, but do not guarantee quality improvement for disadvantaged students at subsidized schools. We also argue that design restrictions for PSPS may not be enough when private providers are scarce or difficult to attract for serving the most disadvantaged population.

Keywords: educational public-private partnerships; public subsidies; student achievement; disadvantaged students; education access; privatization

Escuelas privadas con subsidios públicos en países en desarrollo: Lecciones de Colombia

Resumen: Las alianzas educativas publico-privadas prometen aumentar el acceso y la calidad de la educación en países en desarrollo cuando éstas tienen el diseño adecuado para dirigir la distribución de estos subsidios a poblaciones focalizadas, la matrícula está controlada centralmente, y las escuelas están sometidas a rendición de cuentas. Este estudio investiga el efecto de las escuelas privadas con subsidios públicos (EPSP) en Colombia —un tipo de alianza publico-privada que sigue estas recomendaciones. Empleamos técnicas de puntaje de pareamiento y regresión para identificar los efectos de las EPSP en el logro académico de los estudiantes, medido a través de las pruebas de Estado. Nuestros resultados indican que las EPSP en Colombia atienden a estudiantes vulnerables muy similares a los atendidos por las escuelas públicas tradicionales (EPT). Sin embargo, los estudiantes en EPSP alcanzan un rendimiento más bajo comparados con los estudiantes de EPT. Nuestra conclusión sugiere que las restricciones en el diseño de las EPSP pueden prevenir la selección y auto-selección de estudiantes, pero no garantizan el mejoramiento de la calidad para estudiantes provenientes de sectores desaventajados. Así mismo, argumentamos que dichas restricciones en el diseño son insuficientes cuando los proveedores privados son escasos o difíciles de atraer como prestadores de servicio de las poblaciones más desaventajadas.

Palabras-clave: alianzas educativas publico-privadas; subsidios públicos; rendimiento académico; estudiantes menos favorecidos; acceso a la educación; privatización

Escolas privadas com subsídios públicos em países em desenvolvimento: Lições da Colômbia

Resumo: As parcerias público-privadas na educação prometem aumentar o acesso e a qualidade da educação nos países em desenvolvimento quando são adequadamente projetadas para direcionar a distribuição dos subsídios às populações-alvo, as matrículas são controladas no nível central e as escolas estão sujeitas à prestação de contas. Esta pesquisa estuda o efeito das escolas privadas subsidiadas publicamente (EPSP) na Colômbia - um tipo de parceria público-privada que segue essas recomendações. Empregamos técnicas de correspondência de pontuação e regressão para identificar os efeitos das EPSP no desempenho acadêmico dos estudantes, medidos por meio de exames estaduais. Nossos resultados indicam que as EPSP na Colômbia atendem estudantes vulneráveis muito semelhantes aos atendidos por escolas públicas tradicionais (EPT). No entanto, os estudantes EPSP têm desempenho inferior em comparação com os estudantes EPT. Nossa conclusão sugere que as restrições na forma como as EPSP são concebidas podem impedir a seleção e autoseleção de alunos, mas não garantem a melhoria da qualidade para estudantes de setores desfavorecidos. Da mesma forma, argumentamos que tais restrições são insuficientes quando os fornecedores privados são escassos ou não são fáceis de atrair como fornecedores de serviços para as populações mais desfavorecidas.

Palavras-chave: parcerias público-privadas na educação; subsídios de educação; rendimento escolar; estudantes menos favorecidos; acesso à educação; privatização

Introduction

Educational public–private partnerships (EPPPs) are increasing in developed and developing countries under the premise that private schools can deliver higher quality education to the poorest people in a more efficient way. Private school autonomy, competition for funding, and accountability mechanisms are key factors typically associated with these partnerships that arguably boost education quality. Yet, empirical evaluations of EPPPs in developed countries, and particularly in the US, have reported inconclusive results. Some scholars find evidence of improved student achievement compared with traditional public schooling (TPS; Egalite & Wolf, 2016; Patrinos et al., 2009), while others argue that the impact is marginal, or only benefits certain groups (Clark et al., 2015; Davies, 2013; Rouse & Barrow, 2009). Others, on the other hand, find that these partnerships either underperform compared with public schools, or increase educational inequality and segregation (Abdulkadiroğlu et al., 2018; Figlio & Karbownik, 2016; Lacireno-Paquet et al., 2002; Lubienski & Theule Lubienski, 2013; Mills & Wolf, 2017; Waddington & Berends, 2018).

In developing countries, EPPPs are flourishing, and have even more ambitious purposes. In addition to increasing quality for the poorest people, this type of schooling has also been framed as a solution to problems of educational access, a pressing issue in many low and middle-income nations. Yet, results of EPPPs in developing countries are also inconclusive (Aslam et al., 2017). Due to perceived problems in EPPPs, observers suggest that restrictions in the program design including targeted EPPP programs with controlled allocation of subsidies and accountability mechanisms can improve both access to and quality of education (Abdulkadiroğlu et al., 2017; Aslam et al., 2017; Epple et al., 2015). However, evidence of the ability of EPPPs with design restrictions to cope with both challenges is insufficient (Aslam, et al., 2017). In this article, we undertake this analysis by focusing on one particular type of EPPP: publicly subsidized private schools (PSPS). PSPS are fully independent schools that are contracted and subsidized by the government to enroll students that otherwise could not afford private education (LaRocque & Patrinos, 2006). Colombia is a compelling case to test the effects of PSPS because the country follows design recommendations to target the most disadvantaged students, control enrolment, and implement accountability mechanisms. We employ propensity score (PS) and regression techniques to address the following questions:

Research question 1: Given the country's mechanisms to target and allocate students, are PSPS in Colombia effective in providing educational access to populations of a low socio-economic background?

Research question 2: Considering that the government implemented accountability mechanisms for PSPS, do students in these schools obtain higher achievement as measured by national standardized exams in comparison to students in TPS?

The next section analyzes the theoretical propositions that underlie PSPS, examines previous research on their effects, and describes the structure of these schools in Colombia. The methods section presents details on the PS method and regression models employed in the analysis. The results section explains what kinds of students attend PSPS, and what effects these schools have on students' standardized test scores. Finally, we discuss the policy implications of our findings, as well

as the lessons we can draw from Colombia about the possibilities and limitations of PSPS to simultaneously improve education access and quality in the conditions of developing countries.

Theory of PPS and Previous Studies on their Effects

Similar to arguments that promote the participation of private actors in educational delivery (voucher, charter schools, etc.), advocates of PPS argue that promoting private provision of education improves quality by introducing competitive forces that drive schools to invest greater efforts in attracting, maintaining, and increasing student numbers (Egalite & Wolf, 2016; Patrinos et al., 2009). Observers suggest that the autonomy of private organizations increases diversity in curricula and teaching methodologies, which in turn leads to better matches in regard to family preferences and school choices. Autonomy also allows for more efficient staff selection and management, focusing specifically on quality improvement (Epple et al., 2015). In particular, PPS are independent schools that are competitively selected and contracted by the government to enroll children in exchange of a subsidy (Hill et al., 1997). The government retains the authority to define educational outputs (e.g. learning goals, standards, etc.) and establish goals and criteria to select and hold accountable subsidized providers, while the private organization retains autonomy to choose inputs (e.g. staff, instructional methods, etc.; LaRocque & Patrinos, 2006). Theoretically, for developing countries, expanding enrollment through subsidies to private organizations is faster and more efficient than building new public schools (LaRocque & Patrinos, 2006; Patrinos et al., 2009). Thus, the public sector extracts benefits from existing private organizations, while providing students with the opportunity to receive a higher quality education in comparison to TPS (Banco Mundial, 2006; Hill et al., 1997). Government subsidies to private schools also enable poor students to enjoy the productivity advantages of private education (Hoxby, 2003).

Unlike the classical approach to vouchers, in which parental choices and not the government appraise school quality and define funding (Chubb & Moe, 1990; Friedman, 1955), PPS give a greater responsibility to the government in selecting schools and holding them accountable to established standards. Such a mechanism may solve problems of EPPP's design shown by recent analyses. For instance, incentives distributed exclusively through parental choices and without proper monitoring systems may increase segregation and inequality (Gauri & Vawda, 2004). Likewise, universal programs without regulation on the allocation of students to subsidized private schools give greater chances of selecting better schools to wealthier families, and more leverage to sort more advantaged students to oversubscribed schools (Epple et al., 2015). Suggestions to address these problems include the implementation of non-universal programs that target the most disadvantaged populations to avoid the sorting and 'cream-skimming' effects of universal schemes (Epple et al. 2015). Other studies have also suggested centralized enrollment schemes that match family preferences with school characteristics, and allocate slots in oversubscribed schools regardless of student ability or family resources (Abdulkadiroğlu et al., 2017). Finally, scholars have also recommended the implementation of government accountability systems that level the playing field by restricting the range of available subsidized private schools to those that consistently meet government standards (Gauri & Vawda, 2004; West & Peterson, 2006).

Nevertheless, compared to studies on vouchers, studies on the effects of PPS in developing countries are scarcer and their results are inconclusive (Aslam et al., 2017). A substantial part of the literature on PPS in developing countries has focused on Catholic schools, and more concretely, 'Fe y Alegria' schools, an international federation of local schools of Jesuit tradition. Overall, these studies apply a rigorous methodology indicating that Fe y Alegria students have greater achievement compared to TPS's students. Allcott and Ortega (2009) and Wodon and Parra-Osorio (2010) use

both propensity score matching and OLS to estimate the effects of Fe y Alegria schools in Venezuela and Colombia respectively. These studies find that students in Catholic PSPS are socio-economically similar to students in TPS, but they achieve higher performance, as measured by standardized exams. Wodon and Ying (2009) reported similar findings for Fe y Alegria schools in Sierra Leone using probit and instrumental variable techniques. However, as these studies focus only on Fe y Alegria schools, one cannot rule out that the effects are caused by particular characteristics of this Catholic organization that are not generalizable to other PSPS.

Studies of other types of PSPS are less conclusive. Barrera-Osorio, de Galbert, Habyarimana, and Sabarwal (2016) study a randomized experiment in Uganda that invited private schools to apply for public subsidies, and find that PSPS serve more disadvantaged populations, and outperform fully private schools. Yet, the study does not estimate the effects of PSPS compared to TPS. Using randomized assignment and difference-in-difference methods, Kim, Alderman, and Orazem (1999) find that subsidized schools in Balochistan (Pakistan) improve enrollment of poor urban girls, but results are inconclusive for other vulnerable populations. Using OLS, McEwan (2002) finds higher performance of PSPS in Argentina, but these PSPS are authorized to select their students and therefore, these schools usually have a wealthier population. Uribe, Murnane, Willet and Somers (2006) find that average attributes of PSPS and TPS in Bogota differ markedly. Compared to TPS, PSPS tend to have smaller class sizes, less teaching experience, fewer formal educational credentials, and serve a more affluent population. After controlling for these characteristics using fixed and random effects, Uribe et al (2006) do not find differences in the average performance of students in PSPS and TPS. Aslam et al's (2017) literature review indicates that there is weakly positive evidence that PSPS programs may improve learning outcomes and reach the poorest members of the society. Yet, Day et al.'s review (2014) finds moderate evidence that supports the assumption that private school students achieve better learning outcomes than TPS students. These authors also indicate that evidence on whether these schools reach the poor is weak and inconclusive.

In addition, these studies have not directly examined whether the recommendations on targeted programs, centralized enrolment systems, and accountability mechanisms work in developing countries. The Colombian case permits the exploration of the effects of these recommendations due to the particular characteristics of their PSPS program.

Publicly Subsidized Private Schools in Colombia

In 2016, PSPS accounted for 4% of the total enrolment funded with public expenditure in Colombia. As the PSPS country's program has implemented three mechanisms that coincide with the above described recommendations, Colombia is an interesting case to explore whether or not these suggestions enable PSPS to simultaneously improve access and quality for the poorest populations. The first mechanism implemented in the country targets subsidy beneficiaries. One of the program assumptions is that the excess capacity of existing private schools helps alleviate insufficient public schooling. Thus, Colombia only provides subsidies to private schools in geographical areas where TPSs cannot cope with the demand for education. Local governments (a.k.a secretaries) divide their geographical jurisdictions by catchment areas and verify whether TPSs can serve the entire school population of each of these areas. When school population exceeds public supply capacity, the national education ministry authorizes and transfers the funds for secretaries to sign contracts with private schools in the catchment areas with insufficiency (República de Colombia, 2009a). Areas with insufficient public schooling are often those where the Colombian state has difficulties providing public services for a variety of reasons. For instance, these areas are located in distant rural places, urban neighborhoods with deficient infrastructure and

challenging conditions (unstable terrain, insufficient adequate ground to build new schools, delinquency, conflict, etc.), or new informal settlements of displaced or poor populations. As a result, these areas often have a high concentration of very disadvantaged populations.

Funds transferred by the government for PSPS are a per-student subsidy that matches the same amount of money established for per-student funding in TPSs. PSPS are not permitted to charge families of subsidized children even if their tuition fees exceed the established limit (República de Colombia, 2009a). The assumption here is that subsidized students are not taking spots away from students who pay tuition, but using the excess capacity of existing private schools, which might be attractive for these schools as they receive additional funding without having to invest more resources.

The second mechanism concentrates the responsibility for the allocation of students in secretaries to further target beneficiaries and avoid student sorting. To allocate spots in both PSPS and TPS, secretaries must use the national wealth index known as System for the Selection of Beneficiaries of Social Programs, or SISBEN. SISBEN is a means-test index designed to provide local governments with a technical instrument to targeting beneficiaries of social programs. The index summarizes sets of household characteristics that have been proved effective in identifying the most vulnerable population (Vélez et al., 1998). These sets include 1) human capital endowments and economic vulnerability; 2) public utility services; 3) housing and home appliances; and 4) family demographics, unemployment, dependency ratio, and income per capita. Families interested in becoming beneficiaries of means-tested social programs request their classification in SISBEN. SISBEN then classifies these households according to six levels: level one is assigned to the poorest, while level six is assigned to the least vulnerable. Households classified in levels 1-3 are usually considered eligible for social programs due to their vulnerable socio-economic conditions. Based on this index, secretaries have to follow this procedure to allocate students (República de Colombia, 2006): 1) students classified as SISBEN's level three or lower are given priority in the distribution of spots; 2) students classified in level three or lower are first distributed among existing TPSs in the students' catchment area; 3) when spots in TPSs are exhausted, secretaries allocate the remaining students with SISBEN's level three and lower in PSPS of the corresponding catchment area; 4) once all level three and lower students are offered a spot, secretaries can distribute the remaining students that do not want to pay for private schooling to remaining spots in TPSs, if they are still available, or in PSPS.

This procedure guarantees that the socio-economic conditions of students in PSPS and TPSs are fairly similar, and that schools cannot select wealthier students. In addition, the procedure constrains parental school choices: although parents declare their school preferences, their children will be enrolled in TPSs if spots are available, and only when public supply is not enough for the demand, preferences are considered to distribute children in PSPS. This procedure limits self-selection as wealthier parents have fewer chances to directly select a PSPS and disadvantaged parents in areas with insufficient TPS spots increase their chances to attend a subsidized school even if they have not considered it.

The third mechanism makes PSPS accountable for inputs and outcomes. The national ministry only transfers subsidies for private schools to secretaries if these government bodies competitively select PSPS that meet specific criteria, develop a series of monitoring visits throughout the school year, report collected data for oversight, and implement the established sanctions. The criteria for selection and monitoring of PSPS are (República de Colombia, 2009, 2015a, 2015b):

- Infrastructure: Eligible PSPS have to meet building standards nationally established for educational organizations. Once selected, secretaries also inspect school buildings

twice yearly to secure that they continue to comply with the standards. When deficiencies are found, PSPS need to fix them. Otherwise, these schools may have their contract suspended for the following academic year.

- **Staffing:** Only private schools in which teachers have successfully completed a minimum of a two-year teaching degree are eligible for subsidies. Once selected, the secretary annually verifies that teachers working at PSPS meet qualification standards. Although PSPS retain autonomy to establish teachers' salaries and duration of contracts, secretaries verify that teachers have signed formal job contracts with social security benefits. If PSPS do not comply, their contract is not renewed for the following academic year.
- **Pedagogical approach:** Private schools need to have a clear pedagogical plan formulated to be eligible as PSPS. Although PSPS have autonomy to define their own pedagogical approaches, the secretary uses a variety of methods to ensure that these schools follow their proposed plans. These methods include class observations, analysis of students' workbooks, interviews with students, etc. Schools receive feedback and are expected to address observed problems, otherwise they risk losing their contracts.
- **Financial management:** For-profit schools are not eligible to be PSPS. Eligible PSPS need to demonstrate that they have financial stability prior to selection. Once the contract with the school is signed, secretaries monitor accounting records of PSPS annually to guarantee that transferred subsidies are transparently managed and properly invested in the school (e.g. teachers' payroll and training, building improvement, didactical material, educational trips, etc.). If PSPS cannot certify it, they have to return the funding.
- **Student attendance:** Four times yearly, the secretary verifies that subsidized students are present at the PSPS. When a student fails this physical count more than twice and the school cannot validate an excuse, the secretary suspends the subsidy for this student. This procedure motivates PSPS to implement strategies to avoid student absenteeism and dropout.
- **Results in national standardized tests:** Eligible PSPS have to achieve an average student score that reaches at least the 35th percentile of the secretary. They also need to maintain said score to ensure their contract be renewed for the next academic year.

Theoretically, mechanisms for targeting students, allocating school spots, and making PSPS accountable should guarantee that PSPS serve vulnerable populations with quality standards. The following analysis tests this assumption.

Methodology

Data and Sample

Our data come from two sources. First, we use Saber 11, a mandatory standardized test taken by all students in their last year of high school. Our database contains records from 2014 and 2015. The test covers several subject areas, but our analysis focuses on math, reading, and the general assessment score. Because the general score and subject areas have different score scales (general assessment scores range from 0 to 500, while math and reading scores range from 0 to 100), we standardized each of the test scores relative to the mean and SD of students nationwide within each subject (including general) and year of testing. Saber 11 also collects students' socio-

demographic information, including age, gender, residential area (rural or urban), parents' educational attainment, family classification in low socio-economic status (SISBEN 1-3), monthly family income (self-declared by students), and whether or not the student is employed. The second data source is the annual National School Census C600 collected by the National Department of Statistics (DANE) for 2014 and 2015. This provides data on schools regarding education delivery type (e.g. public, private with public subsidies, or fully private), the proportion of enrollment in PSPS out of the total enrolment subsidized by public funds in the school's catchment area for the year before sampled students start high school, and the percentage of students leaving the school the year prior to the student writing the test, and the secretary to which the school belongs.

To generate a proper comparison, we use a four-step strategy to build the analytic sample. First, we restrict the sample to students in TPSs and students in PSPS whose tuition is paid with government subsidies. Second, since secretaries have a primary role in the capacity to hire private education providers and in the allocation of students, we discard observations in secretaries without PSPS to ensure that we only compare students within the same jurisdiction. Third, we only use data for students in traditional schooling settings, excluding students in juvenile correction centers, students in evening and weekend schools whose curriculum is limited to certain areas, and students with disabilities, who often have an alternative curriculum and are sometimes discouraged from taking standardized tests. Finally, we restrict the analysis to first-time test-takers because repeated test-taking might create learning effects. Additionally, we exclude cases that are missing socio-demographic information or data on achievement scores. Our final sample includes a total of 265,359 observations, including 27,560 subsidized students in 846 PPS (13,834 students in 420 schools in 2014 and 13,726 students in 426 schools in 2015) and 237,799 students in 4,059 TPSs (118,854 students in 1,980 schools in 2014 and 118,945 students in 2,079 schools in 2015). This sample represents 81% of all student test-takers funded by the government in secretaries with both TPSs and PPS.

Analytic Strategy

When evaluating the impact of PPS on student achievement, we need to consider the empirical challenges that face observational studies addressing this question. In our specific case, the main methodological challenge pertains to the fact that the distribution of students between TPS and PPS is not random, as described in the previous section. Although differences in student characteristics are almost all statistically significant, they are very small (Table 1). Yet, the differences in socio-economic status measured by household classification in SISBEN 1 to 3, and percentage of students in the catchment area enrolled in PPS are more noticeable. These differences can be partially attributed to the aforementioned mechanism through which secretaries distribute students in TPS and PPS. Due to these differences, when we analyze student scores in standardized tests, attendance to PPS might appear more or less effective than attendance to TPS, but this would be misleading as students in one or the other type of school might be more disadvantaged than the other.

Table 1*Descriptive Statistics Grouped by School Type and Standardized Mean Differences (SMD) Between Groups*

	Total	TPS	PSPS	SMD	Mean difference- P Value
<i>N</i>	265291	237731	27560		
<u>Student characteristics</u>					
Cohort(2015)	0.50(0.50)	0.50 (0.50)	0.50 (0.50)	0.005	0.471
Age	16.85(0.93)	16.85 (0.92)	16.90 (0.98)	0.059	<0.001
Gender(female)	0.56(0.50)	0.56 (0.50)	0.54 (0.50)	0.044	<0.001
Residency area(Rural)	0.12(0.33)	0.12 (0.32)	0.14 (0.35)	0.057	<0.001
Father with unknown ed. attainment	0.05(0.21)	0.05 (0.21)	0.05 (0.21)	0.001	0.842
Father w/o complete primary ed.	0.22(0.41)	0.21 (0.41)	0.23 (0.42)	0.043	<0.001
Father with complete primary ed.	0.33(0.47)	0.33 (0.47)	0.32 (0.47)	0.023	<0.001
Father with complete secondary ed.	0.30(0.46)	0.30 (0.46)	0.31 (0.46)	0.009	0.161
Father with complete tertiary ed.	0.11(0.31)	0.11 (0.31)	0.09 (0.29)	0.039	<0.001
Mother with unknown ed. attainment	0.01(0.12)	0.01 (0.12)	0.01 (0.11)	0.012	0.055
Mother w/o complete primary ed.	0.15(0.36)	0.15 (0.36)	0.17 (0.38)	0.058	<0.001
Mother with complete primary ed.	0.35(0.48)	0.36 (0.48)	0.34 (0.47)	0.025	<0.001
Mother with complete secondary ed.	0.36(0.48)	0.36 (0.48)	0.36 (0.48)	0.009	0.161
Mother with complete tertiary ed.	0.12(0.33)	0.12 (0.33)	0.11 (0.32)	0.038	<0.001
Low SES(Sisben 1-3)	0.75(0.43)	0.75 (0.43)	0.69 (0.46)	0.142	<0.001
Monthly family income	2.10(0.85)	2.10 (0.85)	2.04 (0.81)	0.076	<0.001
Student works (Yes)	0.06(0.25)	0.06 (0.24)	0.07 (0.26)	0.048	<0.001
% of students in PSPS in the student catchment area	7.83(11.41)	6.35 (8.04)	20.62 (22.67)	0.839	<0.001
% of dropout year before test	7.26(5.79)	7.49 (5.77)	5.24 (5.62)	0.396	<0.001
<u>School characteristics</u>					
Full-day school (Yes)	0.11(0.32)	0.07 (0.26)	0.45 (0.50)	0.958	<0.001
Students-per-teacher ratio	26.21(5.30)	25.95 (5.17)	28.22 (5.79)	0.412	<0.001
% of teachers w/o univ.degree	0.05(0.12)	0.03 (0.10)	0.18 (0.18)	1.015	<0.001

Table 1 cont.*Descriptive Statistics Grouped by School Type and Standardized Mean Differences (SMD) Between Groups*

	Total	TPS	PSPS	SMD	Mean difference- P Value
Outcomes					
General score	252.43(39.22)	253.05 (38.80)	247.07 (42.29)	0.147	<0.001
Math score	50.47(9.75)	50.60 (9.65)	49.35 (10.48)	0.125	<0.001
Reading score	50.79(8.81)	50.90 (8.75)	49.83 (9.25)	0.119	<0.001

Note: Standard deviations reported in parentheses.

As we need to account for possible differences in the students that TPSs and PSPS serve, we conduct propensity score analyses to compare the student achievement in these types of schools. The propensity score is most often estimated using logistic regression models, in which treatment status is regressed on observed characteristics that are theoretically known to be predictors of treatment assignment (Guo & Fraser, 2014). Because a crucial factor to target beneficiaries of PSPS is the insufficiency of spots in TPS, one of the observable characteristics that we include in our logistic regression (Table 2) is the proportion of enrollment in PSPS in the catchment area in the year before students in our sample started high school. We also include the student household classification in SISBEN 1 to 3, as this is the most important factor in the distribution of students among TPS and PSPS. We also include an interaction term between proportion of enrollment in PSPS and student household classification in SISBEN to observe whether a more limited public-school supply may impact the distribution of students with low socioeconomic status.

Because the influence of parental school preferences is relatively constrained but not fully eliminated by the mechanism used to allocate students to TPS or PSPS, we add other socio-demographic characteristics that literature demonstrated to be influential on school choice (student age, gender, area of residence, father's education, mother's education, monthly family income, and whether or not the student is employed; Gauri & Vawda, 2004; Glazerman & Dotter, 2017). In addition, we include the secretaries' dummy variables to match individuals from the same geographic location as recommended by quasi-experimental research design literature (Cook et al., 2008).

With the 'Machit' package from R, we use two strategies to establish out counterfactual groups. In strategy 1, we combine exact matching on the variable secretary with propensity score matching with replacement (0.1 caliper). Exact matching ensures that we compare individuals within the same jurisdiction responsible for the distribution of students among TPS and PSPS. Matching with replacement and caliper 0.1 permits the use of very similar control units as matches for more than one treated observation, and retain as many PSPS students as possible in our matched sample (Stuart, 2010). Since we are interested in the effect of PSPS in PSPS students (treatment effect on the treated group), in strategy 2 we employ a 'weighting by the odds' procedure in which observations in the treated group receive a weight of 1, and those in the control group receive a weight of $p_i/(1-p_i)$, where p_i represents an individual's probability of receiving the treatment, or in other words, the individual's PS. This procedure does not discard observations, but weights all units using PSs to represent the population from which the sample was drawn (Lee et al., 2011).

Table 2*Results of Logistic Regression with Odd Ratios (Exp(B))*

	Beta(B)	Exp(B)	Coefficient interval for Exp(B)	
			Lower 2.5%	Upper 97.5%
Cohort(2015)	0.022(0.014)	1.022	0.994	1.051
Age	-0.021***(0.008)	0.980	0.965	0.995
Gender(female)	-0.098***(0.014)	0.907	0.882	0.933
Residency area(Rural)	0.795***(0.025)	2.215	2.110	2.325
Father with complete primary ed	-0.105***(0.021)	0.901	0.865	0.938
Father with complete secondary ed	0.002(0.023)	1.002	0.958	1.047
Father with complete tertiary ed	0.012(0.031)	1.012	0.952	1.076
Father with unknown ed. attainment	-0.060(0.039)	0.941	0.871	1.017
Mother with complete primary ed	-0.162***(0.022)	0.851	0.814	0.889
Mother with complete secondary ed	-0.095***(0.024)	0.910	0.868	0.953
Mother with complete tertiary ed	-0.030(0.031)	0.971	0.913	1.032
Mother with unknown ed. attainment	-0.147**(0.071)	0.863	0.751	0.992
Monthly family income	-0.012(0.010)	0.988	0.970	1.007
Student works(Yes)	0.266***(0.027)	1.304	1.237	1.375
Low SES(SISBEN 1-3)	0.372***(0.027)	1.450	1.376	1.529
% of students in PSPS in the student catchment area	0.119***(0.002)	1.127	1.123	1.130
Low SES% of student in PSPS	-0.049***(0.002)	0.952	0.949	0.955
Include secretaries		Yes		
Constant	-3.046***(0.142)	0.048	0.036	0.063
Observations	265,291			
Log Likelihood	-71,413.44			
Akaike Inf. Crit.	142,894.90			

Note: * denotes $p < 0.05$, ** $p < 0.01$, *** < 0.001

To assess the balance achieved using these strategies, or the similarity between students in TPS and PSPS, we calculate the standardized bias of each covariate for the treated and control groups before and after the matching procedure (Appendix 1). Following Imai, King and Stuart (2008), we used the standardized mean difference or bias to assess the balance across samples. In strategy 1, we calculate the standardized bias in the matched sample weighting by the number of times that a control unit is employed as a match. In strategy 2, the standardized bias of each covariate is calculated using weighted proportions and weighted standard deviations. Ideally, we need a bias smaller than 0.1 for a balanced sample (Rubin, 2001). All of our covariates have a standardized bias of less than 0.1, with the exception of the area where the student lives in strategy 1. Therefore, we employ a ‘doubly robust’ post-matching analysis (Ho et al., 2007) using the same parametric model that we would have applied to the unmatched sample, namely, an OLS regression.

This type of analysis ‘cleans’ any residual imbalance between covariates in the treated and control groups, providing more robust estimates (Stuart, 2010).

Our OLS model includes the variables used to estimate the propensity score plus the percentage of students leaving the school in the year prior to sampled students writing the standardized test. This last variable is used to control for student attrition that may change the characteristics of students in PSPS and TPS, causing bias to effect estimation. Because we use a matching with replacement and a weighting by the odds procedure, we weigh the respective regressions using the number of times units were employed as matches for matching with replacement, and the formula $\pi/(1-\pi)$ for the weighting by the odds strategy. We estimate each of these models for each of the areas of the standardized exam analyzed here (general score, math, and reading).

This analytic strategy has at least one possible source of unmeasured bias. Since students are in their last year of high school, there may be several factors associated with their academic background that are not captured by the variables used in this study (e.g. school transfer, previous failed grades, and previous performance). To compensate for this limitation, we run additional analyses using a truncated sample of the same standardized exam in 2014 that asked approximately 13,600 students about their academic background before they entered their current PSPS or TPS (number of years in the current school, number of grades failed before entering the current school, number of schools attended during their elementary and secondary education, and number of years in preschool; See Table 3). We run an additional regression using this sample and adding to our model confounding variables associated with academic background or events that happened before the students entered the school (PSPS or TPS) in which they took their standardized exam.

Table 3

Descriptive Statistics of Academic Differences Grouped by School Type and Standardized Mean Differences (SMD) between Groups (Truncated 2014 sample)

	Total	TPS	PSPS	SMD	Mean difference- P Value
Grades failed before registering in current school	0.21(0.69)	0.21 (0.69)	0.21 (0.72)	0.002	0.948
Years in pre-school	1.25(0.79)	1.23 (0.77)	1.41 (0.91)	0.223	<0.001
Number of schools attended	1.41(0.69)	1.41 (0.70)	1.37 (0.65)	0.068	0.013
Years in current school	5.66(2.31)	5.64 (2.33)	5.76 (2.13)	0.051	0.059

Note: Standard deviations reported in parentheses.

We acknowledge that the regression conditional on academic variables in the truncated 2014 sample is not enough to address the problem of hidden bias. Other unobservable factors may still change our estimated effect. Therefore, we perform a sensitivity analysis that allows us to assess the extent to which our results are robust to a potential imbalance in the unobservable factors. We apply the Oster’s procedure to provide bounds on the treatment effect estimates (Oster, 2019). This procedure is based on the idea that the bias from observed characteristics is informative about the bias from unobserved characteristics (Altonji et al., 2005). It analyzes coefficient changes and changes in the explained variation as observed variables are added to the regression model to test the results’ robustness to omitted variable bias. Based on Oster, we use the following estimator of the effect of attending PSPS on student test score:

$$\beta^* = \tilde{\beta} - \delta[\hat{\beta} - \tilde{\beta}] \frac{R_{max} - \tilde{R}}{\tilde{R} - \hat{R}}$$

Where $\tilde{\beta}$ and \tilde{R} are the coefficient estimate and R^2 from the regression including all observable covariates, and $\hat{\beta}$ and \hat{R} are the coefficient estimate and R^2 from the uncontrolled regression. In addition, R_{max} denotes the highest possible value of R^2 . Finally, δ denotes the degree of proportionality of selection on observables to selection of unobservables. Our test bounds the effect of attending PSPS, assuming that the selection on unobservables is as strong as the selection on observables in the same and in the opposite direction ($\delta=1$ and $\delta=-1$; Cattán et al., 2017). These bounds provide robustness checks as the treatment effect is considered to be robust if the bounding set excludes zero. As an additional check, we also test how large the effect of unobservables needs to be relative to the effect of observables for the treatment effect be zero. The treatment effect is considered to be robust when δ is greater than an absolute value of 1. As recommended by Oster, we choose $R_{max} = 1.3 * R^2$, but also employ a more conservative estimate of $R_{max} = 2.5 * R^2$. We perform this bounding exercise for the model based on matching with replacement, the model based on weighting by the odds, and the model performed with the truncated sample.

Findings

What Kinds of Students Attend PSPS?

Table 1 shows that the differences in student characteristics in the unmatched sample are almost all statistically significant, but very small. The majority of students in both types of schools have parents with complete secondary education or less. Student households in both TPS and PSPS receive an average of around two monthly minimum salaries, although this average is slightly lower for PSPS students. PSPS also have a slightly larger percentage of students in rural areas and students who are employed. The only exception is the difference in the SISBEN classification of students' households. On the one hand, for both TPS and PSPS, the majority of subsidized students are classified SISBEN 1 to 3, which suggests that most PSPS students do not come from the wealthiest households. On the other hand, however, PSPS have a smaller proportion of students with low socio-economic status (69% versus 75%), which raises questions about the ability of the Colombian implemented mechanisms to avoid a certain amount of self-selection. As expected, the percentage of enrolment in PSPS in the catchment area in the year before sampled students started high school suggests that students in PSPS indeed live in areas with an insufficient supply of TPS.

Our logistic regression (Table 2) shows that the odd ratios (OR) of attending PSPS increase when students live in rural areas and are more likely to work, and decrease with higher educational attainment of parents (especially mothers). These characteristics are usually associated with more disadvantaged populations. The percentage of students enrolled in the catchment area the year before sampled students start high school and the secretary to which students belongs (not reported in the table) have a strong effect on the OR of attending a PSPS. This is not surprising because secretaries are responsible for determining which private schools are eligible for subsidies and for distributing students according to the insufficiency of TPS supply. Finally, our estimates show that for students in areas with an average percentage of the enrolment in PSPS, the OR of attending PSPS increase when student households are classified as SISBEN 1 to 3. Nevertheless, our interaction term between classification in SISBEN 1 to 3 (or low SES) and the percentage of students enrolled in PSPS in the catchment area the year before the student starts high school shows that as this percentage increases, the ORs to attend a PSPS decrease for low SES students. These

estimates suggest that despite the procedure to target students, the mechanism to allocate spots gives some room for some wealthier students to attend PSPS when the insufficiency of TPS supply is too high. The priority given to spot allocation of SISBEN 1-3 students in TPS may eventually send some better-off children to PSPS once public capacity has been exhausted. This situation might occur when the few TPS spots available in a catchment area are completely filled with only low SES students.

Table 3, based on our truncated 2014 sample, shows the differences in academic background (number of grades failed before attending current school, number of years of preschool attended, number of schools attended since grade 1, and number of years in the current school) between TPS and PSPS students. There are no statistically significant differences between the two groups in terms of the average number of failed grades before attending the current school. Students in PSPS have, on average, more years of preschool, have attended a shorter number of schools, and have spent more years in their current school. These differences suggest that students attending PSPS are not academically disadvantaged compared to TPS students.

Effects of PSPS on Student Achievement

Table 4 shows our OLS estimates of the average effect of PSPS on their subsidized students. To facilitate comparison, the first row presents the results of our regression model in the unmatched sample. Columns show the estimated effects and their robust standard errors for the general score and the two test areas analyzed in this study (math and reading). Our regression model in the unmatched sample shows statistically significant negative effects of attending a PSPS on students' standardized scores (general assessment, math, and reading). Although not reported here, we run a hierarchical linear regression with the unmatched sample that also provided similar results.

When we match the two groups of students by their probability to attend PSPS using our matching with replacement strategy (Row 2), the estimated negative effect of PSPS is larger than in the model estimated with the unmatched sample. We obtain a similar result with our weighting by the odds strategy, although the negative effect is slightly smaller compared to the model based on the matching with replacement strategy. Nevertheless, in our model based on the 2014 truncated sample, in which we adjust for previous academic background, negative effects become smaller for all areas and not statistically significant for math.

Table 4

Average treatment effect on the treated of PSPS (ATT), and robust standard errors (SE)

	ATT general	ATT math	ATT reading
Unmatched	-0.130***(0.006)	-0.092***(0.007)	-0.118***(0.007)
1:1 matching with replacement	-0.163***(0.011)	-0.113***(0.011)	-0.143***(0.012)
Weighting by the odds	-0.146***(0.007)	-0.107***(0.007)	-0.128***(0.007)
Unmatched with truncated sample (acad. background)	-0.104***(0.028)	-0.045 (0.029)	-0.080** (0.029)

Note: * denotes $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors reported in parentheses. OLS uses the same variables used to calculate PS plus dropout rate.

There are no universal benchmarks that can be used to assess the magnitude of effects when judging educational outcomes. Hattie (2009) and Hill, Bloom, Black, and Lipsey (2008) suggest that around 0.2 standard deviations corresponds to a noticeable effect, but Hattie also adds that we

should not only consider the size of an effect, but also look for patterns in the various effect sizes, the causal implications across them, and the moderators that enhance or detract from the average effect (2009, p. 10). At any case, effect sizes estimated here seem small, as they range between 0.104 and 0.163 SD for the general test score, 0.045 and 0.113 SD for math, and 0.080 and 0.143 SD for reading. However, they indicate that students in PSPS are definitely not achieving better performance compared to TPS students, and therefore increasing quality, as the theory would suggest is not a goal PSPS are achieving.

Sensitivity Analysis

Selection on Unobservables

Propensity score matching relies on the strong assumption that selection into a treatment (attending PSPS) is based on observable characteristics. Nevertheless, we acknowledge that selection on unobserved confounders may imply a problem of hidden bias. To deal with this problem, we provide bounds on the treatment effect employing the above-described Oster's procedure. Table 5 presents the degree of proportionality of selection on observables to selection of unobservables (δ) and the bounds on the treatment effect for our OLS models (general score, math, and reading) estimated with the sample obtained through matching with replacement, weighting by the odds, and in the unmatched truncated sample. Row 1 reports the baseline effects that include only our variable of interest, attending PSPS. Row 2 reports the effects in our full OLS model. The identified sets of bounds are bounded by the estimated effect of PSPS with full controls and by the effects estimated at two levels of specifications of R_{\max} ($R_{\max}=1.3 \cdot R^2$ in Rows 3 & 4, and $R_{\max}=2.5 \cdot R^2$ in Rows 6 & 7) and assuming that selection on unobservables is as strong as the selection on observables in the same and in the opposite direction ($\delta=1$ and $\delta=-1$). Rows 5 and 8 show the value of δ which would produce an effect of zero given the values of $R_{\max}=1.3 \cdot R^2$ (Row 5), and $R_{\max}=2.5 \cdot R^2$ (Row 8).

The bound sets calculated at both specifications exclude zero for all outcomes, indicating that the estimated effects of PSPS are robust to accounting for selection on unobservables. This is consistent with the degree of proportionality of selection on observables to selection of unobservables (δ) greater than 1 (in absolute value) for both specifications of R_{\max} indicating that the bias from unobservables needs to be higher than the bias from observables for the effect of PSPS to be zero.

Attrition

An additional problem of our estimates may be attrition that can compromise the comparability between TPS and PSPS students. Our descriptive statistics (Table 1) show that the average dropout of schools in our sample is 3.1% with a difference of around 1 percentage point between TPS and PSPS (3.20% versus 2.21%). This difference may generate selection bias as, for instance, students dropping out of TPS might be more disadvantaged, which could indicate that these schools 'crop off' service to students whose socio-economic and/or academic conditions make it more difficult to achieve higher performance (Lacireno-Paquet et al., 2002).

To explain the negative estimates reported in Table 4 for our truncated sample, students who dropped out of PSPS schools should have scored at the 70th percentile of the general distribution, and students who dropped out of TPS schools should have scored at the 30th percentile for the estimate of the effects of PSPS to be zero. For the estimate measuring the effects on the area of reading to be approximately zero, dropped-out students in PSPS should have scored at the 60th percentile, while dropped-out students in TPS should have scored at the 40th percentile. This degree of imbalance seems unlikely considering the small differences in observed characteristics of students in both groups.

Table 5
Sensitivity Analysis-PSPS Effects

	Matching with replacement			Weighting by the odds			Unmatched-trunc. Sample	
	General	Math	Reading	General	Math	Reading	General	Reading
Baseline effect	-0.117***	-0.074***	-0.100***	-0.105***	-0.072***	-0.090***	-0.052	-0.033
(Stand.Err)	(0.014)	(0.012)	(0.014)	(0.008)	(0.008)	(0.008)	(0.029)	(0.029)
[R2]	[0.003]	[0.001]	[0.002]	[0.003]	[0.001]	[0.002]	[0.0003]	[0.0001]
Controlled effects	-0.163***	-0.113***	-0.143***	-0.146***	-0.107***	-0.128***	-0.103***	-0.087**
(Stand.Err)	(0.011)	(0.011)	(0.012)	(0.007)	(0.008)	(0.007)	(0.028)	(0.029)
[R2]	[0.230]	[0.193]	[0.164]	[0.225]	[0.187]	[0.161]	[0.205]	[0.165]
Bounds:								
$\delta = 1,$								
Rmax=	(-0.177,	(-0.126,	(-0.157,	(-0.158,	(-0.116,	(-0.140,	(-0.124,	(-0.109,
1.3*R2	-0.163)	-0.113)	-0.143)	-0.146)	-0.107)	-0.128)	-0.103)	-0.087)
Bounds:								
$\delta = -1,$								
Rmax=	(-0.163,	(-0.113,	(-0.143,	(-0.146,	(-0.107,	(-0.128,	(-0.103,	(-0.087,
1.3*R2	-0.149)	-0.101)	-0.129)	-0.134)	-0.097)	-0.117)	-0.085)	-0.068)
δ for B=0 given Rmax=								
1.3*R2	-11.78	-9.7	-10.57	-9.93	-9.09	-9.46	-8.65	-6.20
Bounds: $\delta = 1,$								
Rmax=	(-0.238,	(-0.177,	(-0.214,	(-0.202,	(-0.153,	(-0.180,	(-0.256,	(-0.246,
2.5*R2	-0.163)	-0.113)	-0.143)	-0.146)	-0.107)	-0.128)	-0.103)	-0.087)
Bounds:								
$\delta = -1,$								
Rmax=	(-0.163,	(-0.113,	(-0.143,	(-0.146,	(-0.107,	(-0.128,	(-0.103,	(-0.087,
2.5*R2	-0.094)	-0.055)	-0.077)	-0.082)	-0.053)	-0.069)	-0.033)	-0.013)
δ for B=0 given Rmax=								
2.5*R2	-2.51	-2.02	-2.28	-2.05	-1.84	-1.96	-1.76	-1.25

Note: * denotes $p < 0.05$, ** $p < 0.01$, *** < 0.001 . B= PSPS coefficient for student achievement

Discussion and Policy Implications

As recommendations to expand EPPPs in developing countries spread around the world, we need additional studies to investigate whether these arrangements can improve both access to and quality of education. Theoretically, such goals can be achieved when the design of EPPPs avoids cream-skimming by schools, targets the most disadvantaged students, and implements accountability mechanisms to ensure that private schools deliver adequate education (Abdulkadiroğlu et al. 2017; Epple et al. 2015; West and Peterson 2006). Given that Colombia has followed these propositions, this study asks whether PSPS in the country provide access to children from low socio-economic backgrounds, and whether these PSPS obtain higher student achievement compared to TPS. Our results indicate that Colombian PSPS indeed reach students who, compared to TPS students, are more likely to come from rural areas, households with lower monthly family, and have parents with lower educational attainment. Two mechanisms are probably responsible for such an outcome. On the one hand, the insufficiency criteria that only allows subsidies in areas where TPS cannot cope with enrolment prevents subsidies from going to the wealthiest population, as the areas with insufficient public education supply are usually the poorest. On the other hand, the centralized use of means-tested mechanisms to allocate students in PSPS and TPS has prevented school selection and has limited self-selection. Combined, however, the TPS insufficiency criteria and the means-tested mechanism of student allocation that gives priority to students of low SES to attend TPSs have provided room for some less-disadvantaged students to register in PSPS, when their catchment areas have a high insufficiency of TPS supply.

Nevertheless, despite the implementation of accountability mechanisms, our analysis also shows that, compared to TPS, students in PSPS have lower achievement as measured by national standardized exams, particularly in the area of reading and in the general test score. While the difference in student achievement between PSPS and TPS is small, the underperformance of PSPS students suggests that accountability mechanisms are not enough to secure the delivery of quality education by subsidized private schools. Determining the process that produces this underperformance is beyond the scope of this article, but we can speculate on potential explanations on why the theory of PSPS fails in the Colombian context. Our descriptive statistics and other previous studies (Uribe et al., 2006) suggest that the Colombian PSPS program might not be recruiting sufficiently qualified providers. PSPS have, on average, higher students-per-teacher ratio and a smaller percentage of teachers with a university degree (Table 1). These conditions suggest that PSPS might not be adequately equipped to provide quality education. Moreover, since instruction time measured by school schedule is larger in PSPS, their underperformance suggests that these organizations are less time-efficient than TPS. One possible explanation of this recruitment of low-quality providers despite accountability mechanisms is that areas with insufficient TPS supply do not have qualified private providers, and therefore the government does not have an adequate pool to choose from. Put differently, this explanation contradicts the assumption of PSPS theory that competitive education markets can be developed in marginalized areas. Such a scenario suggests that we need to pay attention not only to the mechanisms to regulate subsidies to private schools, but also to the characteristics of the supply of providers to make sure that the existing private organizations can deliver a quality service. An alternative explanation is that qualified suppliers might exist, but the conditions of the subsidies are not attractive enough for them. The multiple accountability requirements of Colombian PSPS along with the established limits for subsidies might discourage qualified providers from participating in a program that demands substantial efforts to serve its vulnerable beneficiaries. Such a scenario contradicts the program assumption that subsidies are an additional and attractive source of funding for private schools

without the investment of more resources. It also challenges the idea that the government can take advantage of private school productivity at a lower price because, in order to increase incentives to attract better providers, the Colombian government would need to pay them more than it invests in TPS.

Findings show the difficulties to simultaneously increase education access and quality for the Colombian PSPS program, and also highlight particular policy dilemmas for the country. Since PSPS do serve students with low socio-economic status, suspending subsidies as a result of the underperformance of subsidized schools could leave vulnerable students unschooled as their catchment areas have insufficient TPS spots. If we assume that the problem is the lack of qualified providers in these areas, one alternative could be to provide subsidies to qualified providers in other areas and pay transportation for students to attend these schools. Nevertheless, additional transportation expenses may increase student costs beyond the public sector, contradicting again the idea that subsidized students in private schools are more affordable than TPS. A second alternative is to attract better equipped private providers outside catchment areas to serve in neighborhoods with insufficient TPS supply, as Colombian concession schools currently do. Colombian concession schools have provided more promising results regarding quality (Barrera-Osorio, 2007; Bonilla, 2010; Villa & Duarte, 2002). However, as these schools involve school construction paid with public funding, they do not provide chances for the public sector to extract fast benefits from existing private providers as PSPS theory suggests. If we assume that the problem is of insufficient incentives to attract qualified providers, the country could increase the subsidy for private schools beyond the limits established for TPS. Yet, again, such a measure might potentially contradict the idea that private schools are more cost-effective. Shortly put, the country needs PSPS to increase access for vulnerable students, but cannot offer quality only with the implementation of mechanisms to target the most disadvantaged students, control enrolment, and make private schools accountable.

While these findings might not be generalizable beyond Colombia, they illuminate additional shortcomings of PSPS theory that might also affect other types of EPPPs. For voucher and charter schools, scholars have shown that the ability of private schools to select students, and the ability of wealthy families to choose schools, create unfair competition that affect the most disadvantaged populations (e.g. Bohlmark et al., 2016; Contreras et al., 2010; Elacqua, 2012; Lacireno-Paquet et al., 2002; Mancebón-Torrubia & Ximénez-de-Embún, 2014). Yet, our case also demonstrates that even when governments implement mechanisms to avoid the problems of student sorting and self-selection, and government mechanisms to make private schools accountable for results, other factors prevent the theorized effectiveness of private schools. In poor areas of low and middle-income countries, private schools are often the result of a lack of public services, and they usually mirror the socio-economic constraints of their communities. In such conditions, governments may have significant problems selecting adequate suppliers that provide the theoretical productivity advantage of private over public schools. Government subsidies may improve the financial stability of these private organizations (Barrera-Osorio et al., 2016) and increase enrolment; however, it is unlikely that subsidies can also drive such schools to provide high quality education at lower costs compared to TPS. Indeed, similar findings of underperformance of private schools in rich countries with voucher programs for disadvantaged students suggest that this problem might not affect exclusively PSPS or low- and middle-income countries (Abdulkadiroğlu et al., 2018; Figlio & Karbownik, 2016; Waddington & Berends, 2018). Overall, our findings suggest that PSPS theory might fail because certain areas may lack conditions to promote competitive educational markets with qualified providers regardless of the implemented regulation mechanisms. Our analysis also points toward the need to reconsider the importance of government investment to achieve education quality beyond results-based accountability. Future research should assess whether

educational markets require stronger incentives to attract better providers for a population that is costlier to educate, and to what extent these incentives are more efficient than alternatives in the traditional public education system.

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