THREE ESSAYS ON MULTI-STAKEHOLDER SCHOOL GOVERNANCE: PARTICIPATION OF PARENTS, LOCAL COMMUNITIES AND PRIVATE PARTNERS IN SCHOOL MANAGEMENT AND FINANCE

By

Jutaro Sakamoto

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Educational Policy – Doctor of Philosophy

2020

ABSTRACT

THREE ESSAYS ON MULTI-STAKEHOLDER SCHOOL GOVERNANCE:
PARTICIPATION OF PARENTS, LOCAL COMMUNITIES AND PRIVATE PARTNERS IN
SCHOOL MANAGEMENT AND FINANCE

By

Jutaro Sakamoto

Education decentralization facilitates the participation of parents, local communities, and private partners in school management and finance, forming a system of multiple-stakeholder school governance. While their participation is expected to hold a school accountable for educational outcomes, engaging external stakeholders who are not education professionals and who have diverging interests may have adverse effects. Does the participation of external stakeholders in school management and finance improve educational outcomes? Whose participation really counts? What conditions need to be met to realize the purported positive effects of multiple-stakeholder governance? I examine these questions in three studies.

The first study explores efficiency-equity tradeoff of engaging non-state stakeholders in public school finance. Financing public schools with private funds is expected to promote efficient use of resources while it raises concern for financial equity. However, private funds raised from different non-state stakeholders may have differential efficiency and equity effects. Using public school data derived from the Learning and Educational Achievements in Punjab Schools (LEAPS) in Pakistan, this study examines how private funds mobilized from parents, local communities, and private donors are associated with the efficiency of generating student achievement and the equity in school finance. The findings inform the importance of understanding effects of private-fund revenue that vary by its source and school type. This helps design cost-sharing policy that improves both school efficiency and financial equity.

The second study explores factors that facilitate or constrain the influence of parents and private partners on school decision-making. Parents and private partners are increasingly engaged in school management as a means to improve education quality and outcomes. In multi-stakeholder school governance, external stakeholders are considered to be able to influence school decisions when their interests and concerns become elevated over the priorities and demands of other parties. This raises a question: under what conditions do their influence become salient? I used the stakeholder salience theory as a conceptual framework to identify factors affecting the influence of parents and private partners on school decision-making through a systematic literature review. The findings were applied to participatory school governance in Pakistan to examine how these factors affect the influence of external stakeholders in a particular context. Based on the analysis, I present a new framework that addresses the multi-dimensional and interrelated nature of stakeholder influence in multi-stakeholder school governance.

The third study explores the association between parent participation in school management and student achievement in eight countries and economies. Engaging parents in school management is expected to hold the school accountable for educational outcomes. However, the evidence has proven inconclusive and limited in explaining mechanisms of learning gain/loss. Using the public school student data derived from the Program for International Student Assessment (PISA) 2015, this study examines the association between student achievement and participation of a student's own parents in school management, which would affect their learning support at home, and the participation of a parent group, which would influence school decisions and thus affect the learning environment at school. The findings suggest the importance of identifying which mechanism accounts for positive/negative associations in order to design effective participatory school governance models.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

BRR	Balanced Repeated Replication
EFA	Education for All
GDP	Gross Domestic Product
IRT	Item Response Theory
ISCED	International Standard Classification of Education
ISEI	International Socio-economic Index of Occupational Status
LEAPS	Learning and Educational Achievements in Punjab Schools
LSAY	Longitudinal Study of American Youth
MAR	Missing at Random
MCAR	Missing Completely at Random
MDG	Millennium Development Goal
MICE	Multiple Imputation by Chained Equations
MLE	Maximum Likelihood Estimation
MNAR	Missing Not at Random
NCLB	No Child Left Behind
NELS	National Education Longitudinal Study
NGO	Non-governmental Organization
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PEC-FIDE	Program of Strengthening and Direct Investment in Schools
PISA	Program for International Student Assessment

PMM	Predictive Mean Matching
PTA	Parent-teacher Association
PTO	Parent-teacher Organization
PPP	Public-private Partnership
PV	Plausible Value
SAP	Structural Adjustment Program
SBM	School-based Management
SC	School Council
SDG	Sustainable Development Goal
SES	Socioeconomic Status
SMC	School Management Committee

Chapter 1. Financing Public Schools with Private Funds: Efficiency-Equity Tradeoff of Multi-Stakeholder School Financing in Punjab, Pakistan

Introduction

Governments and development partners face challenges in securing the rights to quality education for all. Although the global net enrollment rate in primary education reached 89% in 2015, with the global commitment to achieve universal primary education under the Education for All (EFA) framework, over 58 million children of primary school age are still unenrolled (UNESCO Institute for Statistics, 2018b). Even more concerning is of the children who are enrolled in school, 200 million children and adolescents leave school without learning basic skills and knowledge they need to thrive in their society (UNESCO, 2013).

Governments and world leaders established Sustainable Development Goals (SDGs) with a renewed commitment for achieving inclusive and equitable quality education for all by 2030. However, ensuring access to quality education for all children requires massive financial resources. It is estimated that additional 39 billion US dollars will need to be mobilized annually to achieve the global education target by 2030 (UNESCO, 2015c). Mobilizing financial resources and promoting efficient use of resources are therefore recognized as a key policy agenda for the global education initiatives (UNESCO, 2015a).

One of the policy responses to the educational challenge, which was taken by many governments, has been the decentralization of education governance from central to local levels (Iftene, 2014; King & Guerra, 2005; UNESCO, 2008; Weidman & DePietro-Jurand, 2011). By bringing responsibility of public education management and finance to local stakeholders who know their children's educational needs and their local education system better than the central government, education decentralization is assumed to improve the performance of public education system (Barrera-Osorio et al., 2009; UNESCO, 2015b).

In particular, financial decentralization is expected to improve the effectiveness and efficiency of public school education by facilitating access to local financial resources and promoting efficient use of resources (Bruns et al., 2011; Edwards & DeMatthews, 2014). For instance, financial decentralization is used as a strategy to mobilize new resources that would not be easily available in a centralized education system at the local level (McGinn & Welsh, 1999). In fact, in a decentralized school finance system, local public school authorities are often allowed to mobilize private funds through various channels such as donations, sponsorships, and fund-raising activities (Iftene, 2014). In addition, local participation in school finance is assumed to improve the efficiency of school education since, by sharing the cost of education, local community members increase their interest in their children's school education and thus demand that the school be held accountable for efficient use of resources and school outcomes (Gershberg, 2002; Bold et al., 2010). Furthermore, if locally raised, privately funded revenue is less restrictive than central government funds, it enables the schools to be more flexible and efficient in purchasing an appropriate mix of inputs necessary to produce school outcomes (Jimenez & Paqueo, 1996).

However, financial decentralization also risks undermining the equity in school finance. For example, poor communities have a limited capacity to finance their children's schools and education (Bray, 1999; UNESCO Institute for Statistics & UNICEF, 2015). In addition, philanthropic organizations and individuals have their own priorities and interests and thus do not necessarily support the poorest communities and schools (Srivastava & Oh, 2010; Steiner-

Khamsi, 2008). This suggests that local financing of public school education has an efficiency-equity tradeoff.

Although the advantages and disadvantages of local financing are well addressed in both theoretical and empirical studies, the literature does not pay much attention to the diversity of local funding sources and how they may affect the efficiency and equity of public school education. In fact, in a decentralized education system, local public school authorities mobilize private funds from diverse non-state stakeholders including parents, local communities, and private partners who have diverging, potentially conflicting interests in and expectations of school education. This creates multi-stakeholder school financing systems where private funds mobilized from different non-state stakeholders arguably affect the efficiency and equity of public school education differently. In order to understand the efficiency-equity tradeoff of multi-stakeholder school finance, we need to examine how financial contributions from different non-state stakeholders are associated with the efficiency and equity of public school education. This is particularly important in the current global education landscape where public school authorities are encouraged to mobilize private funds from diverse non-state stakeholders, including the private sector, philanthropic organizations, and foundations, as a means to expand and diversify financial sources to achieve the global education goal (UNESCO, 2015a).

This study uses panel data of public schools derived from the Learning and Educational Achievements in Punjab Schools (LEAPS) surveys in Pakistan to examine the efficiency of private-fund revenue mobilized from parents, local communities, and other private donors in generating student achievement and the equity in school finance. School fixed-effects analyses and a series of robustness checks suggest that private-fund revenue has the potential to improve both efficiency and financial equity of public school education. However, these effects differ by the source of the private funds, as well as school segregation by gender.

I found that, on average, public schools whose revenue relied more on education fees assessed to parents were more likely to cut inefficient capital expenditure. This implies that, although collecting tuition/education fees for public school education at the basic level is often criticized from equity perspectives, these user fees could create strong provider-client accountability relationships that hold schools financially accountable for the efficient use of resources and student achievement. In girls' schools, however, financial dependency on local communities and private donors is also associated with a reduction in inefficient capital expenditure and/or non-instructional expenditure. The largest efficiency gain was derived from private donors' contributions in girls' schools, suggesting that public-private partnerships (PPPs) may have been capitalized to accelerate the efficient delivery of education services in girls' schools.

On the other hand, the study found no statistical evidence that mobilizing private-fund revenue through education fees, local community contributions, or private donors' contributions widened financial inequality in school finance. Instead, an increase in local community contributions was associated with an improvement of financial equity in non-instructional expenditure. This indicates that, even though collecting informal fees and contributions is often criticized as a hidden schooling cost, mobilizing financial contributions from local communities outside of education/tuition fees has the potential to help low-spending schools close the financial gap in non-instructional expenditure.

These results underscore the importance of understanding differential effects of private-fund revenue in decentralized education system. Local, multi-stakeholder options for school financing has been promoted with the hope of boosting educational efficiency and the anxiety about educational equity. However, this study provides evidence that engaging non-state stakeholders in public school finance is not necessarily a balancing act between efficiency and equity. Private-fund mobilization could improve both efficiency and equity when it is carefully designed. Understanding the differential effects of private-fund revenue is thus important for policy makers and school authorities so that they may develop effective cost-sharing policies that improve student achievement in a cost efficient manner and enhance financial equity in decentralized education systems.

Literature Review

In this section, I provide a summary of literature on the effects of local, multi-stakeholder finance on the efficiency and financial equity in school education. The literature suggests that, although local financing would improve school efficiency at the expense of financial equity, the efficiency-equity tradeoff needs to be re-examined in consideration of the diversity of local financing sources.

Local, Multi-Stakeholder Finance in Education: Effects on Efficiency

While inconclusive, the empirical evidence is suggestive that a greater reliance on local funds may improve the efficiency in the delivery of school education services. A cross-state study in the United States found that New Hampshire, which maintained a proportion of its school funding raised from local sources between 1980-1990, improved educational outcomes over six other states where schools had instead increased their reliance on the state funding (Hoxby, 1997). Performing fixed effects and random effects analyses on data from 217 New Jersey school districts gathered between 2002-2009, another study found that the proportion of operating expenditures mobilized from local property taxes was positively associated with higher student achievement in standardized tests (Mensah et al., 2013). However, other studies in the United States have not found improved efficiency with local school finance. For instance, a study of K-12 districts in Kansas found that a share of school funding mobilized from local taxes was not statistically significantly associated with per-pupil expenditures (Duncombe & Yinger, 2005).

Studies in low- and middle-income countries are limited, but provide evidence of efficiency effects of local financing on school education. Using a cost function analysis relating education spending to school outcomes, the price of school inputs, and characteristics of students and schools, a study in the Philippines found that the share of school expenditure raised from local sources was negatively associated with total school expenditure after holding school outcomes constant, suggesting that schools relying on local funding are more cost efficient (Jimenez & Paqueo, 1996). Another cost function study applied an instrumental variables approach and found that schools having a greater proportion of their revenue from local sources were more efficient in education service delivery in Indonesia (James et al., 1996).

While these studies provide useful implications for the effects of local financing on school efficiency, they are limited in terms of their considerations of the diversity of local funding. Some of the studies in the United States focused on the effects of local school taxes, paying less attention to other local school revenue sources. For example, public schools in the United States collect various fees directly from parents for auxiliary services so that public funds can be channeled to core instructional services (Fisher, 2006). The other studies in the United Sates and the developing countries aggregated all local contributions under a single umbrella even though the local funds were derived from various local stakeholders such as local government, parents, and firms, and through various channels.

Since stakeholders have unique interests and stakes in school education, the effects of local financing on school efficiency may vary according to the source of local funds. The efficiency gain identified in some of the literature may have been attributed not to the local funds as a whole, but to the contributions from particular local stakeholders through a particular channel. For example, the efficiency gain may be derived from local funds raised from education/tuition fees paid by parents, which may, in turn, create a strong provider-client accountability relationship. It is also important to pay attention to the financial contributions made by private partners, such as businesses and foundations, who may possess the power to hold schools financially accountable for their unique demands. These private partners may affect school efficiency both in positive and negative directions depending on whether their interests are aligned with public values and geared towards improvement of cost-efficiency. In order to identify what money really counts for improving the efficiency of school education in multi-stakeholder financial arrangements, we need to break down locally-raised revenue into finer categories. However, the evidence related to the effects of different types of local contributions on school efficiency is scarce.

Local, Multi-Stakeholder Finance in Education: Effects on Financial Equity

Local financing of schools raises concern about equity in school finance since the ability to raise resources depends on local wealth (Kattan & Burnett, 2004). The available evidence suggests that local financing is likely to undermine financial equity in school education. In the United States, a survey of Chicago public schools indicated that the parents' contributions and fundraising exacerbate disparities in resources within and across districts (Posey-Maddox, 2016). In Asia, trends in education spending in China, Indonesia, and the Philippines demonstrates that the gap in education expenditures per student between wealthier and poorer areas has grown due to education decentralization that increased the variation in the ability to mobilize local resources (King & Guerra, 2005). In Latin America, a study of autonomous school programs in Nicaragua, in which schools raise revenue from local sources, found that the amount of local contributions was negatively associated with the extent of poverty (Gershberg & Meade, 2005).

However, these studies do not necessarily take into account financial contributions from other private partners, such as businesses and foundations, which may either improve or exacerbate school financial equality, depending on their motivation. For example, a survey of 10 elementary schools in Los Angeles County found that the mobilization of private funds did not necessarily cause inequality in school finance since, although schools in wealthier communities had greater contributions from parents, schools in lower-income communities attracted a greater level of support from firms and philanthropic organizations that prefer to support schools with the greatest needs (Zimmer et al., 2003). These acts by philanthropic organizations are explained by the theory of perfect altruism, in which donors are concerned with the level of welfare of recipients solely without consideration of own benefits. In such cases, donors make contributions to schools facing greater financial constraints and, as a result, improve equity in school finance.

However, not all donors are entirely altruistic, and some make contributions for their own benefit (Hernández-Murillo & Roisman, 2005). These include donors whose motivations are explained by the warm-glow theory and/or strategic philanthropy. In the warm-glow theory, donors are motivated to make contributions for the internal satisfaction gained from the act of giving (Andreoni, 1990). Since one's own contribution is an imperfect substitute for the contributions from others in this theory, the donor gives to recipients regardless of the recipients' resource level (Andreoni, 1989). Similarly, strategic philanthropies financially support specific organizations regardless of the recipients' financial conditions as they are motivated to make contributions as a means of achieving their organizational goals rather than broad public interests. These donors may undermine equity in school finance by making contributions to schools that already embrace relatively rich resources. These theories, combined with empirical evidence, suggest that whether financial contributions from parents and local communities exacerbates equity in school finance depends on not only community wealth but also the existence and nature of contributions from other private donors.

Problem Statement, Research Questions, and Contribution

As stated, local participation in school finance has the potential to enhance the efficiency of school education but risks widening financial inequality. However, the efficiency-equity tradeoff needs to be re-examined in consideration of multi-stakeholder financial arrangements in which various non-state stakeholders, including parents, local communities, and private partners, financially support schools for different purposes through multiple channels, and thus may affect the efficiency and equity of school education differentially. In order to understand the impact of multi-stakeholder school finance, we need to examine how financial contributions from different stakeholders are associated with the efficiency and equity of school education. The lack of evidence poses a challenge in developing effective cost-sharing policies within decentralized education systems. In order to address the research gap, this study uses data from Punjab, Pakistan to examine two research questions: 1) to what degree financial contributions from parents, local community members, and private partners are associated with the efficiency of public school education, and 2) to what degree their contributions are associated with the equity in school finance.

This study contributes to the literature on education decentralization, particularly local school financing, by providing new evidence on how different sources of school funding contribute to cost-efficiency and financial equity of public school education in multi-stakeholder financial situations. The evidence provides insights into cost-sharing policy in decentralized education, i.e., who should be engaged in school finance and through which channels. The study is timely and relevant given current global education discourse, which advocates the abolishment of school fees for equity purposes while encouraging PPPs as a means to mobilize private-sector resources to achieve global education goals that envisage quality education for all (UNESCO, 2015a). The findings from this study would be particularly helpful for policy makers and school authorities in developing countries who face internal and external pressures to expand access to quality schooling with limited governmental funding but at the same time to ensure financial equity.

Country Context

Political, Economic, and Socio-Cultural Context

Pakistan is an Islamic country located in South Asia, which gained independence from the British in 1947. The 1973 Constitution declared Pakistan a federal republic, with the federal government as the constituted governing authority of the four provinces of Balochistan, Khyber Pakhtunkhwa, Punjab, and Sindh. The country consists of, in addition to the four provinces, two autonomous territories (Azad Jammu and Kashmir; Gilgit-Baltistan) and one federal territory (Islamabad Capital Territory).

The country has the world’s sixth largest population, 200 million people, 96.4% of which are Muslims (Central Intelligence Agency, 2019). Over half of the population is under 25 years old, and 63% of the population resides in rural areas (Central Intelligence Agency, 2019). The country contains an ethnically diverse population, with Punjabi accounting for 45% of the population along with Pashtun, Sindhi, and Saraiki, among others (Central Intelligence Agency, 2019). The major industry is the service sector followed by agriculture. The gross domestic product (GDP) per capita in purchasing power parity is $5,400, ranking Pakistan 171st in the world (Central Intelligence Agency, 2019).

Figure 1.1. Map of Pakistan with administrative divisions. Reprinted from *CIA Maps*, by Central Intelligence Agency, 2018. Retrieved from https://www.cia.gov/library/publications/resources/cia-maps-publications.

Education System in Pakistan

Education in Pakistan is overseen by the Federal Ministry of Education and the provincial governments. Although the Ministry formulates education policies and plans at the national level, the provincial government possesses the authority to develop and implement its own education plans in accordance with national education policies. For instance, the school education department of Punjab has responsibility of a wide array of educational issues that include, among others, legislation and policy formulation, budgeting, development of curricula, production of text books, teacher professional development, and student assessment (School Education Department of the Government of Punjab, 2018).

School education consists of a primary level (grade 1-5), middle level (grade 6-8), secondary level (grade 9-10), higher secondary level (grade 11-12), and tertiary level. In general, there are three types of schools: public schools, private secular schools, and madrasas. Madrasas are Islamic seminaries that teach mostly Islamic subjects. All of these schools are overseen by the provincial government. Reflecting gender norms in the Islamic country, single-sex schools are common, particularly in the public school sector (Andrabi et al., 2002; Malik, 2013).

Challenges in Education

Given the country's large youth population, Pakistan has made efforts to ensure access to a quality basic school education, but has fallen short of the target. The first Education Conference in 1947 recommended that primary education should be free and compulsory. Since then, the achievement of universal primary education and the need to close the gender gap was reiterated in national education policy in 1970, 1972, 1979, 1992, and 1998 (Ahsan, 2003). The national education policy in 1972 extended free and compulsory school education to the secondary level, and this vision was reflected in the constitution in 1973. This obligated the states to provide free and compulsory secondary education, yet the goal has not been met. The net enrollment rate lies at 76% at the primary level and 53% at the secondary level. (UNESCO Institute for Statistics, 2018b). Over 10 million children and adolescents are out of school (UNESCO Institute for Statistics, 2018a).

Considerable attention has been given to improving the quality of education. Five-year economic plans have continuously articulated the importance of addressing inadequate provisions for teacher training, teaching aids, curriculum development, and physical school infrastructure (Bengali, 1999). Concerns over the quality of education have been addressed in the national education policy as well. For instance, the revision of curricula and textbooks was targeted within the education policy in 1972 (Ahsan, 2003), and the provision of equipment, teaching kits, and textbooks was listed in the implementation strategy of the education policy in 1979 (Bengali, 1999). The National Education Policy 1998-2010 also sought to improve education quality by raising entry requirements for teachers, upgrading in-service teacher training, revising curricula, ensuring the provision of textbooks, and improving management systems, among others (Ministry of Education of Government of Pakistan, 1998). Despite the policy efforts, improving the quality and outcomes of education have continued to be a major challenge. According to household surveys conducted in 154 rural districts in Pakistan, about half of children of grade 5 age have not yet achieved a grade 2 level of learning in both reading and math (ASER Pakistan, 2018). Students in the province of Punjab also performed significantly below curricular standards and their grade level (Andrabi et al., 2008b).

Given the limited capacity of the government to ensure access to a quality basic school education, the private sector has been encouraged to participate in the provisioning of school education since the first Education Conference in 1947 (Ahsan, 2003). The provincial government also plays an important role in promoting private school education. In the Punjab province, for example, the Punjab Education Foundation was established in 1991 as an autonomous body to encourage private-sector engagement in providing school education. Subsequently, the private school sector has expanded to meet the excess demand in the country; private-school enrollment reached 35% of primary-level and 32% of secondary-level students in 2017 (UNESCO Institute for Statistics, 2018b). However, private schools tend to be clustered in affluent communities (Andrabi et al., 2008a). Thus, the public school sector continues playing an important role in ensuring equity in access to quality school education.

In order to reach out to out-of-school children and meet the demand for quality education, improving cost-efficiency within public school education is considered one of the key policy challenges (Ahsan, 2003). In fact, the provincial government invested about 20% of the total provincial budget in education in 2002/2003, ranging from the lowest of 16.41% in Khyber Pakhtunkhwa province, to 19.01% in Sindh, 23.59% in Punjab, and the highest at 26.69% in Balochistan (Husain et al., 2003). The large educational investment is partly explained by inefficiency within public school education. The cost of educating a child in public school is twice as much as that in private school where students perform better (Andrabi et al., 2008b). This indicates that there is room for improving the efficiency of public school education.

Decentralization of Education Management and Finance

Decentralization of the public education system, including community participation in school management and finance, was pursued as a response to the educational challenges. Community participation in school management and resource mobilization was called for as part of the national education policy in 1979 (Bengali, 1999). In 1994, the government of Pakistan issued a notification on the formation and re-establishment of school management committees

(SMCs) and parent-teacher associations (PTAs) in all provinces to promote community engagement in schooling (Khan, 2003). Formation and strengthening of local school governing bodies were prioritized in the national education policy of 1998 as well (Ahsan, 2003).

The provincial governments responded to the federal government's education policy. Parent-represented SMCs were introduced as a mandatory component of public school education in the Khyber Pakhtunkhwa province (Ahmad & Ullah, 2014). The government of Punjab issued an ordinance requiring each school to establish an SMC, later renamed the school council, represented by parents in 1995 (Government of the Punjab School Education Department, 2000).

The SMCs are granted the authority to manage and support their school, which includes monitoring of school activities and raising and disbursement of funds (Shah, 2003). For instance, school councils in the Punjab province are granted the authority to acquire local resources from parents and philanthropists, in addition to annual flat government grants, to use local and government funds to meet the schools' needs, and to monitor school education activities (Government of the Punjab School Education Department, 2000; Punjab Education Sector Reform Programme, 2018). Similarly, SMCs in the Khyber Pakhtunkhwa province are responsible for various tasks that include, among others, the mobilization and disbursement of locally raised revenue and hiring of contract teachers (Ahmad & Ullah, 2014; Rahim, 2017).

The public school sector in Pakistan handled the task of leveraging private funds for improving efficiency of public school education without undermining educational equity, thus providing the ideal venue for this study's investigation. This study provides insights into whether the government's policy of decentralization and the individual school's efforts to mobilize private funds from various non-state stakeholders pay off in terms of improved efficiency and equity.

Data

Data and Sample

This study uses school-level panel data derived from three rounds of the Learning and Educational Achievements in Punjab Schools (LEAPS) survey from 2004-2006. The survey targeted Punjab, the most populous province in Pakistan with 100 million people residing in 36 districts (Government of Punjab, 2018). According to the 1998 census, over 97% of the population were Muslim and 70% lived in rural areas in the province (Pakistan Bureau of Statistics, 2019).

Using geographical stratification to divide the province into North, Center, and South, the LEAPS survey selected three districts in 2003: Punjab-Attock (North), Faisalabad (Center), and Rahim Yar Khan (South). Within the three districts, the survey team randomly selected a total of 112 villages from a pool of rural villages that had at least one private school but less than 25 public and private schools. The survey identified over 800 public and private schools offering primary education in the villages and within 15-minute walking distance from any house in the village (Andrabi et al., 2008b).

A roster of all grade 3 students (13,735) in these sample schools was developed. Then, in 2004, achievement tests in math, English, and Urdu were administered to the 12,110 grade 3 students who were present on the test day. After the first year's tests, some of the students dropped out, some switched schools, some repeated the grade, while others were double-promoted. All the students in the initial roster, including those who had not taken the first year's test, were tracked and retested in 2005 and 2006 if they were present at any school in the villages, no matter the grade they were enrolled in at the time. The tests were also administered to new children who enrolled in grade 4 in 2005 and grade 5 in 2006.

Along with the achievement tests, questionnaires on topics related to the schools, principals, teachers, and students were administered in each of the schools on an annual basis, typically in the beginning of each year (January-March) before the new academic year started in April. A school survey was administered to either the school owner or principal to collect administrative information, including data on school management and finance. A principal survey was administered to understand the principals' demographics. Teacher surveys consisted of two components: a teacher roster survey collecting basic demographic information of all teachers in the schools, and a detailed teacher survey administered to teachers in the tested grade, i.e., grade 3 in 2004, grade 4 in 2005, and grade 5 in 2006. A student survey was administered to a sample of 10 randomly selected children in the tested grade to collect information about students and their families.

I developed school-level panel data by aggregating data from the teacher roster, student achievement tests, and student questionnaire survey according to the school level and merging it with school and principal data. When aggregating the student-level data derived from the achievement tests and student questionnaire survey, I used the information from students who had been in the initial roster of grade 3 students. Sticking to the students who were in the initial roster helps avoid bias that may be due to new students who were identified in the specific grades only and surveyed in later years.

For this study, I used only a public school sample for both conceptual and methodological reasons. First, financing a school through parental contributions may not create the same sense of financial accountability in public and private schools. Public and private schools have different functions in the society and therefore embody different social values, which lead to unique mechanisms for accountability (Anderson, 1992). For instance, paying educational fees for a public school education at the basic level, which is defined as free and compulsory by the constitution, may generate demands for public accountability in a way that differs from financial accountability in the private school sector. Second, the revenue of private schools may be subject to a greater level of measurement error in the LEAPS survey since private schools were asked to report a percentage of tuition fees actually paid by parents.

One public school was excluded due to a reported enrollment of zero students. I also limited the sample to those reporting both expenditure information and enrollment, as these are used to compute per-pupil expenditure as an outcome variable, and those appearing in all three survey rounds to construct a balanced panel data. The final sample is 375 public schools (1,125 observations over three years). The selection of sample is discussed further in the later section.

Relevance of the Data to the Current Education Discourse

Although the data was collected in 2004-2006, it still provides useful contribution to the current global education policy and discourse on decentralized education finance. First, the panel data on school finance and student achievement helps generate new evidence on the efficiency-equity tradeoff in local, multi-stakeholder school financing in developing countries. Empirical studies of school efficiency and financial equity in developing countries are scarce as they require detailed data on school finance and student achievement, which are not readily available in many developing countries. The panel data from Pakistan provides an opportunity to strengthen the evidence base.

Second, the data collected in the 2000s provides important lessons for school finance under the new global development and education framework, Sustainable Development Goals (SDGs), which aims to ensure both “access” and “quality” of education. In pursuit of achieving universal primary education under the Millennium Development Goals (MDGs) and EFA goals, international education stakeholders advocated the abolition of school fees in the 2000s, as they constitute a barrier against the expansion of equitable access to basic education (The World Bank, 2009; UNESCO, 2003). Although the international efforts resulted in the enactment of a policy of free basic education in a number of countries in Africa and Asia (UNESCO, 2015b; UNESCO & UNICEF, 2013), public schools in many developing countries have continued charging parents various formal and informal fees so that they might secure the financial capacity necessary to provide quality education services (e.g., Areba et al., 2013; Centre for Peace and Development Initiatives, 2014; Oumer, 2009; Williams et al., 2015). The experiences of these schools in juggling public and private funds to achieve "access" and "quality" goals should provide useful lessons. Identifying the gains and losses in terms of efficiency and equity consequent to the mobilization of private funds would help us inform school finance policy in the current global education landscape.

Methodology

Analysis of Efficiency

I performed a cost function analysis to examine whether the reliance on private funds raised from various non-state stakeholders improves the efficiency of school education. Within a production function framework, school education can be seen as a process using input factors, such as teachers and learning materials, to produce education outcomes in a given environment. In this respect, school cost is function of the educational outcomes, prices of inputs, school and student characteristics, and environmental factors that affect school efficiency.

I used a Cobb-Douglas cost function, one of the common functional forms used for cost function analysis[1]. The Cobb-Douglas equation takes the natural logarithm of both dependent

[1] I also examined quadratic functional forms as robustness checks.

variable and independent variables. The restrictive form assumes constant elasticity of substitution of one, which means that a proportionate change in the predictor variables results in a change in the cost in the same proportion. Several modifications are commonly made such that variables in a form of a percentage do not take natural logarithms (Duncombe & Yinger, 2005). The present study estimates a variant of the Cobb-Douglas form, in which school and student characteristics and environmental factors expressed in a percentage do not take natural logarithms. The estimation model is specified below.

$$\begin{aligned}\mathrm{lnCost}_{svt} = {} & \beta_0 + \beta_1 \mathrm{lnScore}_{svt} + \beta_2 \mathrm{lnLaborprice}_{vt} + \mathbf{SCHcharacter_{svt}\beta_3} + \mathbf{STUcharacter_{svt}\beta_4} \\ & + \beta_5 \mathrm{RevshareFee}_{svt} + \beta_6 \mathrm{RevshareCommunity}_{svt} + \beta_7 \mathrm{RevshareDonor}_{svt} \\ & + \beta_8 \mathrm{lnSMCmeeting}_{svt} + \beta_9 \mathrm{lnCompetition}_{svt} + \delta_s + \theta_t + \varepsilon_{svt} \qquad (1)\end{aligned}$$

The outcome (*Cost*) is a per-pupil expenditure in school *s* in village *v* in year *t*. The per-pupil expenditure at a given level of student achievement (*Score*) is estimated as a function of the labor input price (*Laborprice*) in village *v*, school characteristics (*SCHcharacter*) and student characteristics (STUcharacter) that create cost variation, and a set of environmental factors affecting school efficiency. The efficiency factors include the degree of educational decentralization in terms of both school finance and management, measured as a proportion of school revenue raised from the parents' payment of educational fees (*RevshareFee*), local community contributions (*RevshareCommunity*), and contributions from other non-state donors (*RevshareDonor*), as well as the number of SMC meetings (*SMCmeeting*). The efficiency factors also include the degree of pressure placed on the school to improve school efficiency so that it may compete for students (*Competition*) in areas where there are other schools that the students can attend.

The model includes school fixed effects (δ) and year fixed effects (θ) to control for the unobserved time-invariant school characteristics and the overall time trends that affect the variation in school cost. The estimated parameters may be biased if unobserved characteristics of schools are correlated with both the independent variables and dependent variable, causing endogeneity. For instance, the degree to which a school prioritizes their students' academic success may generate an upward bias on the slope of student achievement if academically oriented schools attract higher achieving students and spend more to provide a better learning environment. A long-term close and cooperative tie between the school and community, which is not directly observable, may affect both the share of school funding mobilized from parents, local communities, and non-state private donors and school spending. School fixed effects remove the effect of those time-invariant characteristics, so that the model assesses the net effects of variables that vary within school over time. In other words, the fixed-effects estimation tells, in a given school, how changes in a school's financial dependency on private funds is associated with changes in per-pupil expenditure, holding school outcomes, labor input price, school and student characteristics, and other efficiency factors constant. In addition, year fixed effects are included in the model to control for the variation in school expenditures that happened over time, and is not attributable to the independent variables. For example, the data suggests that schools mobilized additional funding from local communities during the school year 2005/2006 in order to respond to damages caused by the 2005 Kashmir earthquake, which destroyed approximately 17,000 school buildings (Earthquake Engineering Research Institute, 2006). Year fixed effects help account for a common shock in a particular year.

ε is an error term. Robust standard errors are used for estimation. The variables used are explained below and also summarized in Appendix 1A.

Measure: Per-pupil expenditure (*Cost*). Per-pupil expenditure was computed for five expenditure categories: 1) total expenditure, 2) instructional expenditure, 3) non-instructional expenditure, 4) current expenditure, and 5) capital expenditure. Each of these expenditures was estimated via separate models, so that I could examine how financial reliance on private funds was associated with the various school expenditure categories individually.

Schools reported monthly expenditure on utilities, building rent, teacher remuneration, non-teaching staff remuneration, and other components incurred in the month before the survey was conducted. Schools also reported annual expenditure on building construction, furniture/fixtures, educational materials, and other components. The monthly expenditures were multiplied by 12 and summed up with the annual expenditures. Per-pupil expenditure was computed by dividing the total expenditures by the number of students. In addition to the per-pupil total school expenditure, I computed a per-pupil instructional expenditure, which are derived from teacher remuneration and educational materials, and a non-instructional expenditure that covers the rest of non-instructional expenditure items. Furthermore, I computed a per-pupil current expenditure, which is derived from expenditures on utilities, rent, and remuneration, and a capital expenditure derived from expenditures on construction, furniture/fixtures, and educational materials[2]. Monthly and annual expenditures on "other components" are excluded from the calculation of the subcategory expenditures to prevent any potential measurement errors. Table 1.1 summarizes the classification of expenditures.

These expenditure figures are expressed in a real price in the 2005 Pakistan Rupee to adjust for inflation. In order to allow the value of zero to take a natural logarithm, a small value (i.e., 0.1) is added to these expenditure variables across observations[3].

[2] I categorized the expense of education materials into capital expenditures since it was reported as an annual disbursement in the survey, and durable materials that are used for many years such as textbooks are sometimes classified as capital expenditures in the education sector (Penrose, 1993; UNESCO International Institute for Educational Planning et al., 2016).

[3] I added the value of 0.1 since this is smaller than any non-zero value in the variables. In order to assess whether the analytical results were sensitive to the selection of a small value that was added to the variables, I also estimated models with increment of other values (0.01 and 0.001) as robustness checks.

Table 1.1.
Classification of Expenditures

Expenditure item reported by school	Expenditure category				
	Total	Instructional	Non-instructional	Current	Capital
<u>Monthly disbursement</u>					
Utilities	×		×	×	
Building rent	×		×	×	
Pay & allowance - teachers	×	×		×	
Pay & allowance - non-teaching staff	×		×	×	
Others	×				
<u>Annual disbursement</u>					
Building construction	×		×		×
Furniture and fixtures	×		×		×
Other educational materials	×	×			×
Others	×				

Measure: Student achievement (*Score*). The model includes student achievement as a school outcome so that it estimates the average spending for schools with a given achievement level. Although the importance of school inputs in learning outcomes is not conclusive (e.g., Greenwald, et al., 1996; Grubb, 2008; Hanushek, 2006), there is suggestive evidence that some basic resources matter for student achievement in resource constrained environments within developing countries (Glewwe et al., 2011). Therefore, it has been hypothesized that learning gains come with an increased education cost.

The achievement tests were scored and equated across the survey rounds by using Item Response Theory (IRT) so that the scores are comparable over time. I used the latent ability traits (theta) estimated via maximum likelihood estimation (MLE). Since parameters in an IRT model are invariant up to a linear transformation (Templin, 2012), raw IRT scores are often transformed by a linear transformation to scale scores (Ye Tong & Kolen, 2010). Therefore, I linearly transformed the raw ability-trait values to scale scores in the equation: $\textit{scale score} = 300 + 50\theta$.

All the scale scores were expressed by non-zero, positive values so that the natural logarithm could be taken. The scores in math, English, and Urdu were averaged and aggregated according to the school level. The school-mean of student achievement for each year was derived from the students who were on the initial student roster regardless of their drop-out, repetition, and promotion status in the later years. The scores of those who repeated the same grade or were double promoted were included in the computation of school-mean scores in Year 2 and 3 since schools incurred cost of educating these students in lower or higher grades. The cost-efficiency affected by dropout was accounted for by including enrollment in the model, which is explained later.

Measure: Labor input price (*Laborprice*). I used a village-mean monthly teacher salary, which included all allowances, as a proxy for labor input price in the education sector. Education cost is expected to increase as the teacher salary increased. Even though the measure does not account for labor input price of non-teaching staff, the use of teacher salary can be justified by the fact that teacher remuneration accounts for a large share of school expenditure in developing countries. The data was derived from the teacher roster, which provided a monthly salary of all teachers in the identified schools. I aggregated the salary of teachers who were doing the actual teaching in all the schools to the village level, including both public and private schools, on the assumption that public and private school teachers were in the same teacher labor market[4]. These salary figures were expressed as a real price in the 2005 Pakistan Rupee to adjust for inflation.

Measures: School characteristics (*SCHcharacter*). I controlled for a set of school characteristics that would create cost variation: 1) enrollment, 2) proportion of students by education level, 3) school facilities, 4) access to electricity, and 5) geographic isolation.

[4] I also estimated the models with the average public school teacher salary in robustness checks.

1) Enrollment (Enrol). School size may affect the cost of school education. Large enrollment is expected to reduce the per-pupil expenditure if school achieves the economy of scale, a reduction in the average cost resulting from an increase in the volume of outputs. The enrollment was computed by adding up the number of male and female students in each grade.

2) A percentage of students by education level (Edlevel). I controlled for the proportion of students enrolled in the pre-primary, primary (grade 1-5), middle (grade 6-8), and secondary (grade 9-12) levels. The cost of education may be higher at the middle and secondary levels due to the difference in curricula and a need for teachers who are qualified for teaching upper level courses. In the analysis, the proportion of students at the primary level was omitted as a reference level.

3) School facilities (Facility). School facilities incur maintenance costs. Schools reported whether they had classrooms, staffrooms, libraries, halls, storage, sport equipment, fences, toilets, blackboards, personal computers, and fans/coolers. Schools received a value of one if they did not possess a given facility and two if they did, which allows all values to take a natural logarithm. Since it is difficult to identify which facilities cost more than others, the value indicating the availability of each facility (1 or 2) was averaged for the 11 facilities to develop an index of school facility availability.

4) Electricity access (Electricity). I controlled for the access to electricity, which would increase utility costs. Schools reported whether they had electricity and how many hours of load shedding, a deliberate shutdown of the electrical supply, they experienced in an average week. I created an index for electricity access, weighted by the hours school can use electricity in absence of load shedding, so that it represents access to electricity in a more precise manner[5].

5) Geographic isolation (Remote). I controlled for geographic isolation so as to capture potential differences in the cost of travel and the non-labor input price. The survey provided information on distance from school to nearest telephone, bank, healthcare center, public transportation, and council-level (markaz-level)[6] office in a six-point-scale from one to six. The mean value of the five variables is used as an index of remoteness.

I did not include some school characteristics. First, I excluded the ownership of school buildings. The data suggest that not all public schools' building were properties of the government. Some were owned (by school administrators), rented, or donated. Although the difference in building ownership potentially creates cost variation, I did not control for it due to uncertainty about who paid rent and property tax. For instance, the property tax may have been paid from a school budget, in which case the cost is added into school expenditures. However, it could have been directly paid by the public school authority, local government, or school administrator personally, in which case the cost would not appear as a school expenditure. The decision to eliminate building ownership is expected to have a limited impact on the analysis since government owned buildings make up 90% of public schools in the sample.

Second, I excluded provision for transportation service. Although schools may incur costs by providing transportation services, including this dichotomous variable makes data imputation

[5] I assumed that school personnel could check hours of load shedding at school for 12 hours per day for six days a week, which accumulated to 72 hours a week. The electricity access was computed by the formula: 1 + (72 – hours load shedding per week) / 72. The variable was given a value from 1 to 2, with 1 indicating no access to electricity and 2 indicating full access to electricity without load shedding.

[6] Union councils (called Markaz in Punjab) are comprised of a number of schools in the city (Razzaque & Magno, 2013).

models difficult to converge. The omission of this variable is expected to have a limited effect because less than 1% of public schools provided transportation service in the sample.

Third, I did not control for an experimental program implemented by the LEAPS survey. The LEAPS survey conducted a randomized experiment that disseminated report cards to schools in one half of the sample villages in September 2004, after the Year 1 baseline survey and before the Year 2 survey. The experiment had positive effects on both enrollment and achievement (Andrabi, et al., 2017). I did not include the program implementation in my model since enrollment and student achievements are already controlled for in the model, and the data imputation models did not converge with the variable indicating the program implementation.

Measures: Student characteristics (*STUcharacter*). It is common to include student characteristics, which may create cost differentials, in cost function analysis. For example, cost function analysis of K-12 education in the United States often includes a percentage of students who are in poverty, in addition to those who possess special education needs and language-learning needs. Each of these could increase school costs due to the additional services and personnel provided to meet their unique educational needs (Golebiewski, 2011). This study includes measures of 1) students' household wealth and 2) students' gender, which may create cost differences among schools in the Punjab province.

Wealth of student's household (Wealth). In many developing countries, children of economically disadvantaged families are more likely to repeat grades and drop out of school since they are often engaged in income generating work and household chores more than others. Public schools in Punjab may have devoted additional human and material resources to retain and educate such vulnerable children. This is a plausible assumption since school councils represented by parents have certain discretion to mobilize and use funds to meet educational needs of their children at each school. Therefore, I accounted for the potential cost differential by including a school average of household asset wealth in the model. The survey asked students whether their family has a range of goods; if they did not possess a given asset, a value of one was recorded, and if they did, a value of two was recorded. I averaged the value of 13 consumer durables, items which any families would appreciate possessing, and aggregated it to the school level[7]. The measure is derived from students who were in the initial roster. This asset-wealth is weakly correlated with student achievement (a coefficient of correlation of 0.185), suggesting that multicollinearity is not be a serious concern.

2) Student gender (Female). I also included the proportion of female students in the school, in consideration of gender norms and segregated schooling. More specifically, if boys and girls are determined to have different educational needs and expectations, this will likely be reflected in the school's curriculum and programs, and thusly in the costs incurred by the particular school. The potential cost differential based on student gender is controlled for by including the percentage of female students within the model.

Measures: Efficiency controls. With the variables above, the model estimates the average spending for schools according to given student achievement, labor input price, and school and student characteristics. In order to estimate the cost, a minimum level of expenditure required to produce a certain level of student outcome, one needs to control for the difference in school efficiency. I assumed that, given the education decentralization initiatives in the country and province, local participation in school finance and management affected efficiency. In addition, competition for students between schools may incentivize schools to be more efficient in order to produce higher quality educational outcomes. These efficiency factors are measured by 1) the

[7] These consumer durables include: bed, table, chair, radio, TV, telephone, fridge, fan, watch, bicycle, motorcycle, motor rickshaw, and car.

share of school revenue raised from non-state stakeholders, 2) the degree of parent participation in school management, and 3) the degree of school competition.

1) A share of school revenue raised from non-state stakeholders (RevshareFee; RevshareCommunity; RevshareDonor). In the survey, schools provided information about school revenue. First, schools reported the price of admission fees and annual school fund fees[8] charged per student in grade 1-3, 4-5, and 6-8 respectively. The survey instrument indicates that the admission fees are paid each year, not just one time. This information is used to calculate the school revenue raised from educational fees paid by parents. The price information is available only for grades 1-8 although some schools accommodate students in pre-primary and grades 9-12. Since the fees increase as a child moves upward through the grades, I calculated the fee revenue for the pre-primary level based on the fee prices for grades 1-3, and the fee revenue for grades 9-12 based on the fee prices for grades 6-8. Second, schools reported a sum of additional revenue raised from parents in the name of sports fees and examination/paper funds and the broader, local community through community events since the beginning of school year. Third, schools reported external funding received from the government[9], donor programs, religious charities, and other entities since the beginning of school year. The revenue raised from these streams were summed to calculate the school's annual revenue. The revenue categories provided in the survey are summarized in Table 1.2.

[8] According to the Centre for Peace and Development Initiatives (2014), parents are charged nominal fees for schooling even though free education is a right under the constitution of Pakistan.
[9] The government provides development and/or administrative grants to public schools, in addition to an annual flat-rate grant to a school council (Centre for Peace and Development Initiatives, 2014).

Table 1.2.
Public School Revenue Sources Reported in LEAPS Surveys

Funder	Source
Government	Grants to school council funds Other funds
Parents	Admission fee (yearly) School funds fee (monthly)
Local community (incl. parents)	Sport fee, examination/paper funds, community event, etc.
Non-state private donors	Donor programs and trusts Religious charities Others

Then, the share of school revenue from non-state stakeholders was calculated. First the revenue mobilized from payment of admission fees and school funds fees were used to compute the percentage of school revenue raised from parents' education fees payment (*RevshareFee*). These fees are the amount parents paid for educational services and instruction provided to their children in a given school, and thus are expected to generate pressure for increased efficiency. Therefore, it is hypothesized that an increase in financial dependency on education fees would be associated with a reduction in per-pupil school expenditures, controlling for students' achievement. Whether the fees are mandates or voluntary does not matter according to the principle of resource dependency theory developed by Pfeffer & Salancik (1978), since the parents' ability to hold the school accountable and to influence the school's direction is generated from the school's financial dependency of the resources provided by the parents.

Second, the revenue mobilized as sport fees, examination/paper funds, and through community events was used to compute the percentage of school revenue raised from local community contributions (*RevshareCommunity*). These revenue sources are raised from the broader set of local community members without an explicit linkage to the provision of instructional services, and thus may not create the same pressure for accountability and increased efficiency. For instance, if these funds are used for paying costs related to school administration and extracurricular activities, which are not directly related to the students' learning, an increased dependency on the local community contributions may actually result in increased costs for student achievement.

Third, the revenue mobilized from donor programs/trusts, religious charities, and other external entities was used to compute the percentage of school revenue raised from private donors (*RevshareDono*r). Whether these revenue sources provide schools with incentives to improve efficiency depends on the interests and motivation of the donors. If the donors' contributions are intended to improve students' learning and facilitate efficient use of resources, an increase in financial dependency on the private donors' contributions would be associated with a reduction in per-pupil non-instructional expenditure, controlling for student achievement. On the other hand, if their contributions are channeled to school facilities and infrastructure that do not contribute to students' learning directly, an increase in financial dependency on the private donors' contributions may be associated with a corresponding increase in non-instructional and capital expenditures per pupil, making school less efficient.

Since the three revenue-share variables are weakly correlated one another, they were included in the same model. The percentage of school revenue mobilized from the government was omitted from the analytical model as a reference category in order to avoid multicollinearity.

2) A degree of parent participation in school management (SMCmeeting). Schools reported the number of meetings of School Management Committees (SMCs) / School Councils (SCs) / Parent-Teacher Associations (PTAs) held in the past year. I used this variable as a proxy for the degree of parental participation in school management. Since parents have direct incentives to improve their children's education and know their children's learning needs, their participation in school management is expected to improve the efficiency of education service delivery by increasing transparency of operation and accountability for educational outcomes, and by achieving a better match between students' learning needs and school offerings (Barrera-Osorio et al., 2009; Bruns et al., 2011; Edwards & DeMatthews, 2014). In order to allow a value of zero to be transformed to natural logarithm, a small value (0.1) was added to the variable across observations.

3) A degree of school competition (Competition). Competition may incentivize school to be more cost-efficient in improving student learning in order to attract students. The degree of competition is often measured by the number of other schools within a certain distance. The sample used in this study suggests that, although the majority of students commuted from a walking distance within 15 minutes, 21% of male students and 16% female students walked for over 15 minutes from home to school. Therefore, school competition was measured by a school's report on the number of other schools that their students could attend instead, regardless of distance. I added a small value (0.1) to the variable across observations in order to allow a value of zero to be transformed to natural logarithm.

Sample. The initial sample had missing values in the dependent variable, per-pupil school expenditures, accounting for 7.01% of the sample. Although imputing for missing data in dependent variable is technically possible, it does not make a meaningful gain unless there are auxiliary variables that are strongly correlated with the dependent variable (Williams, 2018). Therefore, this study dropped observations that had a missing value in per-pupil expenditure information. The deletion of observations would not affect the analysis, if they are missing completely at random (MCAR). In order to analyze the randomness of the missing data, I examined whether there were any significant differences between schools with and without the per-pupil expenditure information. The results are presented in Table 1.3.

Table 1.3 shows some differences between schools that provided per-pupil expenditure information and those that did not. On average, schools that provided the expenditure information were more likely to have higher student test scores and were located in village with higher teacher salary. These schools were characterized by a smaller overall enrollment, a higher proportion of students enrolled at the pre-primary level, and a lower proportion at the middle school level. Schools that provided per-pupil expenditure information also had a lower facility index and less access to electricity. In addition, students in these schools were more likely to come from wealthier households. These schools also depended less on revenue from education fees than those that did not report the expenditure information. Overall, the tests of differences suggest that the missing data are not completely at random. Therefore, with the deletion of observations that did not provide the per-pupil expenditure data, this study is able to estimate the parameter of public schools that provided the expenditure information. This limits the generalizability of this study’s findings.

Table 1.3.
Comparison of Public Schools With/Without Per-Pupil Expenditure Data

Variable	Mean characteristics: Per-pupil expenditure Reported	Mean characteristics: Per-pupil expenditure Not-reported	Test of differences: Coefficient (Standard error)
School outcome			
Student achievement	262.736	245.218	17.518***
(*Score*)			(3.601)
Labor input price			
Village-mean monthly teacher salary	5,146.153	4,801.636	344.517***
(*Laborprice*)			(107.316)
School characteristics			
Enrollment	185.356	287.305	-101.949***
(*Enrol*)			(32.954)
% students: Pre-primary	32.877	28.564	4.312**
(*Edleveln*)			(1.967)
% students: Primary	58.475	57.866	0.609
(*Edlevelp*)			(2.073)
% students: Middle	7.030	10.967	-3.937**
(*Edlevelm*)			(1.663)
% students: Secondary	1.618	2.602	-0.984
(*Edlevels*)			(0.749)
School facility index	1.407	1.450	-0.043**
(*Facility*)			(0.019)
Electricity access index	1.487	1.615	-0.128***
(*Electricity*)			(0.045)
Geographic isolation index	3.208	3.099	0.109
(*Remote*)			(0.094)
Student characteristics			
Household asset index	1.532	1.501	0.031***
(*Wealth*)			(0.009)
% female students	45.798	38.544	7.253
(*Female*)			(4.664)
Efficiency factors			
% revenue: Parents' education fees	56.168	66.330	-10.162**
(*RevshareFee*)			(4.531)
% revenue: Local community contributions	5.683	4.820	0.864
(*RevshareCommunity*)			(1.709)
% revenue: Private donor contributions	1.438	3.902	-2.464
(*RevshareDonor*)			(1.639)
No. of SMC meetings	5.189	5.728	-0.539
(*SMCmeeting*)			(0.385)
No. of other schools	9.242	8.904	0.337
(*Competition*)			(1.064)
Observations	1,367	103	

Note. Student achievement is derived from achievement tests. Teacher salary is derived from the teacher roster. Household asset index is derived from the student surveys. Other variables are from the school surveys. STATA mean and lincom commands are used for the test for differences. Significance level: * < 0.1; ** < 0.05; *** < 0.01.

After dropping 103 school observations that did not have per-pupil expenditure information, the sample was further limited to schools that appeared in all the three rounds of surveys, resulting in data from a balanced panel of 375 schools (1,125 observations over three years). Table 1.4 shows the summary statistics of the restricted sample of 375 public schools with the degree of missing values in each variable. Even in the sample restricted to schools that reported per-pupil expenditure information, there are still missing values in some variables, accounting for the maximum of 7.02% of the sample. Since removing observations with these missing values further reduces the sample size, I used multiple imputation to replace missing values in independent variables with a set of plausible values predicted by other variables in the dataset. A more detailed explanation of imputation procedures is found in Appendix 1B.

Table 1.4 presents the description of the restricted sample before imputation. The average per-pupil total expenditure was 3,057 rupees (about 50 US dollars in 2005 exchange rate), 85% of which was spent on instructional items. The high standard deviation in expenditure suggests that there is a large variation in the level of per-pupil expenditures, even among public schools. The sample schools accommodated 178 students on average. While the majority of students enrolled at the primary level, one-third of their students attended a pre-primary level. Female students were underrepresented in the sample schools (45.46%). Although free primary education has been envisioned since the country's independence, the sample schools relied on private funds for running schools according to the revenue streams reported in the survey. On average, the schools raised 56.49% of their revenue from education fees paid by parents. Revenue was supplemented by contributions from local communities and private donors, which accounted for 5.81% and 1.45% of the revenue, respectively. However, the relatively high standard deviation indicates a large variation in financial dependency on private revenue sources. The financial dependency has very weak or no correlation with the household asset index (a correlation coefficient of 0.099 for education fees, 0.105 for local community contributions, and -0.003 for private donor contribution). This implies that school-level socioeconomic status is not an important factor explaining why some schools relied on private funds more than others. The schools also held meetings of the SMC, SC, or PTA 5.27 times per year, on average. There were about nine other schools that students attending a given school could attend instead, indicating a potentially high level of competition between schools for students.

Table 1.4.

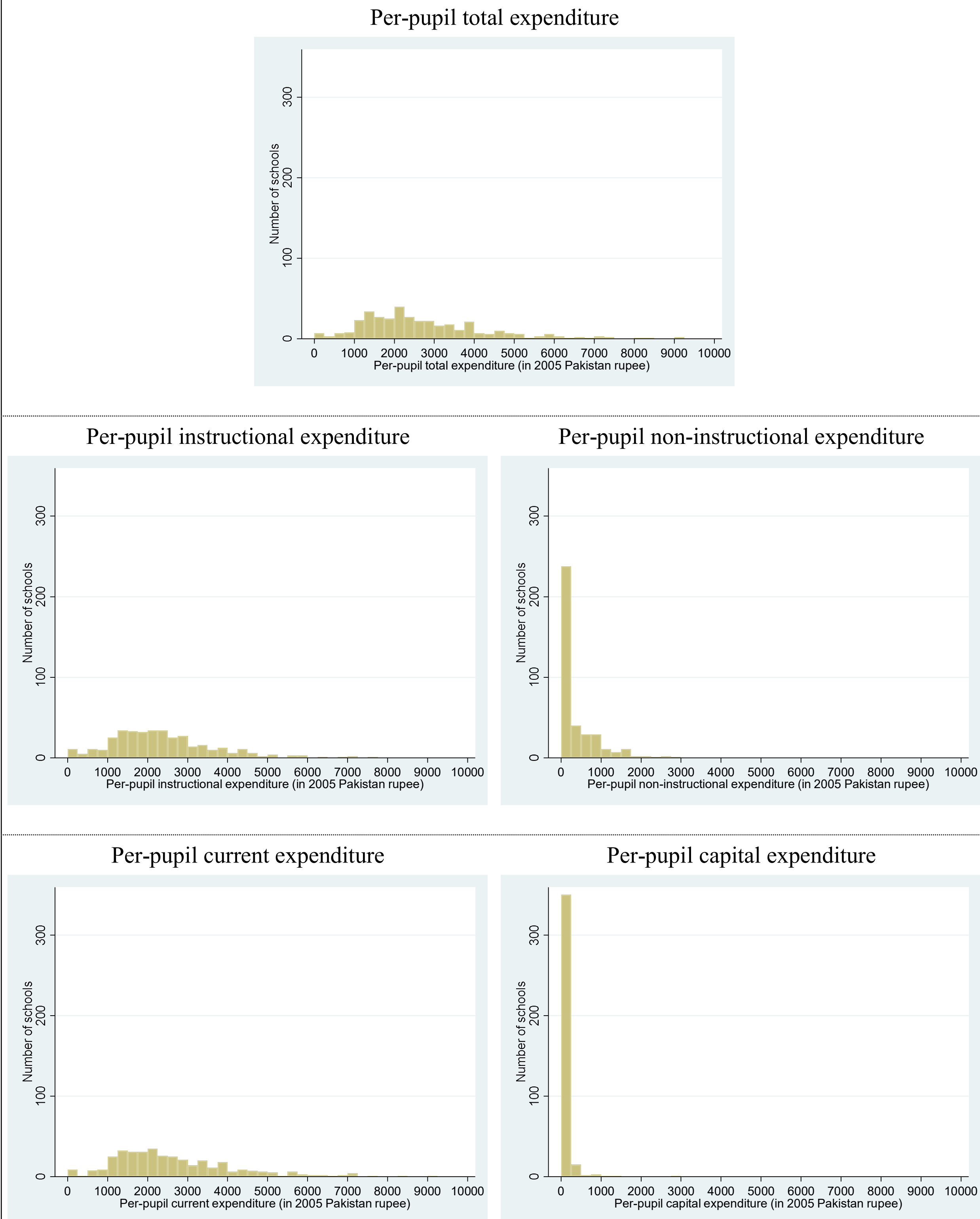
Summary Statistics of Public Schools, Non-Imputed Balanced Panel Data

Variable	All years Mean (SD)	All years % missing	2004 Mean (SD)	2004 % missing	2005 Mean (SD)	2005 % missing	2006 Mean (SD)	2006 % missing
Dependent variables								
Per-pupil expenditure: Total	3,056.73 (2,319.91)	0.00%	2,867.73 (2,647.61)	0.00%	2,997.39 (1,772.17)	0.00%	3,305.07 (2,433.75)	0.00%
Per-pupil expenditure: Instructional	2,606.33 (1,713.95)	0.00%	2,399.20 (1,422.06)	0.00%	2,562.33 (1,441.24)	0.00%	2,857.47 (2,149.65)	0.00%
Per-pupil expenditure: Non-instructional	434.78 (1,405.37)	0.00%	440.88 (2,092.66)	0.00%	421.58 (821.40)	0.00%	441.87 (938.91)	0.00%
Per-pupil expenditure: Current	2,868.60 (1,896.58)	0.00%	2,673.91 (1,665.51)	0.00%	2,809.84 (1,634.35)	0.00%	3,122.06 (2,293.35)	0.00%
Per-pupil expenditure: Capital	172.51 (1,339.20)	0.00%	166.18 (2,049.91)	0.00%	174.07 (737.79)	0.00%	177.28 (802.12)	0.00%
Independent variables								
Student achievement	260.72 (38.70)	6.76%	239.01 (37.21)	2.40%	259.59 (34.63)	7.73%	285.45 (28.43)	10.13%
Village-mean monthly teacher salary	5,139.20 (1,274.54)	0.00%	4,933.74 (1,131.11)	0.00%	5,057.52 (1,211.69)	0.00%	5,426.33 (1,415.21)	0.00%
Enrollment	178.27 (150.55)	0.00%	167.78 (141.08)	0.00%	177.10 (146.19)	0.00%	189.94 (163.07)	0.00%
% students: Pre-primary	33.22 (19.14)	0.00%	34.77 (20.44)	0.00%	33.77 (18.58)	0.00%	31.14 (18.20)	0.00%
% students: Primary	58.53 (18.16)	0.00%	57.34 (19.41)	0.00%	58.26 (17.30)	0.00%	59.98 (17.66)	0.00%
% students: Middle	6.66 (12.69)	0.00%	6.36 (12.62)	0.00%	6.48 (12.27)	0.00%	7.14 (13.19)	0.00%
% students: Secondary	1.59 (4.87)	0.00%	1.53 (4.84)	0.00%	1.49 (4.57)	0.00%	1.75 (5.20)	0.00%
School facility index	1.40 (0.18)	0.53%	1.39 (0.17)	1.60%	1.42 (0.18)	0.00%	1.40 (0.18)	0.00%
Electricity access index	1.46 (0.47)	0.00%	1.43 (0.47)	0.00%	1.47 (0.47)	0.00%	1.49 (0.48)	0.00%
Geographic isolation index	3.21 (0.71)	3.20%	3.20 (0.67)	4.27%	3.20 (0.71)	5.07%	3.24 (0.75)	0.27%
Household asset index	1.53 (0.10)	7.02%	1.49 (0.09)	2.40%	1.53 (0.09)	8.00%	1.57 (0.09)	10.67%
% female students	45.46 (43.82)	0.00%	45.54 (44.62)	0.00%	44.80 (43.74)	0.00%	46.03 (43.20)	0.00%
% revenue: Parents' education fees	56.49 (44.14)	0.80%	61.90 (42.22)	2.40%	55.41 (43.88)	0.00%	52.30 (45.78)	0.00%
% revenue: Local community contributions	5.81 (16.65)	0.09%	6.44 (17.42)	0.27%	5.83 (16.57)	0.00%	5.18 (15.96)	0.00%
% revenue: Private donor contributions	1.45 (10.59)	0.44%	2.19 (12.73)	1.33%	1.29 (10.43)	0.00%	0.88 (8.14)	0.00%
No. of SMC meetings	5.27 (3.58)	0.00%	5.21 (3.71)	0.00%	5.41 (3.68)	0.00%	5.19 (3.34)	0.00%
No. of other schools	9.09 (6.63)	3.73%	6.94 (4.90)	6.13%	10.06 (6.95)	3.20%	10.17 (7.23)	1.87%
Observations	1,125		375		375		375	

Note. Student achievement is derived from achievement tests. Teacher salary is derived from the teacher roster. Household asset index is derived from the student surveys. Other variables are derived from the school surveys.

Figure 1.2 presents the distribution of per-pupil expenditure in 2004 (academic year 2003/04) in histograms. The figure excludes two schools that had a very high per-pupil expenditure for the purpose of showing the distribution patterns in a visible manner. One of the two schools made large investment in school construction, while the other school had the lowest pupil-teacher ratio, and thus resulted in a very high per-pupil expenditure on teacher allowances[10]. The histograms show that per-pupil total expenditures in the public school sector in Punjab were widely spread, indicating low financial equity. The similarly wide distribution is also observed in the per-pupil instructional and current expenditures. On the other hand, the majority of public schools have relatively small per-pupil non-instructional and capital expenditures. This reflects the fact that over 80% of school expenditure was spent on teacher allowances.

[10] These schools are included in analysis since they are legitimate observations that reflect real financial situation faced by some of the public schools in the Punjab province.



Note. Out of 375 public schools, two schools that had very high per-pupil expenditure are excluded from all figures.

Figure 1.2. Distribution of per-pupil expenditure in 2004 (school year 2003/2004).

Analysis by school type. Although a proportion of female students is included in a model as a control for student characteristics, cost differentials by gender may be derived from whether school is a co-educational or single-sex school. For instance, education costs in co-educational school may be different from that in single-sex schools if special arrangements are needed to accommodate both boys and girls in the same school. The cost of education may also differ between boys' and girls' schools if they provide different facilities, curricula, and teachers for religious and gender considerations. In addition, how financial contributions from parents, local communities, and other private donors influence school efficiency may differ by school type. In order to assess the heterogeneous effects, I performed an efficiency analysis for co-educational, boys', and girls' schools separately as well.

In the LEAPS surveys, schools did not report whether they were single-sex or co-educational schools. Therefore, the schools were categorized according to the presence or absence of genders of the enrolled children. Out of the sample of 375 public schools for the efficiency analysis, 110 schools were identified as co-educational schools, along with 108 boys' schools and 73 girls' schools. The remaining 84 schools that changed categories over the three years were not included in the efficiency analysis by school type.

Analysis of Financial Equity

I used the school-level data to perform regression analysis to estimate the effects of education fees paid by the parents, local community contributions, and private donors' contributions on horizontal equity in school finance within villages. Horizontal equity means that students who are alike receive an equal share of resources (Odden & Picus, 2014). Equity in school finance is often examined at the village, district, and state levels (e.g., Odden & Picus, 2014; Springer et al., 2009). However, I use school-level data, rather than village-level data, since this study assumes that school-level variation in private-fund revenue affects the financial equity. Financial equity in a given village is assumed to change when some schools are able to mobilize more private funds than other schools in the same village. Therefore, there is a need to capture the school-level variation in private-fund mobilization.

From the school-level data used in the previous efficiency analysis, I excluded 18 schools that were a given village's sole school, yet for which a within-village financial equity could not be computed. Accordingly, I used the balanced panel data from 357 public schools (1,071 school observations across the three years). The balanced panel data allows me to estimate the financial equity based on the same set of schools over the years. The regression model is specified as follow:

$$\begin{aligned}\mathrm{Inequality}_{\mathrm{svt}} = \gamma_0 + \gamma_1 \mathrm{RevGovernment}_{\mathrm{svt}} + \gamma_2 \mathrm{RevFee}_{\mathrm{svt}} + \gamma_3 \mathrm{RevCommunity}_{\mathrm{svt}} + \\ \gamma_4 \mathrm{RevDonor}_{\mathrm{svt}} + \mathbf{SCHcharacter}_{\mathbf{svt}} \boldsymbol{\gamma}_{\mathbf{5}} + \mathbf{STUcharacter}_{\mathbf{svt}} \boldsymbol{\gamma}_{\mathbf{6}} + \delta_s + \theta_{\mathrm{t}} + \varepsilon_{\mathrm{svt}} \quad (2)\end{aligned}$$

In the model 2, the outcome is the degree of financial inequality (*Inequality*) faced by school *s* in village *v* in year *t*, which is measured by the absolute value of standardized per-pupil expenditure. Per-pupil expenditure is standardized to have a mean of zero and a standard deviation of one for each village and year. The standard values, often called z-scores, indicate the number of standard deviations a given school's per-pupil expenditure is above or below the village average. The absolute value of the z-score tells how many standard deviations the per-pupil expenditure of a given school is away from the village average. Unlike other equity measures computed at the village, district, and state levels, this measure of inequality allows schools in the same village to take different values. The inequality measure suggests that, on average, schools had per-pupil total expenditure that is 0.749 standard deviation units away from their village mean, and the degree of inequality does not differ much in any sub-category expenditures (0.722-0.743). This indicates that, even within a same village, there was a certain level of financial inequality among public schools although this may be attributed to various factors such as a proportion of students by education level and gender.

The outcome is estimated as a function of per-pupil revenue raised from the government *(RevGovernment*), education fees paid by parents *(RevFee*), local community contributions (*RevCommunity*), and private donors' contributions (*RevDonor*) in school *s* in village *v* and year *t*. Unlike the efficiency analysis for which a proportion of school revenue raised from private funds is used as an independent variable based on the resource dependency theory, this equity analysis examines how the amount of privately funded revenue per pupil is associated with financial equity in expenditure. The revenue from all the four sources, including the allocation from the government, is included in the same model since the contribution from one stakeholder may be dependent on others' contribution. In other words, I examined the relationship between a particular type of private-fund revenue and financial equity holding all other revenues constant. The revenue from education fees and local community contributions may increase inequality in school finance, controlling for government funds and private donors' contributions, if the revenue from parents and community members depends on local wealth. The association between the revenue from private donors and financial inequality would depend on the motivation and interests of donors.

The model controls for school-level characteristics (*SCHcharacter*) that create variation in school expenditures. These are the same variables that were used in the previous efficiency analysis but not in the natural logarithm form. In addition, since horizontal equality means that students who are alike receive an equal share of resources (Odden & Picus, 2014), the model controls for student characteristics (*STUcharacter*). These include average student achievement

(*Score*) in addition to household asset wealth (*Wealth*) and the percentage of female students (*Femal*e).

The basic model includes school fixed effects (δ) and year fixed effects (θ) to control for the unobserved, time-invariant school characteristics and the overall time trends that affect the variation in financial inequality. The estimated parameters may be biased if unobserved characteristics of schools are correlated with both the independent variables and dependent variable, causing endogeneity. For instance, a positive and cooperative relationship between the school and community, a situation which is specific to the school but not directly observable, is likely to affect both revenue mobilized from parents and local communities and inequality in school finance in a given village. School fixed effects remove the effect of such time-invariant characteristics, so that the model assesses the net effects of variables that vary over time. In other words, the fixed-effects estimation tells, in a given school, how changes in private-fund revenue is associate with changes in financial inequality faced by the school, holding revenue raised from the government and characteristics of the school and its students constant. In addition, year fixed effects are included in the model to control for the variation in school finance equity that happened over time, and is not attributed to the independent variables. ε is an error term. Robust standard errors are used for estimation.

The equity analysis was not performed using the school's gender categorization since the outcome, a within-village financial inequality, is derived from a mixture of co-educational and single-sex schools in the given village.

Results

Efficiency of School Education

Table 1.5 presents the results of fixed-effects estimation of association between per-pupil expenditures and a range of cost factors.

Table 1.5.
Results of Cost-Function Analysis

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.011	-0.025	-1.108	0.224	0.056
	(0.185)	(0.516)	(0.998)	(0.459)	(1.057)
Log village-mean monthly teacher salary	0.150	0.256	-0.993	0.504	1.327
	(0.369)	(0.492)	(1.229)	(0.490)	(1.292)
Log enrollment	-0.970***	-0.877***	-1.347**	-0.822***	-0.867
	(0.112)	(0.214)	(0.580)	(0.202)	(0.586)
% students: Pre-primary	0.000	0.002	-0.001	0.002	-0.006
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.016*	0.033*	0.017	0.019**	0.019
	(0.009)	(0.017)	(0.024)	(0.010)	(0.028)
% students: Secondary	0.014	0.016	0.058	0.010	-0.053*
	(0.010)	(0.026)	(0.056)	(0.011)	(0.031)
Log school facility index	0.392	0.300	1.775	0.251	2.152
	(0.381)	(0.471)	(1.420)	(0.432)	(1.399)
Log electricity access index	0.273	0.188	2.792***	0.215	-0.254
	(0.265)	(0.269)	(0.716)	(0.265)	(0.647)
Log geographic isolation index	0.047	0.330	-0.482	0.221	-1.248**
	(0.121)	(0.269)	(0.557)	(0.184)	(0.608)
Log household asset index	0.857	1.153*	-2.467	0.877	1.296
	(0.573)	(0.658)	(3.090)	(0.688)	(2.759)
% female students	0.001	-0.001	0.019*	-0.001	0.016
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.001	0.004	-0.006	0.004	-0.013*
	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.013
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
Log number of SMC meetings	-0.043**	-0.064**	0.169	-0.050**	0.121
	(0.020)	(0.030)	(0.110)	(0.025)	(0.107)
Log number of other schools	-0.066	-0.131	0.101	-0.092	0.314*
	(0.055)	(0.086)	(0.148)	(0.075)	(0.173)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.007	< 0.001	<0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Private-fund mobilization. The results suggest that, although the mobilization of private funds does not result in efficiency gains in terms of the total per-pupil expenditure, a greater reliance on education fees from parents is associated with a reduction in capital expenditure. Column 1 in Table 1.5 shows that, on average, financial dependency on education fees, local community contributions, and private donors' contributions is not significantly associated with the per-pupil total expenditure of producing a given learning achievement, holding labor input price, school and student characteristics, and other efficiency factors constant. This indicates that, contrary to the theories, participation of parents and local community in school financing does not result in increased efficiency, while PPPs in school finance also does not produce increased efficiency, in multi-stakeholder school finance systems in the Punjab province in Pakistan.

The columns 2-5 show that financial dependency on private funds is not significantly associated with the majority of sub-categories of school expenditures, except for in a few cases. In column 5, financial dependency on education fees is negatively associated with per-pupil capital expenditure at the 1% significance level. Coefficients involving log transformed dependent and/or independent variables are interpreted in terms of percent change (Wooldridge, 2013). Thus, the results indicate that a one percentage point increase in the proportion of school revenue that is mobilized from education fees is associated with a one percent decrease in per-pupil capital expenditure, on average. In addition, financial dependency on local community contributions is negatively associated with per-pupil capital expenditure at the 10% significance level. On average, a one percentage point increase in the proportion of school revenue that is raised from local community contributions is associated with a 1.3% decrease in per-pupil capital expenditure. These results suggest that schools relying more on education fees and local community contributions are more likely to reduce inefficient capital expenditure that does not contribute to student learning.

The results provide evidence that the effects of private-fund revenue on efficiency differ by its source. What may be driving the increased efficiency in public schools is not privately funded revenue, per-se, but is more likely to be revenue collected from parents as education fees, thereby generating a stronger provider-client accountability relationship. However, there is a negative association between the financial dependency on education fees and per-pupil total expenditure, while not statistically significant. This indicates possibilities that, since capital expenditure accounts for only 5.64% of total expenditure, funds saved in capital expenditure were not a large enough component of total school expenditure or were, perhaps, used for other purposes that do not contribute to learning gain.

Other factors. The results also provide evidence of other cost factors. Student achievement has a non-significant association with per-pupil instructional expenditure, indicating that public schools in the Punjab province did not necessarily make good use of financial resources for improving the learning environment and student achievement. Teacher salary as an input price has a positive but non-significant association with per-pupil instructional and current expenditures, holding student achievement and other cost factors constant.

With regards to school characteristics, enrollment reduces per-pupil total education expenditure, suggesting that schools realized scale economies. A one percent increase in enrollment is associated with a decrease in per-pupil total expenditure by 0.97% on average, at the 1% significance level. The statistically significant coefficients on log enrollment in the column 2 and 3 suggest that the increased efficiency consequent to the scale economies is derived from reduction in both instructional and non-instructional expenditures.

In addition to enrollment, school education levels also create cost differentials. The results provide evidence that middle school education is more costly than primary school education. A one percentage point increase in the proportion of students enrolled at the middle school level is associated with 1.9% increase in per-pupil current expenditure, at the 5% significance level, and 3.3% increase in per-pupil instructional expenditure, at the 10% significance level, on average. Total per-pupil expenditures also increase by 1.6% as the proportion of students at the middle school level increases by one percentage point, at the 10% significance level. In addition, the results show that an increase in the proportion of students at the secondary level is negatively associated with per-pupil capital expenditure at the 10% significance level. This may imply that, to attain certain achievement levels, educating secondary school students requires less investment in terms of school infrastructure and equipment compared to primary school students.

The analysis also shows that the availability of school facilities has no significant association with per-pupil school expenditure, although its coefficients are positive. However, the results indicate that access to electricity increases the per-pupil non-instructional expenditure. A one percent increase in the electricity access index is associated with 2.8% increase in non-instructional expenditure on average, at the 1% significance level. On the other hand, geographic isolation reduces per-pupil capital expenditure. A one percent increase in the geographic isolation index is associated with 1.3% decrease on average in per-pupil capital expenditure, at the 5% significance level. This may indicate that the non-labor price related to capital investment was less expensive in remote areas.

Concerning student characteristics, students' wealth, measured by their household asset index, is positively associated with per-pupil instructional expenditure, at the 10% significance level, holding student achievement and other cost factors constant. This suggests that schools accommodating relatively wealthy students spent more on instructional items, but the investment did not necessarily payoff in terms of increased learning. The results also show that the percentage of female students is positively associated with per-pupil non-instructional expenditure, at the 10% significance level. This implies that educating girls may result in additional investment in non-instructional items.

With respect to other efficiency factors, there is evidence that participatory school governance contributed to the efficiency of school education. The results show that the number of SMC meetings is significantly associated with a decrease in per-pupil school expenditure at the 5% significance level, although its magnitude is small. A one percent increase in the number of SMC meetings is associated with a decrease in per-pupil total expenditure by 0.04%, on average. This small increase in efficiency seems to be derived from a reduction in instructional and current expenditures, suggesting that parents have contributed to the curtailing of inefficient, teacher-related investment through their participation in school management. In addition, school competition is associated with an increase in capital expenditure at the 10% significance level. The results show that a one percent increase in the number of schools competing for students is associated with an increase in per-pupil capital expenditure by 0.31%, on average. This implies that schools facing greater competitive pressure made greater investments in construction, facilities, and materials, which, in turn, did not sufficiently contribute to improving student achievement.

Analysis by School Gender Type

Table 1.6, 1.7, and 1.8 present the results of efficiency analysis for co-educational, boys', and girls' schools, respectively.

Table 1.6.
Results of Cost-Function Analysis, Co-Educational Schools

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.164	0.502	0.083	0.511	0.201
	(0.281)	(0.502)	(2.290)	(0.507)	(2.015)
Log village-mean monthly teacher salary	1.260**	1.214*	4.070*	1.378*	2.370
	(0.543)	(0.651)	(2.286)	(0.699)	(2.367)
Log enrollment	-0.849***	-0.650**	-1.214	-0.672**	-1.007
	(0.132)	(0.291)	(0.885)	(0.295)	(0.872)
% students: Pre-primary	0.003	0.007	-0.008	0.007	-0.008
	(0.002)	(0.005)	(0.019)	(0.005)	(0.014)
% students: Middle	-0.013**	-0.011	-0.027	-0.013	0.060
	(0.006)	(0.009)	(0.114)	(0.009)	(0.104)
% students: Secondary	0.040***	0.029***	0.317***	0.037***	-0.042
	(0.006)	(0.007)	(0.038)	(0.007)	(0.045)
Log school facility index	-0.395	-0.700	3.250	-0.794	0.881
	(0.647)	(0.658)	(2.045)	(0.794)	(2.188)
Log electricity access index	0.248	0.097	4.626***	0.106	0.683
	(0.161)	(0.186)	(1.073)	(0.173)	(1.046)
Log geographic isolation index	0.217	0.519	-1.542	0.569	-0.730
	(0.221)	(0.436)	(1.150)	(0.444)	(1.229)
Log household asset index	1.183	0.814	-1.566	0.826	3.304
	(0.712)	(0.903)	(4.172)	(0.934)	(3.615)
% female students	-0.002	-0.003	0.009	-0.005	0.019
	(0.005)	(0.006)	(0.021)	(0.006)	(0.021)
% revenue: Parents' education fees	0.000	0.001	0.005	0.001	-0.002
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.002	0.009	-0.010	0.008	-0.020
	(0.003)	(0.008)	(0.012)	(0.008)	(0.013)
% revenue: Private donor contributions	0.000	-0.001	0.011	-0.001	-0.014*
	(0.001)	(0.002)	(0.014)	(0.002)	(0.007)
Log number of SMC meetings	-0.031	-0.025	-0.029	-0.026	-0.065
	(0.022)	(0.026)	(0.235)	(0.028)	(0.186)
Log number of other schools	-0.143	-0.181	0.066	-0.207	-0.070
	(0.106)	(0.161)	(0.251)	(0.175)	(0.380)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.7.
Results of Cost-Function Analysis, Boys' Schools

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.419	-1.187**	-2.312*	-0.612**	-0.009
	(0.274)	(0.505)	(1.313)	(0.286)	(1.305)
Log village-mean monthly teacher salary	-0.433	-1.213	-1.007	-0.098	3.516
	(0.942)	(1.161)	(2.337)	(1.199)	(2.558)
Log enrollment	-1.166***	-1.303***	-0.317	-1.169***	0.174
	(0.375)	(0.479)	(1.117)	(0.383)	(1.020)
% students: Pre-primary	-0.003	0.002	-0.003	-0.001	-0.022
	(0.006)	(0.007)	(0.021)	(0.005)	(0.022)
% students: Middle	0.025	0.064*	0.039	0.025	0.081**
	(0.020)	(0.037)	(0.047)	(0.022)	(0.038)
% students: Secondary	0.019	0.002	-0.049	0.023	-0.208***
	(0.016)	(0.030)	(0.049)	(0.019)	(0.069)
Log school facility index	3.249*	3.563*	2.498	3.346**	4.689
	(1.643)	(1.815)	(2.725)	(1.674)	(3.113)
Log electricity access index	0.204	0.157	2.782**	0.159	1.090
	(0.571)	(0.569)	(1.064)	(0.574)	(1.001)
Log geographic isolation index	0.103	0.495	-1.252	0.123	-2.686**
	(0.343)	(0.642)	(1.091)	(0.374)	(1.152)
Log household asset index	2.593	4.793*	-7.745	3.750	-12.780*
	(2.197)	(2.501)	(7.423)	(2.567)	(6.912)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.010	-0.002	-0.014**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.021*	0.004	-0.005
	(0.005)	(0.006)	(0.011)	(0.005)	(0.013)
% revenue: Private donor contributions	-0.003	-0.002	-0.003	-0.004	-0.006
	(0.003)	(0.004)	(0.016)	(0.003)	(0.015)
Log number of SMC meetings	-0.082	-0.112	0.397*	-0.097	0.543**
	(0.066)	(0.102)	(0.220)	(0.070)	(0.252)
Log number of other schools	-0.067	-0.264	0.598**	-0.070	0.903***
	(0.165)	(0.223)	(0.297)	(0.182)	(0.297)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.011	0.236	0.031	0.039	<0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.8.
Results of Cost-Function Analysis, Girls' Schools

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.380	4.284	-5.154**	3.977	-0.072
	(0.971)	(3.489)	(1.966)	(3.413)	(3.960)
Log village-mean monthly teacher salary	0.297	1.449	-2.148	1.240	0.359
	(0.692)	(1.424)	(1.874)	(1.104)	(2.595)
Log enrollment	-1.056**	-1.269	-2.660	-0.726	1.633
	(0.420)	(1.623)	(1.623)	(1.255)	(1.841)
% students: Pre-primary	-0.010	-0.032	0.045	-0.026	-0.013
	(0.008)	(0.021)	(0.027)	(0.018)	(0.025)
% students: Middle	0.022*	0.023	0.065***	0.007	-0.060
	(0.013)	(0.030)	(0.024)	(0.023)	(0.041)
% students: Secondary	0.036	0.125*	0.054	0.005	-0.048
	(0.023)	(0.074)	(0.048)	(0.036)	(0.074)
Log school facility index	-0.950	-0.438	-7.843**	-0.040	2.922
	(0.826)	(1.705)	(3.177)	(1.149)	(3.318)
Log electricity access index	0.258	0.396	-1.632	0.425	-4.918***
	(0.242)	(0.576)	(2.107)	(0.434)	(1.167)
Log geographic isolation index	0.461	0.904	0.920	0.652	0.459
	(0.309)	(0.801)	(0.86)	(0.551)	(1.154)
Log household asset index	1.011	3.370	-7.562	3.036	4.620
	(1.127)	(3.073)	(7.000)	(2.453)	(9.117)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.005	-0.011*	-0.003	-0.022***
	(0.002)	(0.004)	(0.007)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.004	-0.015	0.000	-0.039***
	(0.002)	(0.006)	(0.012)	(0.004)	(0.012)
% revenue: Private donor contributions	-0.001	0.007	-0.045***	0.008	-0.081***
	(0.002)	(0.008)	(0.012)	(0.008)	(0.013)
Log number of SMC meetings	-0.006	-0.080	0.065	-0.070	0.169
	(0.031)	(0.088)	(0.165)	(0.081)	(0.231)
Log number of other schools	-0.006	-0.012	-0.013	-0.037	0.273
	(0.067)	(0.168)	(0.284)	(0.119)	(0.369)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.003	0.086	< 0.001	0.243	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Private-fund mobilization. The results show that there exists a significant relationship between a financial dependency on privately funded revenue and school expenditures, at the 5% significance level, for single-sex schools only. Table 1.6 shows that, in co-educational schools, there is no statistically significant association between the share of revenue mobilized from parents, local communities, and other private donors and per-pupil expenditure across any categories, at the 5% significance level. However, Table 1.7 indicates that, in boys' schools, a one percentage point increase in the proportion of school revenue that is mobilized from education fees is associated with a decrease in per-pupil capital expenditure by 1.4%, at the 5% significance level. Similar effects on school efficiency are also found in girls' schools. As presented in Table 1.8, a one percentage point increase in the proportion of school revenue raised from education fees is associated with 2.2% decrease in per-pupil capital expenditure in girls' schools, at the 1% significance level. The results suggest that increasing a financial dependency on education fees would help reduce inefficient capital investment in single-sex schools.

It is worthy of notice that girls' schools also realized gains in efficiency from funds mobilized from local communities and private donors with greater magnitudes. A one percentage point increase in financial dependency on local community contributions is associated with a 3.9% decrease in capital expenditure in girls' schools, at the 1% significance level. A one percentage point increase in financial dependency on private donors' contributions is associated with a decrease in capital expenditure by 8.1% and non-instructional expenditure by 4.5%, at the 1% significance level. The results suggest that increasing the proportion of school revenue raised from local communities and other private donors helped reduce inefficient capital and/or non-instructional investment in girls' schools. Interestingly, the largest efficiency gain was derived from funds mobilized from private donors, such as trusts and charities for girls' schools.

The results provide evidence that the effects of private funds upon efficiency differ not only by its source but also by school type. The findings indicate that girls' schools were more likely to become financially accountable to a diverse set of non-state financial contributors in a decentralized school finance system. It is, however, important to note that improved efficiency has not been identified in terms of per-pupil total school expenditure in either boys' or girls' schools at the 5% significance level. This implies that capital and/or non-instructional expenditures saved did not comprise a significant portion of total school expenditures, or that they were used for other purposes that do not contribute to increased learning.

Other factors. The results also document an association between school expenditure and a range of costing factors in each type of school. Some costing factors play differential roles depending on the school type. For example, the mean teacher salary as a labor input price is positively associated with the per-pupil total expenditure, at the 5% significance level, in co-educational schools only, indicating that the teacher labor market for co-educational schools and single-sex schools may differ. Similarly, the proportion of students enrolled at the secondary school level is positively associated with per-pupil total expenditure, at the 5% significance level, for co-educational schools only. This indicates that the education cost differential between primary and secondary school levels is larger in co-educational schools than single-sex schools, possibly because educating both male and female youth of secondary school age within the same school becomes costly in Pakistan. Furthermore, the positive association between school competition and per-pupil capital expenditure, which was identified in the full-sample analysis, is found only in boys' schools. This suggests that boys' schools are likely to increase inefficient capital investment when they face competitive pressures.

On the other hand, there are associations that are consistent across school types. For instance, enrollment is negatively associated with per-pupil total expenditure at the 5% significance level in all types of schools. This suggests that the scale economies could be an important mechanism for improving school efficiency in public schools in rural Punjab, regardless of school type. In addition, the small reduction in per-pupil total expenditure derived from the number of SMC meetings, which was identified in the full-sample analysis, disappeared in the analysis by school type. The number of SMC meeting has a negative but non-significant association with per-pupil total expenditure in co-educational, boys', and girls' schools, possibly due to reduction in statistical power resulting from a smaller sample size.

Robustness Check of Efficiency Analysis

To check the robustness of the analysis, I constructed 10 different models to examine whether the associations between a schools' financial dependency on private funds and per-pupil expenditures are sensitive to the selection of model specifications. The results of robustness checks for all schools, co-educational schools, boys' schools, and girls' schools are summarized, respectively, in Tables 1.9, 1.10, 1.11, and 1.12. I find that the results for the financial dependency on private funds are mostly insensitive to the selection of model specifications. The robustness checks reaffirm that effects of private-fund mobilization on school efficiency differ by the source of the fund and school type. The results also corroborate the evidence that girls' schools relying on funds from education fees, local community contributions, and/or private donors' contributions were likely to reduce inefficient capital and/or non-instructional expenditures.

Using per-pupil expenditures based on monthly expenditures multiplied by nine months (Model A1). I estimated alternative models using per-pupil expenditures, which are computed on the assumption that monthly expenditure items are expensed for nine months a year on average. In the original model, monthly expenditures were multiplied by 12 months. However, some of the monthly expenditure items may not have been expensed across 12 months. For instance, teacher salary may be paid only in months when school operates. Utility costs may be significantly less when school is on vacation. In order to assess whether the results are sensitive to the calculation of expenditure, I estimated models by using per-pupil expenditures calculated according to a nine-month monthly expenditure rate. The results are presented in Tables 1.16-1.19 in Appendix 1C. Use of per-pupil expenditures based on the nine-month calculation does not change the results in a meaningful way. The statistically significant associations found in the original models at the 5% significance level remain significant with the same signs and similar magnitudes.

Using math scores (Model A2). I estimated alternative models with math scores instead of an average score of math, English, and Urdu in order to remove the potential influence of home language on student achievement. Urdu became the official national language in the 1973 constitution as a symbol of Pakistan's Muslim identity and was used as a school instructional language until 2009 when the government set English as the new instructional language (Bashir & Batool, 2017; Rahman, 1997). However, Urdu was the mother tongue for just 7.57% of population according to the 1981 census and there have been calls for use of other languages such as Punjabi and English in public schools (Rahman, 1997). This may raise concerns that composite achievement scores may have been influenced by students' home languages. In order to minimize the potential influence of home language, I estimated models by replacing the composite scores with math scores, which should be less influenced by home languages than test scores on English and Urdu. The results are presented in Tables 1.20-1.23 in Appendix 1C.

Using math scores does not change the results meaningfully; the statistically significant associations at the 5% significance level found in the original models remain significant with the same signs and similar magnitudes.

Using a village-mean public school teacher salary (Model A3). I estimated alternative models using an average monthly salary of public school teachers as labor input price, instead of that of both public and private school teachers. Using average teacher salaries for public and private school sectors combined as a proxy for labor input price may be subject to measurement errors if public and private school teachers are in different labor markets. In order to investigate whether the decision on labor input price change the analytical results, I constructed new models in which a village-mean public school teacher salary was used as the labor input price. The results of these alternative models are presented in Tables 1.24-1.27 in Appendix 1C. The significant associations between a financial dependency on private funds and school expenditures found at the 5% significance level in the original models remain significant with the same signs and similar magnitudes.

Including square terms for quadratic functional forms (Model A4-6). I estimated alternative models that assume quadratic relationships between selected independent variables and per-pupil expenditures. Some cost factors may have increasing or diminishing effects on per-pupil expenditure. For instance, scale economies resulting from enrollment may diminish when the school size becomes very large. Privately funded revenue may have diminishing effects on school efficiency if a heavy reliance on private funds increases administrative cost. Gains in efficiency derived from SMC meetings might be reduced when SMC meetings are held too many times and thus become costly. In order to examine the possibility of quadratic relationships in these variables, I constructed models by adding a squared term of log enrollment, dependency on private funds, and log number of SMC meetings (Model A4, A5, and A6, respectively). The results are presented in Tables 1.28-1.39 in Appendix 1C.

The inclusion of a squared log enrollment or a squared log number of SMC meetings does not change the results in meaningful ways. The statistically significant associations found at the 5% significance level in the original models remain significant with the same signs and similar magnitudes. With regards to quadratic terms of the financial dependency, none of the squared terms are significant at the 5% significance level. This suggests that the relationship between a financial dependency on private funds and school expenditures is not quadratic.

Alternative treatment of zero values for log transformation (Model A7-8). I added the value of 0.1 to school expenditures, the number of SMC meetings, and the number of other schools accessed by students in order to allow the zero value to be transformed to a natural logarithm. In order to assess whether the results are sensitive to the selection of the value to be incremented, I estimated alternative models where I added 0.01 and 0.001 to the variables (Models A7 and A8, respectively). The results are presented in Tables 1.40-1.47 in Appendix 1C. The statistically significant associations between a financial dependency on privately funded revenue and school expenditures found in the original models at the 5% significance level remain significant with the same signs and similar magnitudes, except for one association. The negative association between a financial dependency on education fees and per-pupil capital expenditures in boys' schools becomes non-significant at the 5% significance level in the alternative model. This indicates that the association in boys' school is sensitive to ways to deal with the zero value for log transformation.

Dropping the number of SMC meetings and school competition measures (Model A9). I estimated alternative models by removing the number of SMC meetings and school competition measures. Adding a value of 0.1 to the aforementioned three variables for log transformation could result in measurement errors. Measurement errors in the dependent variables do not generate biased estimates since any systematic variations are subsumed in the constant term, and random variations are subsumed in the error term, although they still affect standard errors and thus statistical inference as well. However, measurement errors in independent variables cause bias and inconsistency in slope estimates. Therefore, adding the small value to independent variables, i.e., the number of SMC meetings and school competition, may result in biased estimates. In order to examine whether the results were affected by potential measurement errors in the number of SMC meetings and school competition measures to which the value of 0.1 was systematically added, I constructed alternative models by dropping the two independent variables. The results, which are presented in Tables 1.48-1.51 in Appendix 1C, show that the statistically significant associations between a financial dependency on privately funded revenue and school expenditures found in the original models at the 5% significance level remain significant with the same signs and similar magnitudes.

Excluding teacher allowance from expenditures (Model A10). I estimated alternative models by using per-pupil expenditures that exclude payments of teacher allowances. The calculation of school revenue and expenditures using the LEAPS data suggests that expenditures were much higher than revenue in the majority of public schools. Comparing school finance figures between the LEAPS data and the Annual School Census 2012 (Punjab Education Sector Reform Programme, 2013), I found that the school expenditures in the LEAPS data was remarkably higher than that in the School Census, mainly due to high spending on teacher allowances. Since many public schools reported that government funds were used as a primary source for paying teacher allowances in the LEAPS data, it is possible that public schools reported payment of teacher allowance as an expenditure while the government funds used to pay for the teacher allowances were not recorded as school revenue in the LEAPS survey. In order to examine whether the results of analysis are sensitive to treatments of the high expenditure on teacher allowances, I constructed alternative models that excluded the payment of teachers' allowances from expenditures.

The results are presented in Tables 1.52-1.55 in Appendix 1C. Excluding teacher allowances does not change the results, except for a few associations. The statistically significant associations found at the 5% significance level in the original models remain significant with the same signs and similar magnitude. In the alternative models, however, a couple of non-significant associations become significant at the 5% significance level. For instance, private funds mobilized from private donors' contributions are positively associated with per-pupil current expenditures in the analysis using the sample of all schools. In addition, revenue raised from local community contributions is negatively associated with per-pupil current expenditures in boys' schools, but positive in girls' schools.

Conclusion from robustness checks. Tables 1.9-1.12 below summarize how the associations between a dependency on private-fund revenue sources and per-pupil expenditures changed in the alternative models constructed for robustness checks. The tables show that the results are insensitive to model selection in general. Most statistically significant associations in the original models remain significant with the same sign and similar magnitude. One exception is the negative association between a financial dependency on education fees and per-pupil capital expenditures in boys' schools, which is sensitive to the ways to handle the zero value for log transformation.

The robustness checks reaffirm that the effects of private-fund mobilization on school efficiency differ by its source and school type. The results corroborate the evidence that girls' schools relying on revenue raised from education fees, local community contributions, and/or private donors' contributions were more likely to cut inefficient capital and/or non-instructional expenditures.

Table 1.9.
Summary of Robustness Checks for Efficiency Analysis, All Schools

Independent variable Model	Log per-pupil expenditure (1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
% revenue: Parents' education fees					
Original model	-0.001	0.000	-0.002	0.000	-0.010***
A1: Use 9-month-based expenditures	-0.001	0.000	-0.002	0.000	-0.010***
A2: Use math scores	-0.001	0.000	-0.002	0.000	-0.010***
A3: Use public school teacher salary	-0.001	0.000	-0.002	0.000	-0.010***
A4: Include a squared term (enrollment)	-0.001	0.000	-0.002	0.000	-0.010***
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.001	0.000	-0.002	0.000	-0.010***
A7: Add 0.01 for log transformation	-0.001	0.000	-0.001	0.000	-0.010***
A8: Add 0.001 for log transformation	-0.001	0.000	-0.001	0.000	-0.010**
A9: Drop SMC meetings & school competition	-0.001	0.000	-0.002	0.000	-0.010***
A10: Exclude teacher allowance from expenditures	-0.002	0.000	-0.002	0.002	-0.010***
% revenue: Local community contributions					
Original model	0.001	0.004	-0.006	0.004	-0.013*
A1: Use 9-month-based expenditures	0.001	0.003	-0.006	0.004	-0.013*
A2: Use math scores	0.001	0.004	-0.006	0.004	-0.013*
A3: Use public school teacher salary	0.001	0.004	-0.006	0.004	-0.013*
A4: Include a squared term (enrollment)	0.001	0.004	-0.006	0.004	-0.013*
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.002	0.004	-0.006	0.004	-0.013*
A7: Add 0.01 for log transformation	0.001	0.004	-0.007	0.004	-0.014
A8: Add 0.001 for log transformation	0.001	0.004	-0.009	0.005	-0.015
A9: Drop SMC meetings & school competition	0.001	0.003	-0.006	0.004	-0.013*
A10: Exclude teacher allowance from expenditures	-0.005	0.001	-0.006	0.005	-0.013*
% revenue: Private donor contributions					
Original model	0.000	0.001	0.003	0.001	-0.013
A1: Use 9-month-based expenditures	0.000	0.001	0.003	0.001	-0.014
A2: Use math scores	0.000	0.001	0.003	0.001	-0.014
A3: Use public school teacher salary	0.001	0.002	0.003	0.002	-0.014
A4: Include a squared term (enrollment)	0.000	0.001	0.003	0.001	-0.014*
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.000	0.001	0.003	0.001	-0.014
A7: Add 0.01 for log transformation	0.000	0.001	0.005	0.001	-0.017
A8: Add 0.001 for log transformation	0.000	0.001	0.007	0.001	-0.021
A9: Drop SMC meetings & school competition	0.000	0.001	0.003	0.001	-0.014*
A10: Exclude teacher allowance from expenditures	0.008	-0.007*	0.003	0.014**	-0.013

Note. Each cell shows a slope coefficient from a separate regression model. Significance level: * p<0.1; ** p<0.05; *** p<0.01. (a) A coefficient is not presented as the squared term of the given variable is not significant at the 5% level.

Table 1.10.
Summary of Robustness Checks for Efficiency Analysis, Co-Educational Schools

Independent variable Model	Log per-pupil expenditure (1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
% revenue: Parents' education fees					
Original model	0.000	0.001	0.005	0.001	-0.002
A1: Use 9-month-based expenditures	0.000	0.001	0.004	0.001	-0.002
A2: Use math scores	0.000	0.001	0.004	0.001	-0.002
A3: Use public school teacher salary	0.001	0.001	0.005	0.001	-0.002
A4: Include a squared term (enrollment)	0.000	0.001	0.004	0.001	-0.003
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.000	0.001	0.004	0.001	-0.002
A7: Add 0.01 for log transformation	0.000	0.001	0.007	0.001	-0.002
A8: Add 0.001 for log transformation	0.000	0.001	0.009	0.002	-0.002
A9: Drop SMC meetings & school competition	0.000	0.001	0.005	0.001	-0.002
A10: Exclude teacher allowance from expenditures	0.004	-0.002	0.005	0.005	-0.002
% revenue: Local community contributions					
Original model	0.002	0.009	-0.010	0.008	-0.020
A1: Use 9-month-based expenditures	0.002	0.009	-0.010	0.008	-0.020
A2: Use math scores	0.002	0.009	-0.010	0.008	-0.020
A3: Use public school teacher salary	0.003	0.010	-0.008	0.009	-0.019
A4: Include a squared term (enrollment)	0.002	0.009	-0.010	0.008	-0.020
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.002	0.009	-0.010	0.009	-0.020
A7: Add 0.01 for log transformation	0.002	0.011	-0.015	0.010	-0.023
A8: Add 0.001 for log transformation	0.002	0.012	-0.020	0.012	-0.026
A9: Drop SMC meetings & school competition	0.001	0.008	-0.009	0.007	-0.020
A10: Exclude teacher allowance from expenditures	-0.001	0.007	-0.009	0.010	-0.020
% revenue: Private donor contributions					
Original model	0.000	-0.001	0.011	-0.001	-0.014*
A1: Use 9-month-based expenditures	0.000	-0.001	0.011	0.000	-0.013*
A2: Use math scores	0.000	0.000	0.011	0.000	-0.014*
A3: Use public school teacher salary	0.001	-0.001	0.014	0.000	-0.014*
A4: Include a squared term (enrollment)	-0.001	-0.001	0.004	-0.001	-0.017*
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.000	-0.001	0.011	-0.001	-0.014*
A7: Add 0.01 for log transformation	0.000	-0.001	0.014	-0.001	-0.020*
A8: Add 0.001 for log transformation	0.000	-0.001	0.018	0.000	-0.026*
A9: Drop SMC meetings & school competition	0.000	0.000	0.011	0.000	-0.014*
A10: Exclude teacher allowance from expenditures	0.017	-0.012	0.011	0.022*	-0.013*

Note. Each cell shows a slope coefficient from a separate regression model. Significance level: * p<0.1; ** p<0.05; *** p<0.01. (a) A coefficient is not presented as the squared term of the given variable is not significant at the 5% level.

Table 1.11.
Summary of Robustness Checks for Efficiency Analysis, Boys' Schools

Independent variable Model	Log per-pupil expenditure (1) Total	 (2) Instructional	 (3) Non-instructional	 (4) Current	 (5) Capital
% revenue: Parents' education fees					
Original model	-0.002	-0.002	-0.010	-0.002	-0.014**
A1: Use 9-month-based expenditures	-0.002	-0.002	-0.011*	-0.002	-0.014**
A2: Use math scores	-0.002	-0.002	-0.011	-0.002	-0.014**
A3: Use public school teacher salary	-0.002	-0.002	-0.010	-0.001	-0.015**
A4: Include a squared term (enrollment)	-0.002	-0.002	-0.010	-0.002	-0.014**
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.002	-0.002	-0.011*	-0.002	-0.014**
A7: Add 0.01 for log transformation	-0.002	-0.002	-0.012	-0.002	-0.014*
A8: Add 0.001 for log transformation	-0.002	-0.002	-0.013	-0.002	-0.014
A9: Drop SMC meetings & school competition	-0.002	-0.002	-0.011*	-0.002	-0.015**
A10: Exclude teacher allowance from expenditures	-0.010*	0.006	-0.011*	-0.004	-0.014**
% revenue: Local community contributions					
Original model	0.004	0.004	-0.021*	0.004	-0.005
A1: Use 9-month-based expenditures	0.003	0.004	-0.021*	0.004	-0.005
A2: Use math scores	0.004	0.004	-0.020*	0.004	-0.004
A3: Use public school teacher salary	0.004	0.004	-0.021*	0.004	-0.004
A4: Include a squared term (enrollment)	0.004	0.004	-0.020*	0.004	-0.004
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	0.004	0.004	-0.022*	0.004	-0.003
A7: Add 0.01 for log transformation	0.004	0.004	-0.024	0.004	-0.004
A8: Add 0.001 for log transformation	0.004	0.004	-0.026	0.003	-0.002
A9: Drop SMC meetings & school competition	0.004	0.004	-0.020*	0.004	-0.004
A10: Exclude teacher allowance from expenditures	-0.012	0.005	-0.020*	-0.017**	-0.004
% revenue: Private donor contributions					
Original model	-0.003	-0.002	-0.003	-0.004	-0.006
A1: Use 9-month-based expenditures	-0.003	-0.002	-0.004	-0.004	-0.007
A2: Use math scores	-0.003	-0.002	-0.003	-0.004	-0.006
A3: Use public school teacher salary	-0.004	-0.003	-0.004	-0.005	-0.004
A4: Include a squared term (enrollment)	-0.003	-0.001	-0.004	-0.003	-0.007
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.003	-0.001	-0.003	-0.003	-0.008
A7: Add 0.01 for log transformation	-0.003	-0.002	-0.001	-0.004	-0.005
A8: Add 0.001 for log transformation	-0.004	-0.001	-0.001	-0.005	-0.007
A9: Drop SMC meetings & school competition	-0.003	-0.002	-0.001	-0.004	-0.004
A10: Exclude teacher allowance from expenditures	0.004	0.003	-0.003	0.000	-0.006

Note. Each cell shows a slope coefficient from a separate regression model. Significance level: * p<0.1; ** p<0.05; *** p<0.01. (a) A coefficient is not presented as the squared term of the given variable is not significant at the 5% level.

Table 1.12.
Summary of Robustness Checks for Efficiency Analysis, Girls' Schools

Independent variable Model	Log per-pupil expenditure (1) Total	 (2) Instructional	 (3) Non-instructional	 (4) Current	 (5) Capital
% revenue: Parents' education fees					
Original model	-0.002	-0.005	-0.011*	-0.003	-0.022***
A1: Use 9-month-based expenditures	-0.002	-0.005	-0.011*	-0.003	-0.021***
A2: Use math scores	-0.002	-0.005	-0.011*	-0.003	-0.022***
A3: Use public school teacher salary	-0.002	-0.005	-0.011	-0.003	-0.022***
A4: Include a squared term (enrollment)	-0.003	-0.007	-0.010	-0.004	-0.019**
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.002	-0.005	-0.011*	-0.003	-0.022***
A7: Add 0.01 for log transformation	-0.002	-0.006	-0.011	-0.003	-0.023***
A8: Add 0.001 for log transformation	-0.002	-0.007	-0.012	-0.003	-0.024***
A9: Drop SMC meetings & school competition	-0.002	-0.005	-0.011*	-0.003	-0.022***
A10: Exclude teacher allowance from expenditures	-0.008	0.003	-0.011*	-0.006*	-0.022***
% revenue: Local community contributions					
Original model	-0.002	-0.004	-0.015	0.000	-0.039***
A1: Use 9-month-based expenditures	-0.002	-0.003	-0.016	0.000	-0.039***
A2: Use math scores	-0.002	-0.003	-0.015	0.000	-0.040***
A3: Use public school teacher salary	-0.002	-0.002	-0.016	0.000	-0.039***
A4: Include a squared term (enrollment)	-0.002	-0.005	-0.014	-0.002	-0.036***
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.002	-0.003	-0.015	0.000	-0.039***
A7: Add 0.01 for log transformation	-0.002	-0.004	-0.018	0.000	-0.044***
A8: Add 0.001 for log transformation	-0.002	-0.005	-0.021	0.000	-0.048***
A9: Drop SMC meetings & school competition	-0.002	-0.003	-0.015	0.000	-0.039***
A10: Exclude teacher allowance from expenditures	-0.014	-0.001	-0.016	0.015**	-0.040***
% revenue: Private donor contributions					
Original model	-0.001	0.007	-0.045***	0.008	-0.081***
A1: Use 9-month-based expenditures	-0.002	0.007	-0.045***	0.007	-0.080***
A2: Use math scores	-0.002	0.004	-0.040***	0.005	-0.080***
A3: Use public school teacher salary	-0.001	0.008	-0.044***	0.008	-0.080***
A4: Include a squared term (enrollment)	-0.002	0.004	-0.044***	0.005	-0.080***
A5: Include squared terms (private funds)	- (a)	- (a)	- (a)	- (a)	- (a)
A6: Include a squared term (SMC meetings)	-0.002	0.006	-0.045***	0.007	-0.081***
A7: Add 0.01 for log transformation	-0.001	0.007	-0.049***	0.009	-0.099***
A8: Add 0.001 for log transformation	-0.001	0.009	-0.056***	0.010	-0.118***
A9: Drop SMC meetings & school competition	-0.001	0.006	-0.044***	0.007	-0.080***
A10: Exclude teacher allowance from expenditures	-0.020	-0.010	-0.046***	0.004	-0.082***

Note. Each cell shows a slope coefficient from a separate regression model. Significance level: * p<0.1; ** p<0.05; *** p<0.01. (a) A coefficient is not presented as the squared term of the given variable is not significant at the 5% level.

Equity in School Finance

Table 1.13 presents the results of fixed-effects estimation of inequality in per-pupil expenditure. The results suggest that mobilization of private funds did not affect the horizontal equity in total per-pupil expenditure. However, the revenue raised from local community contributions helped improving the horizontal equity in non-instructional expenditure.

Table 1.13.
Results of Equity Analysis

Variable	Within-village inequality in per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Per-pupil revenue: Government	0.000***	0.000	0.000***	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Parents' education fees	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Local community contributions	0.001	0.000	-0.002**	0.001*	-0.002*
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Per-pupil revenue: Private donor contributions	0.000	0.000	0.000	0.000	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Enrollment	0.000	0.000	-0.001**	0.000	-0.001
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
% students: Pre-primary	0.000	-0.002	0.001	-0.001	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
% students: Middle	-0.006*	-0.005	0.001	-0.007*	0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)
% students: Secondary	0.010**	0.009*	0.008	0.009*	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
School facility index	0.040	-0.211	-0.157	-0.035	0.131
	(0.131)	(0.133)	(0.147)	(0.119)	(0.171)
Electricity access index	-0.056	-0.030	-0.024	-0.036	0.026
	(0.043)	(0.049)	(0.053)	(0.040)	(0.065)
Geographic isolation index	-0.015	-0.040*	0.013	-0.014	-0.003
	(0.025)	(0.024)	(0.027)	(0.024)	(0.040)
Achievement (3-subject average)	0.000	0.000	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Household asset index	0.160	-0.022	-0.220	0.092	0.290
	(0.252)	(0.241)	(0.236)	(0.248)	(0.362)
% female students	-0.001	-0.001	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.002	0.147	< 0.001	0.397	0.128
Observations	1,071	1,071	1,071	1,071	1,071

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Column 1 shows that the revenue per pupil raised from any of the private sources is not associated with inequality in per-pupil total expenditures on average, controlling for the revenue from the government and characteristics of schools and students. Even though the sample schools mobilized private funds that accounted for 67% of their total revenue, on average, at the time of survey implementations, the results suggest that these private funds did not necessarily create within-village inequality in total per-pupil expenditure.

Although the effects of private-fund revenue on equity in total expenditures could not be identified, there is a negative and statistically significant association between revenue raised from local community contributions and inequality in non-instructional expenditure, as shown in the column 3. The results indicate that, on average, an increase in per-pupil local community contributions by 10 rupees (0.17 US dollars in 2005 exchange rate) is associated with decrease in within-village inequality in per-pupil non-instructional expenditures by 0.02 standard deviation units, at the 5% significance level, controlling for revenue from other sources and school and student characteristics. Altogether, an improvement in within-village equality is achieved when low-spending schools are able to close the spending gap between themselves and high-spending schools, regardless of whether the low-spending schools able to actualize a greater rate of spending, or a reduced decrease in spending, in comparison to the high-spending schools. However, it is unlikely that schools reduce their expenditures as a result of receiving additional revenue from private sources. Therefore, the result from the fixed-effects model would suggest that public schools whose non-instructional expenditures were relatively low were more likely to use the community-sourced revenue to increase their investment in non-instructional items, which, in turns, lessens the gap in non-instructional expenditures.

On the other hand, none of the private revenue is associated with inequality in instructional, current, and capital expenditures per pupil at the 5% significance level, as shown in columns 2, 4, and 5. The results of the F-test also suggest that the predictors in these specifications are jointly insignificant at the 10% significance level. Therefore, there is no evidence that private revenue sources are associated with within-village inequality in instructional, current, and capital expenditures.

The results also show that the revenue from the government is significantly associated with total expenditures, as well as non-instructional expenditures. However, the magnitude of associations is negligibly small. This would imply that public schools in the same village received a similar level of per-pupil revenue from the government and spent it in a similar manner.

These results indicate that, despite the concerns over negative effects of the procurement and use of private funds on equity in the public school sector, mobilizing private revenue sources does not necessarily widen financial inequality in the public school sector. Rather, some privately funded revenue has the potential to improve financial equity. Although private-fund mobilization did not affect horizontal equity in per-pupil total spending, private revenue sources raised from local community contributions contributed to improving horizontal equity in non-instructional expenditure possibly by incentivizing low-spending schools to use the additional revenue to increase their investment in non-instructional items.

Robustness Check of Equity Analysis

For robustness checks of the effects of privately funded revenue on financial equity, I examined whether the results from the original models change if I change the measurements of inequality in expenditure and student achievement. The results of robustness checks on the equity analysis are summarized in Table 1.14. I find that the analytical results for privately funded revenue are insensitive to the selection of models. In particular, the significant association identified in the original models remain significant with the same sign and similar magnitude.

Using per-pupil expenditure based on monthly expenditures multiplied by nine months (Model B1). I estimated alternative models in which financial inequality is computed based on the assumption that reported monthly expenditures accrued for nine months on average. The results are presented in Table 1.56 in Appendix 1D. Using per-pupil expenditure based on a nine-month calculation does not change the results. The statistically significant associations found in the original model at the 5% significance level remain significant with the same sign and similar magnitude.

Using math scores (Model B2). I estimated alternative models with math scores instead of an average of the math, English, and Urdu scores in order to remove potential influence of home language on student achievement. The results are presented in Table 1.57 in Appendix 1D. Using math scores does not change the analytical results. The statistically significant associations found at the 5% significance level in the original model remain significant with the same sign and similar magnitude.

Excluding teacher allowance from expenditures (Model B3). I estimated alternative models by using the inequality in per-pupil expenditure that excludes the payment of teacher allowances. As discussed earlier, there is a possibility that, while public schools reported payment of teacher allowances as their expenditure, the government funds used to pay for the teacher allowances might not have been recorded as school revenue in the LEAPS survey. In order to examine whether the results of analysis are sensitive to the ways to treat the expenditure on teacher allowances, I estimated new models by using financial inequality measure that excludes the payment of teacher allowances.

The results are presented in Table 1.58 in Appendix 1D. Even if I use the modified inequality measures, the statistically significant associations between privately funded revenue and financial inequality found at the 5% significance level in the original model remain significant with the same sign and similar magnitude. Interestingly, the relationship between per-pupil revenue mobilized from local community contributions and financial inequality in total expenditures becomes negative and statistically significant at the 5% significance level in the modified model. In this model, an increase in per-pupil local community contributions by 10 rupees (0.17 US dollars in 2005 exchange rate) is associated with decrease in within-village inequality in total expenditures by a 0.02 standard deviation units, on average. This implies that local community contributions may have improved horizontal equity in per-pupil total school expenditure as well.

Conclusion from robustness checks. Table 1.14 below summarizes how the associations between private revenue sources and financial equity in school expenditures change in the alternative models constructed for robustness checks. The robustness checks reaffirm the finding that private-fund revenue raised from local community contributions helped improve within-village horizontal equity in non-instructional expenditure.

Table 1.14.
Summary of Robustness Checks for Equity Analysis

Independent variable Model	Inequality in per-pupil expenditure (1) Total	 (2) Instructional	 (3) Non-instructional	 (4) Current	 (5) Capital
Per-pupil revenue: Parents' education fees					
Original model	0.000	0.000	0.000	0.000	0.000
B1: Use 9-month-based expenditures	0.000	0.000	0.000	0.000	0.000
B2: Use math scores	0.000	0.000	0.000	0.000	0.000
B3: Exclude teacher allowance from expenditures	0.000	0.000	0.000	0.000	0.000
Per-pupil revenue: Local community contributions					
Original model	0.001	0.000	-0.002**	0.001*	-0.002*
B1: Use 9-month-based expenditures	0.001	0.000	-0.002***	0.001*	-0.002*
B2: Use math scores	0.001	0.001	-0.002**	0.002*	-0.002*
B3: Exclude teacher allowance from expenditures	-0.002**	0.000	-0.002**	0.000	-0.002*
Per-pupil revenue: Private donor contributions					
Original model	0.000	0.000	0.000	0.000	-0.001*
B1: Use 9-month-based expenditures	0.000	0.000	0.000	0.000	-0.001*
B2: Use math scores	0.000	0.000	0.000	0.000	-0.001*
B3: Exclude teacher allowance from expenditures	0.000	0.000	0.000	0.000	-0.001*

Note. Each cell shows a slope coefficient from a separate regression model. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Limitations

This study is subject to several limitations, and therefore the findings need to be interpreted with these limitations in mind. First, this study limits the sample to public schools that provided financial and enrollment data necessary to compute per-pupil expenditures. As noted earlier, schools with and without per-pupil expenditure information differ in school and student characteristics. This limits generalization of the findings.

Second, financial figures reported by school are subject to measurement errors. With regards to school revenue, price information of education fees at pre-primary and secondary education levels are not available and were therefore proxied by the price charged in those grades closest to them. In addition, schools might have extra revenue that was not reported in the survey, including savings from previous years. The inconsistency between school revenue and expenditures is another issue of measurement errors. For example, schools were asked to report some revenue that had been raised from the beginning of school year (April) while they were requested to report annual expenditures incurred in the previous year. I also found that government funds used to pay for teacher remuneration may not have been recorded as school revenue. Although I conducted a robustness check for this issue, this study relies on financial figures provided by each of school.

Third, an efficiency analysis was performed based on restrictive functional forms. This study used a variant of the Cobb-Douglas function model first and, in the robustness checks, examined quadratic functions by adding squared terms of some variables. A more flexible functional form, which is used in cost function analysis, is the trans-log form. In this functional form, variables are transformed to a natural logarithm and interacted with one another. However, using a trans-log functional form is not feasible in this study since it increases the number of independent variables considerably and uses up the degrees of freedom in the sample.

Fourth, although the school fixed-effect models control for time-invariant school characteristics, the model estimates may be still subject to bias if unobserved time-variant characteristics are correlated with both dependent and independent variables. Therefore no causality can be established in this study. Particularly, fixed effects models work under strict exogeneity, which assumes that past outcomes do not have independent effects on independent variables in future. This assumption may not be met in the presence of a feedback loop. In the efficiency analysis, for example, schools that increased per-pupil expenditure (a dependent variable) by mobilizing private funds may recognize the importance of school resources and change their unobserved valuation of school inputs, which may in turn incentivize these schools to mobilize more private funds (independent variables) in the next year. The use of instrumental variables is a common approach to addressing the issue of strict exogeneity. For instance, revenue raised from parents and local communities could be instrumented by a village variation in the average household asset wealth and parental education level, which may represent the local community members' ability to pay for schooling and taste for education. However, in the data for this study, the asset wealth and parental education are weakly correlated with the proportion of school funding raised from parents and local communities. This violates the power assumption that expects instruments to be sufficiently correlated with the endogenous variables. In the absence of valid instruments, a fixed-effects approach would be a plausible way to reduce the bias resulting from the endogeneity even though it is not perfect.

These limitations would be addressed by collecting data that contain more detailed and accurate information on school financing and management and that allow rigorous causal inference, such as data arising from randomized control trials and administrative data systematically collected over years. However, such data are not readily available, especially in low- and middle-income countries.

Keeping in mind the above-mentioned limitations, I discuss the findings of this study and their implications to multi-stakeholder school finance in the following section.

Discussion and Conclusion

In decentralized education systems, schools mobilize private funds from diverse non-state stakeholders through multiple channels to complement limited government funds and strengthen their financial capacity to provide quality education. The theory suggests that local financing improves the efficiency of school education delivery while it entails the risk of undermining the equity in school finance. However, we have limited evidence on how private funds mobilized from different stakeholders who have diverging interests and stakes in education affect the school efficiency and equity, which poses a challenge to designing effective cost-sharing policy.

This study uses public school panel data from Punjab, Pakistan to examine how revenue mobilized from parents, local communities, and other private donors are associated with the efficiency of generating student achievement and the equity in school finance. School fixed-effects analyses and a series of robustness checks suggest that revenue derived from private sources has the potential to improve both efficiency and financial equity within public school education. However, these effects differ by the source of private funds as well as school segregation by gender.

Efficiency Implications of Local Multi-Stakeholder School Finance

The analysis of all 375 sample schools found that, on average, public schools relying more on education fees paid by parents were more efficient in terms of capital expenditure. These schools spent less on school construction, furniture/fixtures, and materials for generating given student achievement. The largest component of capital expenditure is construction of buildings, which accounts for over 90% of capital expenditure. Although the construction is mainly funded by the government, a closer look at the link between expense items and revenue sources sheds light on the ability of schools to adjust their spending pattern on capital items in the decentralized education system.

In the survey round 2 and 3, schools reported the primary source of revenue used for buying each of the expenditure items in detail. Among the schools that invested in building construction, 87.03% used government funds as a primary source of funds while 9.62% used education fees collected from parents. However, over half of the former group reported that the primary source is government funds allocated to a school council, which is at the discretion of council members that include parents and/or local community members. This indicates that, although some government funds might have been earmarked with construction and purchase of specific facilities and equipment, schools still have the flexibility to adjust their investment in capital items. Thus, schools relying on education fees might have been incentivized to take advantage of the flexibility to minimize their capital expenditures that do not contribute to student learning. This implies that, although collecting tuition/education fees in public schools at the basic education level is often criticized from equity perspectives, user fees may have the potential to create strong provider-client accountability relationships that hold schools financially accountable for efficient use of resources and educational outcomes. It is however worth noting that a school may not be able to realize such efficiency gain consistently over the years since capital expenditure is more likely to vary from year to year compared to recurrent expenditures.

The analyses by school type provide suggestive evidence that the aforementioned efficiency effects were most likely to be realized in girls' schools. Interestingly, girls' schools also realized efficiency gain by mobilizing private funds from other stakeholders. The results suggest that financial dependency on local community contributions was associated with a reduction in capital expenditure. The finding indicates that local communities may have created accountability pressure to reduce inefficient capital expenditure in girls' schools even if the funds were mobilized without explicit linkages to the delivery of instructional services. In addition, the results suggest that financial dependency on private donors' contributions was associate with a reduction in capital and non-instructional expenditures. The findings imply that PPPs may have been capitalized to accelerate efficient use of capital and non-instructional expenditure to generate student achievement in girls' schools.

One possible reason why increased efficiency was mostly found in girls' schools could be the presence of female principals, who could be more willing to and capable of being financially accountable to non-state financial contributors than male principals. Reflecting gender norms in the country, girls' schools had female principals and boys' schools had male principals, except in a few cases in the public school sample of this study. One study in the Punjab province found that female principals in girls' schools are more flexible and open to local demands than male principals in boys' schools who tend to adhere to traditional norms of school management (Khan, 2007). In addition, according to another study that explored teachers' views of the performance of their principal in the Punjab province, female principals have better managerial skills in preparing school budget efficiently and planning to improve school performance (Khan, et al., 2009). The female principals' open mind and managerial skills could explain the reason why girls' schools were more likely to realize efficiency gain from private-fund mobilization.

It is important to note, however, that there is no statistical evidence of effects on efficiency in terms of total expenditures, even though the estimated coefficients are negative in girls' schools. This suggests that funds saved in capital and/or non-instructional expenditures were not a substantial proportion of total school expenditures, or were perhaps reallocated to other expenditure categories that do not contribute to learning gain.

Equity Implications of Local Multi-Stakeholder School Finance

With respect to financial equity, this study found no statistical evidence that mobilizing revenue through private sources such as education fees, local community contributions, or PPPs widened financial inequality in school finance. Rather, the results suggest that an increase in local community contributions was associated with an improvement of the horizontal equity in non-instructional expenditure. This implies that mobilization of private funds from local communities may have provided low-spending schools with opportunities and incentives to close the expenditure gap in non-instructional items. The findings provide important implications for cost-sharing policy. Informal fees and contributions such as uniform fees, sports fees, and paper funds are often criticized as hidden schooling costs incurred by parents. However, this study suggests that mobilizing financial contributions from local communities other than formal education/tuition fees has the potential to mitigate financial inequality in non-instructional expenditures.

Conclusion

In the current global education landscape, public school authorities are encouraged to mobilize private funds from diverse non-state stakeholders as a means to expand and diversify funding sources for providing quality education for all (UNESCO, 2015a). In fact, in decentralized education systems, local public school authorities mobilize private funds not only from parents and local communities but also from for-profit and non-profit organizations. Such local, multi-stakeholder school finance systems have been promoted with the hope of addressing resource constraints and inefficiency of public school education. However, school finance systems that depend on local community wealth and engage private partners who support only schools of their interest are viewed as a threat to equity in public school education. The advantages and disadvantages of multi-stakeholder partnerships for school finance have been argued in a normative sense. However, there is little evidence on how revenue mobilized from different, private stakeholders affect the efficiency and equity of public school education in the complex multi-stakeholder financing system. This poses challenges for designing effective cost-sharing policy.

This study provides evidence from the Punjab province in Pakistan that engaging non-state stakeholders in a decentralized school finance system need not necessarily be a balancing act between efficiency and equity. The findings suggest that the mobilization of private funds has the potential to improve both efficiency and financial equity of public school education. However, these effects differ by source of private funds as well as school type. This informs the importance of understanding differential effects of privately funded revenue in order to develop effective cost-sharing policy that improves student achievement in a cost efficient manner and even enhances the financial equity in a decentralized education system. Such evidence-based school financing system would contribute to achieving inclusive and equitable quality education for all.

APPENDICES

Appendix 1A: List of Variables

Table 1.15.
List of Variables

Variable	Type	Definition
Outcomes (school expenditures)		
Per-pupil expenditures - Total expenditures - Instructional expenditures - Non-instructional expenditures - Current expenditures - Capital expenditures	Continuous	The expenditures divided by the number of students, expressed in a real price in the 2005 Pakistan Rupee. For efficiency analysis, the variable was transformed to a natural logarithm. The per-pupil expenditures were computed for total, instructional, non-instructional, current, and capital expenditures. - The total expenditure is a sum of annual expenditure (building construction, facilities/equipment, educational materials, and other components) and monthly expenditure (utilities, building rent, teacher remuneration, non-teaching staff remuneration, and other components), which was multiplied by 12. - The instructional expenditure is a sum of annual expenditure on educational materials and monthly expenditure on teacher remuneration, which was multiplied by 12. - The non-instructional expenditure is a sum of annual expenditure on building construction and facilities/equipment and monthly expenditure on utilities, building rent and non-teaching staff remuneration, which was multiplied by 12. - The current expenditure is a sum of monthly expenditure on utilities, building rent, teacher remuneration and non-teaching staff remuneration, which was multiplied by 12. - The capital expenditure is a sum of annual expenditure on building construction, facilities/equipment and educational materials.
Inequality in per-pupil expenditures - Total expenditures - Instructional expenditures - Non-instructional expenditures - Current expenditures - Capital expenditures	Continuous	The absolute value of within-village standardized per-pupil expenditure. The absolute value tells how many standard deviations the per-pupil expenditure of a given school is away from the village average. The inequality measure is computed for total, instructional, non-instructional, current, and capital expenditures.
Labor input price		
A village-mean teacher salary	Continuous	A village-mean monthly salary of teachers who were in the actual teaching in schools identified in the surveys, expressed in a real price in the 2005 Pakistan Rupee. The variable was transformed to a natural logarithm.

Table 1.15. (cont'd)

Variable	Type	Definition
School characteristics		
Enrollment	Continuous	The number of students in school. For efficiency analysis, the variable was transformed to a natural logarithm.
A percentage of students by school level - Pre-primary school level - Middle school level - Secondary school level	Continuous	A percentage of students enrolled at pre-primary, middle (grade 6-8), and secondary (grade 9-12) levels. The percentage at primary (grade 1-5) level is omitted as a reference category.
School facility index	Continuous	The average of 11 dummy variables that indicate whether school has a given facility (classroom, staffroom, library, hall, storage, sport equipment, fence, toilet, blackboard, personal computer, and fan/cooler). For efficiency analysis, the index was transformed to a natural logarithm.
Electricity access index	Continuous	Access to electricity weighted by hours for which schools can use electricity in absence of load shedding, assuming that school personnel can check load shedding 12 hours per day for six days a week. For efficiency analysis, the index was transformed to a natural logarithm.
Geographic isolation index	Continuous	The average of five variables that measure a distance from a given school to a nearest telephone, bank, healthcare center, public transportation, and council-level (markaz-level) office in a six-point-scale. For efficiency analysis, the index was transformed to a natural logarithm.
Student characteristics		
Average test score	Continuous	The average of student test scores in three subjects (math, English, and Urdu) aggregated to school level. The test score was derived from the students who were in the initial student roster. The raw IRT score was transformed to a scale score in the equation: scale score $= 300 + 50\theta$. For efficiency analysis, the variable was transformed to a natural logarithm.
Household asset index	Continuous	A school-mean asset wealth of student's household, which is measured by the average of 13 dummy variables that indicate whether student's family possesses a given consumer durable good (bed, table, chair, radio, TV, telephone, fridge, fan, watch, bicycle, motorcycle, motor rickshaw, and car). The measure is derived from students who were in the initial roster. For efficiency analysis, the index was transformed to a natural logarithm.
A proportion of female students	Continuous	A percentage of students who are female.

Table 1.15. (cont'd)

Variable	Type	Definition
<u>School revenue</u>		
Per-pupil revenue raised from: - Government - Parents' education fees - Local community contributions - Private donor contributions	Continuous	Per-pupil school revenue raised from the following four revenue sources. The revenue is expressed in a real price in the 2005 Pakistan Rupee. - Revenue raised from the government: School council funds and other grants allocated by government. - Revenue raised from parents' education fees: Annual admission fees and annual school fund fees. Since the price information is available only for grades 1-8, the fee revenue for the pre-primary level was computed based on the fee prices for grade 1-3 and the fee revenue for grades 9-12 was calculated based on the fee prices for grade 6-8. - Revenue raised from local community contributions: A sum of additional revenue raised as sports fees, examination/paper funds, and through community events and others. - Revenue raised from private donor contributions: A sum of external grants received from local and international donor programs and trusts, religious charities, and other donors.
<u>Efficiency factors</u>		
A share of school revenue raised from non-state stakeholders - Parents' education fees - Local community contributions - Private donor contributions	Continuous	A percentage of school revenue raised from parents' education fees, local community contributions, and private donor contributions. The share of revenue raised from the government was omitted as a reference category.
A degree of parental participation in school management	Continuous	The number of meetings of SMC/SC/PTA held in the past year. The variable was transformed to a natural logarithm.
A degree of school competition	Continuous	The number of other schools that students of a given school could attend instead. The variable was transformed to a natural logarithm.

Appendix 1B: A Note for Imputation

I performed Multiple Imputation by Chained Equations (MICE) with Stata “mi impute” commands to add 20 imputations to the data set. Although five imputations are considered sufficient to obtain valid inference, using 20 imputations reduces the sampling error due to imputations because the reference distribution for multiple imputation inference becomes approximately normal when the number of imputations is large (StataCorp, 2017).

It is ideal to estimate a single imputation model that contains all the variables used in efficiency and equity analyses as well as variables used for robustness checks. However, since the school-level data has a relatively small sample size, the imputation model containing a large number of variables to be used in both efficiency and equity analyses did not converge. Therefore, I constructed separate imputation models for efficiency and equity analyses.

For imputation, I used predictive mean matching (PMM). Most variables to be imputed have upper and/or lower bounds. Using regression (regress) generates imputed data containing outliers whose value is beyond the range in the original data. Although truncated regression (truncreg) can estimate values with specific upper and lower limits, it caused a convergence problem. To handle the issues, I used PMM, which predicts a value for a given observation but uses it to identify observations whose observed value of the variable is close to the predicted value and select one of them randomly as the imputed value. Since PMM draws its imputed values from the observed values, imputed values are never outside the range of the observed values. I set “knn(#)” in a way that 10 closest observations are considered as matches, as recommended by Morris et al (2014).

Imputation of data for efficiency analysis. Imputation was performed with all the public school observations, excluding one school that reported an enrollment of zero. The data was restricted to the final sample for analysis after the imputation (Williams, 2018). For the robustness checks that use different set of variables, imputation was also performed separately. This was justified on the conceptual and practical grounds. First, it is reasonable to construct a separate imputation model for each of the robustness checks since each robustness check assumes that a different set of variables are related to outcome variables. Second, imputation models did not converge if they include all the variables used in all robustness checks, since the number of variables becomes large relative to the number of observations. In each imputation model, all the variables to be used in the given model, including squared terms, were included as "just another variables" (Williams, 2018).

Imputation of data for equity analysis. Imputation models need to include dependent variables to be used for subsequent analyses. The dependent variable in the equity analysis was the measures of within-village financial inequality, which were derived from and applicable to a subset of the sample schools that appeared in all the three survey rounds and were not only the school in a given village. In this case, it was problematic to impute for missing values in all the public schools while the outcome variable was derived from and applicable to only the final sample. In order to handle this issue, I first restricted the data to the final sample of 1,071 observations and then performed imputation. Imputation was performed separately for the basic model analysis and each robustness checks.

Statistical inference using imputed data. In regression analysis using imputed data, the residual degrees of freedom that are used for the statistical inference are different for each parameter depending on the number of imputations and the rates of missing information in each variable (StataCorp, 2017).

Appendix 1C: Results of Robustness Checks for Efficiency Analysis

Table 1.16.
Robustness Check for Efficiency Analysis: Using 9-Month-Based Expenditures (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.025	-0.039	-1.241	0.197	-0.110
	(0.176)	(0.501)	(1.009)	(0.444)	(1.037)
Log village-mean monthly teacher salary	0.125	0.252	-0.949	0.483	1.325
	(0.364)	(0.476)	(1.228)	(0.478)	(1.293)
Log enrollment	-0.975***	-0.877***	-1.363**	-0.827***	-0.879
	(0.108)	(0.208)	(0.574)	(0.197)	(0.587)
% students: Pre-primary	0.000	0.002	-0.002	0.002	-0.006
	(0.002)	(0.003)	(0.010)	(0.003)	(0.01)
% students: Middle	0.016*	0.032*	0.016	0.019**	0.019
	(0.009)	(0.017)	(0.024)	(0.010)	(0.028)
% students: Secondary	0.015	0.016	0.057	0.011	-0.053*
	(0.010)	(0.025)	(0.055)	(0.011)	(0.031)
Log school facility index	0.419	0.311	1.758	0.257	2.151
	(0.376)	(0.457)	(1.411)	(0.422)	(1.399)
Log electricity access index	0.272	0.182	2.659***	0.208	-0.256
	(0.260)	(0.263)	(0.709)	(0.259)	(0.647)
Log geographic isolation index	0.020	0.311	-0.540	0.198	-1.281**
	(0.117)	(0.239)	(0.557)	(0.169)	(0.605)
Log household asset index	0.808	1.124*	-2.547	0.842	0.980
	(0.570)	(0.646)	(2.967)	(0.675)	(2.778)
% female students	0.001	-0.001	0.019*	-0.001	0.016
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.001	0.003	-0.006	0.004	-0.013*
	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.014
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
Log number of SMC meetings	-0.042**	-0.062**	0.170	-0.050**	0.122
	(0.019)	(0.030)	(0.109)	(0.025)	(0.107)
Log number of other schools	-0.060	-0.118	0.125	-0.082	0.318*
	(0.053)	(0.081)	(0.149)	(0.073)	(0.175)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.006	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.17.
Robustness Check for Efficiency Analysis: Using 9-Month-Based Expenditures (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.101	0.427	-0.033	0.435	0.047
	(0.258)	(0.462)	(2.309)	(0.465)	(1.986)
Log village-mean monthly teacher salary	1.254**	1.161*	3.984*	1.322*	2.303
	(0.531)	(0.627)	(2.274)	(0.672)	(2.369)
Log enrollment	-0.864***	-0.670**	-1.228	-0.694**	-1.036
	(0.126)	(0.279)	(0.867)	(0.283)	(0.875)
% students: Pre-primary	0.002	0.006	-0.008	0.007	-0.008
	(0.002)	(0.005)	(0.019)	(0.005)	(0.014)
% students: Middle	-0.014**	-0.011	-0.022	-0.013	0.060
	(0.006)	(0.009)	(0.113)	(0.008)	(0.104)
% students: Secondary	0.041***	0.030***	0.310***	0.038***	-0.040
	(0.005)	(0.007)	(0.038)	(0.007)	(0.045)
Log school facility index	-0.329	-0.656	3.142	-0.752	0.909
	(0.626)	(0.630)	(2.030)	(0.764)	(2.192)
Log electricity access index	0.268	0.099	4.536***	0.109	0.692
	(0.166)	(0.180)	(1.048)	(0.165)	(1.041)
Log geographic isolation index	0.186	0.507	-1.573	0.548	-0.799
	(0.216)	(0.425)	(1.179)	(0.433)	(1.283)
Log household asset index	1.146*	0.772	-2.047	0.758	2.785
	(0.662)	(0.866)	(4.027)	(0.879)	(3.791)
% female students	-0.002	-0.003	0.008	-0.005	0.019
	(0.004)	(0.006)	(0.020)	(0.006)	(0.022)
% revenue: Parents' education fees	0.000	0.001	0.004	0.001	-0.002
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.002	0.009	-0.010	0.008	-0.020
	(0.003)	(0.008)	(0.012)	(0.007)	(0.013)
% revenue: Private donor contributions	0.000	-0.001	0.011	0.000	-0.013*
	(0.001)	(0.001)	(0.014)	(0.002)	(0.007)
Log number of SMC meetings	-0.031	-0.026	-0.023	-0.027	-0.062
	(0.021)	(0.026)	(0.231)	(0.027)	(0.186)
Log number of other schools	-0.128	-0.152	0.094	-0.176	-0.059
	(0.099)	(0.148)	(0.248)	(0.162)	(0.375)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.18.

Robustness Check for Efficiency Analysis: Using 9-Month-Based Expenditures (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.413	-1.185**	-2.380*	-0.626**	-0.117
	(0.274)	(0.503)	(1.321)	(0.284)	(1.293)
Log village-mean monthly teacher salary	-0.461	-1.176	-0.923	-0.119	3.494
	(0.916)	(1.121)	(2.333)	(1.167)	(2.550)
Log enrollment	-1.159***	-1.282***	-0.393	-1.160***	0.130
	(0.369)	(0.469)	(1.115)	(0.377)	(1.024)
% students: Pre-primary	-0.003	0.001	-0.004	-0.001	-0.022
	(0.006)	(0.007)	(0.021)	(0.005)	(0.022)
% students: Middle	0.026	0.062*	0.039	0.025	0.082**
	(0.020)	(0.036)	(0.047)	(0.022)	(0.038)
% students: Secondary	0.018	0.002	-0.049	0.022	-0.208***
	(0.016)	(0.029)	(0.049)	(0.019)	(0.069)
Log school facility index	3.208**	3.512*	2.565	3.303**	4.604
	(1.614)	(1.776)	(2.724)	(1.641)	(3.113)
Log electricity access index	0.201	0.150	2.684**	0.149	1.083
	(0.559)	(0.555)	(1.056)	(0.560)	(1.005)
Log geographic isolation index	0.075	0.500	-1.205	0.104	-2.609**
	(0.326)	(0.602)	(1.088)	(0.356)	(1.122)
Log household asset index	2.268	4.608*	-7.972	3.605	-13.174*
	(2.147)	(2.407)	(7.224)	(2.494)	(6.85)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.011*	-0.002	-0.014**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.003	0.004	-0.021*	0.004	-0.005
	(0.005)	(0.006)	(0.011)	(0.005)	(0.013)
% revenue: Private donor contributions	-0.003	-0.002	-0.004	-0.004	-0.007
	(0.003)	(0.003)	(0.016)	(0.003)	(0.015)
Log number of SMC meetings	-0.077	-0.109	0.405*	-0.096	0.547**
	(0.065)	(0.099)	(0.219)	(0.069)	(0.252)
Log number of other schools	-0.059	-0.250	0.607**	-0.070	0.907***
	(0.162)	(0.214)	(0.299)	(0.178)	(0.299)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.008	0.202	0.030	0.034	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.19.
Robustness Check for Efficiency Analysis: Using 9-Month-Based Expenditures (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.255	4.062	-5.231**	3.769	-0.218
	(0.883)	(3.357)	(2.153)	(3.285)	(3.979)
Log village-mean monthly teacher salary	0.256	1.428	-2.174	1.214	0.355
	(0.684)	(1.383)	(1.896)	(1.090)	(2.591)
Log enrollment	-1.052***	-1.295	-2.481	-0.784	1.651
	(0.385)	(1.585)	(1.614)	(1.231)	(1.85)
% students: Pre-primary	-0.010	-0.030	0.042	-0.025	-0.013
	(0.008)	(0.020)	(0.027)	(0.018)	(0.025)
% students: Middle	0.022*	0.022	0.059**	0.008	-0.060
	(0.013)	(0.028)	(0.024)	(0.023)	(0.041)
% students: Secondary	0.038*	0.118	0.055	0.005	-0.048
	(0.023)	(0.072)	(0.048)	(0.036)	(0.074)
Log school facility index	-0.984	-0.395	-7.705**	-0.057	2.936
	(0.822)	(1.637)	(3.166)	(1.129)	(3.334)
Log electricity access index	0.240	0.439	-1.750	0.451	-4.918***
	(0.245)	(0.560)	(2.049)	(0.434)	(1.148)
Log geographic isolation index	0.412	0.760	0.885	0.567	0.483
	(0.286)	(0.628)	(0.878)	(0.466)	(1.138)
Log household asset index	0.898	3.245	-7.523	2.910	4.765
	(1.112)	(3.041)	(6.495)	(2.407)	(8.909)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.005	-0.011*	-0.003	-0.021***
	(0.002)	(0.004)	(0.007)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.003	-0.016	0.000	-0.039***
	(0.002)	(0.006)	(0.012)	(0.004)	(0.012)
% revenue: Private donor contributions	-0.002	0.007	-0.045***	0.007	-0.080***
	(0.002)	(0.007)	(0.012)	(0.007)	(0.015)
Log number of SMC meetings	-0.002	-0.077	0.069	-0.067	0.167
	(0.030)	(0.085)	(0.161)	(0.079)	(0.230)
Log number of other schools	-0.008	-0.034	-0.008	-0.048	0.285
	(0.070)	(0.173)	(0.295)	(0.119)	(0.384)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.001	0.067	0.002	0.212	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.20.

Robustness Check for Efficiency Analysis: Using Math Scores (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (math)	-0.044	0.078	-0.923	0.191	0.077
	(0.159)	(0.368)	(0.947)	(0.343)	(0.933)
Log village-mean monthly teacher salary	0.152	0.250	-0.970	0.499	1.312
	(0.372)	(0.490)	(1.232)	(0.491)	(1.295)
Log enrollment	-0.970***	-0.871***	-1.322**	-0.827***	-0.865
	(0.110)	(0.203)	(0.577)	(0.193)	(0.581)
% students: Pre-primary	0.000	0.002	-0.001	0.001	-0.006
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.016*	0.033*	0.017	0.019**	0.020
	(0.009)	(0.017)	(0.024)	(0.01)	(0.028)
% students: Secondary	0.014	0.016	0.059	0.010	-0.053*
	(0.010)	(0.026)	(0.056)	(0.011)	(0.031)
Log school facility index	0.377	0.275	1.734	0.243	2.079
	(0.382)	(0.474)	(1.421)	(0.437)	(1.398)
Log electricity access index	0.271	0.188	2.816***	0.212	-0.248
	(0.265)	(0.269)	(0.715)	(0.265)	(0.647)
Log geographic isolation index	0.037	0.299	-0.481	0.194	-1.270**
	(0.120)	(0.244)	(0.562)	(0.180)	(0.610)
Log household asset index	0.817	1.086	-2.757	0.792	0.918
	(0.577)	(0.678)	(3.076)	(0.710)	(2.814)
% female students	0.001	-0.001	0.019*	-0.001	0.016
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.001	0.004	-0.006	0.004	-0.013*
	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.014
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
Log number of SMC meetings	-0.043**	-0.064**	0.173	-0.051**	0.123
	(0.020)	(0.031)	(0.112)	(0.025)	(0.108)
Log number of other schools	-0.067	-0.134	0.100	-0.095	0.315*
	(0.055)	(0.082)	(0.149)	(0.074)	(0.176)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.007	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.21.

Robustness Check for Efficiency Analysis: Using Math Scores (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (math)	-0.024	0.164	0.467	0.146	0.323
	(0.228)	(0.373)	(1.293)	(0.387)	(1.070)
Log village-mean monthly teacher salary	1.239**	1.178*	3.955*	1.341*	2.268
	(0.55)	(0.646)	(2.261)	(0.699)	(2.372)
Log enrollment	-0.865***	-0.681**	-1.229	-0.707**	-1.011
	(0.131)	(0.276)	(0.874)	(0.281)	(0.869)
% students: Pre-primary	0.003	0.007	-0.009	0.007	-0.009
	(0.002)	(0.005)	(0.019)	(0.005)	(0.014)
% students: Middle	-0.014**	-0.012	-0.023	-0.014	0.062
	(0.006)	(0.009)	(0.114)	(0.008)	(0.104)
% students: Secondary	0.041***	0.031***	0.319***	0.039***	-0.042
	(0.005)	(0.007)	(0.038)	(0.007)	(0.045)
Log school facility index	-0.378	-0.679	3.209	-0.772	0.876
	(0.636)	(0.647)	(2.039)	(0.780)	(2.191)
Log electricity access index	0.237	0.094	4.711***	0.104	0.692
	(0.159)	(0.181)	(1.061)	(0.166)	(1.036)
Log geographic isolation index	0.218	0.499	-1.503	0.546	-0.726
	(0.221)	(0.418)	(1.186)	(0.426)	(1.267)
Log household asset index	1.035	0.622	-2.825	0.603	2.805
	(0.714)	(0.95)	(4.169)	(0.988)	(3.773)
% female students	-0.002	-0.002	0.009	-0.004	0.020
	(0.005)	(0.006)	(0.021)	(0.006)	(0.022)
% revenue: Parents' education fees	0.000	0.001	0.004	0.001	-0.002
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.002	0.009	-0.010	0.008	-0.020
	(0.003)	(0.008)	(0.012)	(0.007)	(0.013)
% revenue: Private donor contributions	0.000	0.000	0.011	0.000	-0.014*
	(0.001)	(0.001)	(0.014)	(0.002)	(0.007)
Log number of SMC meetings	-0.031	-0.027	-0.019	-0.028	-0.063
	(0.022)	(0.026)	(0.238)	(0.027)	(0.187)
Log number of other schools	-0.139	-0.176	0.079	-0.201	-0.046
	(0.102)	(0.152)	(0.256)	(0.167)	(0.370)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.22.
Robustness Check for Efficiency Analysis: Using Math Scores (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (math)	-0.423	-0.899*	-2.308	-0.464	-0.602
	(0.313)	(0.522)	(1.670)	(0.344)	(1.568)
Log village-mean monthly teacher salary	-0.452	-1.251	-1.084	-0.126	3.514
	(0.947)	(1.166)	(2.365)	(1.203)	(2.551)
Log enrollment	-1.164***	-1.284***	-0.371	-1.158***	0.088
	(0.376)	(0.479)	(1.129)	(0.385)	(1.022)
% students: Pre-primary	-0.002	0.002	-0.002	-0.001	-0.022
	(0.006)	(0.007)	(0.020)	(0.006)	(0.022)
% students: Middle	0.025	0.064*	0.041	0.025	0.082**
	(0.020)	(0.038)	(0.047)	(0.022)	(0.038)
% students: Secondary	0.019	0.001	-0.048	0.023	-0.209***
	(0.016)	(0.031)	(0.050)	(0.019)	(0.069)
Log school facility index	3.210*	3.482*	2.396	3.302*	4.419
	(1.645)	(1.812)	(2.737)	(1.673)	(3.084)
Log electricity access index	0.221	0.204	2.907***	0.182	1.145
	(0.570)	(0.570)	(1.060)	(0.572)	(0.997)
Log geographic isolation index	0.073	0.459	-1.294	0.085	-2.733**
	(0.331)	(0.525)	(1.107)	(0.367)	(1.140)
Log household asset index	2.592	4.664*	-8.209	3.727	-13.821**
	(2.224)	(2.495)	(7.346)	(2.619)	(6.852)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.011	-0.002	-0.014**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.020*	0.004	-0.004
	(0.005)	(0.006)	(0.011)	(0.005)	(0.013)
% revenue: Private donor contributions	-0.003	-0.002	-0.003	-0.004	-0.006
	(0.003)	(0.004)	(0.016)	(0.003)	(0.015)
Log number of SMC meetings	-0.081	-0.107	0.410*	-0.095	0.543**
	(0.066)	(0.102)	(0.222)	(0.070)	(0.256)
Log number of other schools	-0.069	-0.261	0.600*	-0.073	0.915***
	(0.166)	(0.222)	(0.304)	(0.182)	(0.300)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.012	0.204	0.073	0.042	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.23.

Robustness Check for Efficiency Analysis: Using Math Scores (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (math)	0.851	2.665	-3.441	2.418	2.594
	(0.625)	(2.256)	(2.129)	(2.217)	(3.898)
Log village-mean monthly teacher salary	0.287	1.431	-2.220	1.230	0.134
	(0.707)	(1.474)	(1.909)	(1.161)	(2.676)
Log enrollment	-1.102***	-1.429	-2.415	-0.875	1.933
	(0.406)	(1.545)	(1.639)	(1.181)	(1.855)
% students: Pre-primary	-0.010	-0.031	0.045	-0.025	-0.014
	(0.008)	(0.022)	(0.028)	(0.020)	(0.026)
% students: Middle	0.023*	0.027	0.060**	0.011	-0.066
	(0.013)	(0.029)	(0.025)	(0.022)	(0.040)
% students: Secondary	0.035	0.119	0.063	0.000	-0.051
	(0.025)	(0.078)	(0.047)	(0.041)	(0.078)
Log school facility index	-0.885	-0.184	-8.328**	0.230	2.582
	(0.849)	(1.864)	(3.161)	(1.392)	(3.301)
Log electricity access index	0.228	0.284	-1.455	0.302	-4.868***
	(0.232)	(0.505)	(2.112)	(0.372)	(1.197)
Log geographic isolation index	0.430	0.812	0.893	0.592	0.508
	(0.297)	(0.752)	(0.872)	(0.508)	(1.147)
Log household asset index	0.603	2.251	-7.914	1.964	4.127
	(1.095)	(3.037)	(6.381)	(2.156)	(8.596)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.005	-0.011*	-0.003	-0.022***
	(0.002)	(0.004)	(0.006)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.003	-0.015	0.000	-0.04***
	(0.002)	(0.006)	(0.012)	(0.004)	(0.011)
% revenue: Private donor contributions	-0.002	0.004	-0.040***	0.005	-0.080***
	(0.002)	(0.006)	(0.011)	(0.005)	(0.012)
Log number of SMC meetings	-0.012	-0.098	0.086	-0.086	0.160
	(0.035)	(0.105)	(0.164)	(0.099)	(0.237)
Log number of other schools	0.005	0.012	-0.078	0.001	0.353
	(0.070)	(0.145)	(0.287)	(0.097)	(0.398)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.010	0.062	< 0.001	0.310	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.24.
Robustness Check for Efficiency Analysis: Using Public School Teacher Salary (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.015	-0.028	-1.213	0.224	0.058
	(0.185)	(0.518)	(1.035)	(0.461)	(1.043)
Log village-mean monthly public school teacher salary	-0.868**	-0.733	-0.252	-0.711	0.996
	(0.376)	(0.518)	(1.287)	(0.446)	(1.423)
Log enrollment	-0.976***	-0.882***	-1.343**	-0.832***	-0.878
	(0.112)	(0.212)	(0.579)	(0.200)	(0.584)
% students: Pre-primary	0.000	0.002	-0.001	0.001	-0.006
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.017*	0.033**	0.017	0.020**	0.020
	(0.009)	(0.017)	(0.025)	(0.009)	(0.028)
% students: Secondary	0.014	0.015	0.057	0.010	-0.051
	(0.010)	(0.026)	(0.057)	(0.011)	(0.031)
Log school facility index	0.412	0.308	1.772	0.261	2.099
	(0.380)	(0.471)	(1.426)	(0.431)	(1.403)
Log electricity access index	0.277	0.194	2.782***	0.226	-0.232
	(0.263)	(0.266)	(0.717)	(0.262)	(0.649)
Log geographic isolation index	0.039	0.250	-0.477	0.191	-1.268**
	(0.121)	(0.233)	(0.557)	(0.177)	(0.607)
Log household asset index	0.712	1.041	-2.806	0.759	1.249
	(0.571)	(0.647)	(3.007)	(0.680)	(2.765)
% female students	0.001	-0.001	0.019*	-0.001	0.016*
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue:	-0.001	0.000	-0.002	0.000	-0.01***
Parents' education fees	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue:	0.001	0.004	-0.006	0.004	-0.013*
Local community contributions	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue:	0.001	0.002	0.003	0.002	-0.014
Private donor contributions	(0.001)	(0.001)	(0.009)	(0.001)	(0.009)
Log number of SMC meetings	-0.040**	-0.061**	0.166	-0.046*	0.125
	(0.019)	(0.030)	(0.110)	(0.024)	(0.107)
Log number of other schools	-0.067	-0.130	0.095	-0.092	0.298*
	(0.054)	(0.080)	(0.153)	(0.070)	(0.178)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.007	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.25.
Robustness Check for Efficiency Analysis: Using Public School Teacher Salary (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.110	0.439	-0.265	0.441	0.031
	(0.275)	(0.500)	(2.314)	(0.504)	(1.966)
Log village-mean monthly public school teacher salary	0.710	1.103	1.220	1.041	2.888
	(0.549)	(0.697)	(2.979)	(0.679)	(2.927)
Log enrollment	-0.873***	-0.675**	-1.310	-0.701**	-1.029
	(0.135)	(0.288)	(0.894)	(0.293)	(0.876)
% students: Pre-primary	0.003	0.007	-0.007	0.008	-0.008
	(0.002)	(0.005)	(0.019)	(0.005)	(0.014)
% students: Middle	-0.009	-0.007	-0.012	-0.009	0.065
	(0.006)	(0.009)	(0.117)	(0.009)	(0.104)
% students: Secondary	0.037***	0.028***	0.310***	0.035***	-0.045
	(0.006)	(0.007)	(0.038)	(0.008)	(0.044)
Log school facility index	-0.321	-0.652	3.513*	-0.727	0.870
	(0.633)	(0.642)	(2.074)	(0.771)	(2.204)
Log electricity access index	0.245	0.098	4.664***	0.107	0.682
	(0.171)	(0.182)	(1.090)	(0.169)	(1.054)
Log geographic isolation index	0.221	0.521	-1.541	0.572	-0.819
	(0.227)	(0.440)	(1.161)	(0.449)	(1.269)
Log household asset index	1.013	0.742	-2.751	0.701	3.660
	(0.735)	(0.908)	(4.160)	(0.946)	(3.615)
% female students	-0.002	-0.003	0.010	-0.005	0.019
	(0.004)	(0.006)	(0.021)	(0.006)	(0.021)
% revenue: Parents' education fees	0.001	0.001	0.005	0.001	-0.002
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.003	0.010	-0.008	0.009	-0.019
	(0.003)	(0.008)	(0.012)	(0.008)	(0.013)
% revenue: Private donor contributions	0.001	-0.001	0.014	0.000	-0.014*
	(0.001)	(0.002)	(0.014)	(0.002)	(0.008)
Log number of SMC meetings	-0.027	-0.022	-0.013	-0.022	-0.063
	(0.022)	(0.027)	(0.234)	(0.028)	(0.185)
Log number of other schools	-0.141	-0.183	0.107	-0.206	-0.076
	(0.101)	(0.138)	(0.256)	(0.154)	(0.392)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.004
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.26.

Robustness Check for Efficiency Analysis: Using Public School Teacher Salary (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.422	-1.214**	-2.239*	-0.602**	0.107
	(0.291)	(0.551)	(1.337)	(0.302)	(1.311)
Log village-mean monthly public school teacher salary	-3.035***	-4.056***	0.956	-3.423***	5.269**
	(1.067)	(1.382)	(2.485)	(1.254)	(2.205)
Log enrollment	-1.164***	-1.282***	-0.310	-1.173***	0.094
	(0.373)	(0.478)	(1.093)	(0.383)	(1.001)
% students: Pre-primary	-0.003	0.001	-0.003	-0.002	-0.022
	(0.006)	(0.007)	(0.021)	(0.006)	(0.022)
% students: Middle	0.027	0.065*	0.036	0.027	0.081**
	(0.018)	(0.035)	(0.048)	(0.019)	(0.04)
% students: Secondary	0.025*	0.009	-0.050	0.030*	-0.216***
	(0.015)	(0.028)	(0.047)	(0.017)	(0.071)
Log school facility index	3.268**	3.600**	2.713	3.328**	4.474
	(1.634)	(1.795)	(2.770)	(1.652)	(3.117)
Log electricity access index	0.254	0.209	2.729**	0.228	1.111
	(0.561)	(0.563)	(1.053)	(0.564)	(1.042)
Log geographic isolation index	0.161	0.444	-1.320	0.198	-2.745**
	(0.334)	(0.529)	(1.090)	(0.354)	(1.132)
Log household asset index	2.769	4.814*	-7.745	4.073	-12.462*
	(2.351)	(2.595)	(7.165)	(2.837)	(6.811)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.010	-0.001	-0.015**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.021*	0.004	-0.004
	(0.005)	(0.006)	(0.011)	(0.005)	(0.014)
% revenue: Private donor contributions	-0.004	-0.003	-0.004	-0.005	-0.004
	(0.003)	(0.004)	(0.016)	(0.003)	(0.014)
Log number of SMC meetings	-0.069	-0.102	0.385*	-0.079	0.547**
	(0.06)	(0.094)	(0.216)	(0.062)	(0.249)
Log number of other schools	-0.071	-0.255	0.622**	-0.081	0.885***
	(0.156)	(0.210)	(0.303)	(0.168)	(0.308)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.003	0.099	0.038	0.015	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.27.

Robustness Check for Efficiency Analysis: Using Public School Teacher Salary (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.569	4.872	-5.526***	4.423	0.049
	(1.002)	(3.647)	(1.953)	(3.620)	(3.942)
Log village-mean monthly public school teacher salary	0.922*	2.643*	-0.955	1.982	0.819
	(0.515)	(1.424)	(1.472)	(1.258)	(2.546)
Log enrollment	-1.025**	-1.135	-2.822*	-0.613	1.705
	(0.408)	(1.609)	(1.542)	(1.277)	(1.793)
% students: Pre-primary	-0.010	-0.031	0.046*	-0.025	-0.013
	(0.008)	(0.020)	(0.027)	(0.018)	(0.025)
% students: Middle	0.020	0.020	0.063**	0.005	-0.061
	(0.012)	(0.029)	(0.025)	(0.023)	(0.041)
% students: Secondary	0.039*	0.138**	0.035	0.016	-0.043
	(0.021)	(0.065)	(0.039)	(0.028)	(0.065)
Log school facility index	-1.035	-0.806	-7.503**	-0.343	2.771
	(0.735)	(1.514)	(3.06)	(0.968)	(3.237)
Log electricity access index	0.370	0.713	-1.698	0.656	-4.870***
	(0.253)	(0.587)	(2.124)	(0.471)	(1.167)
Log geographic isolation index	0.386	0.600	1.046	0.447	0.548
	(0.302)	(0.681)	(0.912)	(0.497)	(1.203)
Log household asset index	1.626	4.992	-8.191	4.188	4.548
	(1.193)	(3.437)	(7.044)	(2.865)	(8.820)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.005	-0.011	-0.003	-0.022***
	(0.002)	(0.004)	(0.007)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.002	-0.016	0.000	-0.039***
	(0.002)	(0.006)	(0.011)	(0.004)	(0.012)
% revenue: Private donor contributions	-0.001	0.008	-0.044***	0.008	-0.08***
	(0.002)	(0.007)	(0.013)	(0.007)	(0.016)
Log number of SMC meetings	-0.008	-0.080	0.049	-0.068	0.164
	(0.032)	(0.087)	(0.169)	(0.079)	(0.232)
Log number of other schools	-0.013	-0.028	-0.034	-0.045	0.271
	(0.069)	(0.167)	(0.289)	(0.120)	(0.373)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.002	0.046	0.001	0.219	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.28.

Robustness Check for Efficiency Analysis: Quadratic Form for Log Enrollment (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.029	-0.049	-1.126	0.201	-0.093
	(0.182)	(0.507)	(0.999)	(0.446)	(1.043)
Log village-mean monthly teacher salary	0.154	0.269	-1.023	0.515	1.300
	(0.368)	(0.490)	(1.234)	(0.489)	(1.298)
Log enrollment	-0.562	1.533	-7.662*	1.058	-9.819**
	(0.829)	(1.594)	(4.056)	(1.366)	(4.011)
Log enrollment squared	-0.044	-0.262	0.686	-0.205	0.972**
	(0.085)	(0.166)	(0.417)	(0.133)	(0.418)
% students: Pre-primary	0.001	0.002	-0.002	0.002	-0.007
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.017*	0.039**	0.002	0.023**	-0.002
	(0.009)	(0.018)	(0.026)	(0.010)	(0.030)
% students: Secondary	0.016	0.025	0.035	0.017	-0.085**
	(0.010)	(0.027)	(0.058)	(0.011)	(0.036)
Log school facility index	0.399	0.315	1.719	0.257	2.143
	(0.382)	(0.475)	(1.423)	(0.434)	(1.388)
Log electricity access index	0.271	0.181	2.817***	0.210	-0.236
	(0.265)	(0.269)	(0.714)	(0.265)	(0.651)
Log geographic isolation index	0.041	0.330	-0.535	0.208	-1.174*
	(0.120)	(0.253)	(0.551)	(0.181)	(0.602)
Log household asset index	0.808	1.208*	-3.187	0.903	0.462
	(0.566)	(0.649)	(3.137)	(0.670)	(2.775)
% female students	0.001	-0.002	0.020*	-0.002	0.017*
	(0.002)	(0.001)	(0.011)	(0.001)	(0.01)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.001	0.004	-0.006	0.004	-0.013*
	(0.001)	(0.0030)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.014*
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
Log number of SMC meetings	-0.042**	-0.062**	0.167	-0.049**	0.118
	(0.019)	(0.030)	(0.110)	(0.025)	(0.106)
Log number of other schools	-0.069	-0.133*	0.090	-0.099	0.296*
	(0.055)	(0.080)	(0.150)	(0.072)	(0.174)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.006	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.29.

Robustness Check for Efficiency Analysis: Quadratic Form for Log Enrollment (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.137	0.442	0.739	0.467	0.376
	(0.275)	(0.487)	(2.286)	(0.491)	(2.000)
Log village-mean monthly teacher salary	1.276**	1.220*	4.338*	1.386*	2.506
	(0.558)	(0.663)	(2.308)	(0.716)	(2.391)
Log enrollment	-2.101	-1.080	-16.425**	-1.338	-8.292
	(1.286)	(1.636)	(7.745)	(1.759)	(7.925)
Log enrollment squared	0.142	0.048	1.727**	0.075	0.827
	(0.137)	(0.168)	(0.837)	(0.182)	(0.861)
% students: Pre-primary	0.003	0.007	-0.007	0.007	-0.007
	(0.002)	(0.005)	(0.019)	(0.005)	(0.015)
% students: Middle	-0.015**	-0.011	-0.041	-0.014	0.053
	(0.006)	(0.010)	(0.115)	(0.009)	(0.103)
% students: Secondary	0.035***	0.028***	0.251***	0.034***	-0.072
	(0.009)	(0.01)	(0.046)	(0.011)	(0.051)
Log school facility index	-0.417	-0.694	2.710	-0.797	0.636
	(0.673)	(0.684)	(1.914)	(0.826)	(2.228)
Log electricity access index	0.255	0.087	4.879***	0.099	0.790
	(0.167)	(0.195)	(1.064)	(0.183)	(1.081)
Log geographic isolation index	0.186	0.510	-1.884	0.553	-0.909
	(0.210)	(0.438)	(1.154)	(0.443)	(1.272)
Log household asset index	1.117	0.808	-2.029	0.801	2.946
	(0.727)	(0.898)	(4.276)	(0.935)	(3.773)
% female students	-0.002	-0.003	0.011	-0.004	0.021
	(0.004)	(0.006)	(0.019)	(0.006)	(0.021)
% revenue: Parents' education fees	0.000	0.001	0.004	0.001	-0.003
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.002	0.009	-0.010	0.008	-0.020
	(0.003)	(0.008)	(0.013)	(0.008)	(0.013)
% revenue: Private donor contributions	-0.001	-0.001	0.004	-0.001	-0.017*
	(0.002)	(0.002)	(0.014)	(0.002)	(0.009)
Log number of SMC meetings	-0.031	-0.025	-0.041	-0.026	-0.068
	(0.022)	(0.026)	(0.226)	(0.028)	(0.184)
Log number of other schools	-0.153	-0.206	0.025	-0.232	-0.095
	(0.105)	(0.150)	(0.243)	(0.165)	(0.379)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.30.
Robustness Check for Efficiency Analysis: Quadratic Form for Log Enrollment (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.437	-1.233**	-2.298*	-0.624**	-0.108
	(0.275)	(0.519)	(1.365)	(0.283)	(1.358)
Log village-mean monthly teacher salary	-0.420	-1.209	-1.000	-0.083	3.462
	(0.943)	(1.165)	(2.345)	(1.199)	(2.569)
Log enrollment	-1.692	-2.733	-0.817	-1.253	-6.370
	(2.152)	(3.046)	(5.971)	(2.086)	(5.795)
Log enrollment squared	0.056	0.151	0.048	0.010	0.676
	(0.206)	(0.308)	(0.620)	(0.201)	(0.601)
% students: Pre-primary	-0.003	0.002	-0.004	-0.001	-0.024
	(0.006)	(0.007)	(0.021)	(0.006)	(0.022)
% students: Middle	0.025	0.062	0.038	0.025	0.070
	(0.020)	(0.038)	(0.047)	(0.022)	(0.043)
% students: Secondary	0.018	-0.002	-0.049	0.022	-0.221***
	(0.016)	(0.031)	(0.047)	(0.018)	(0.075)
Log school facility index	3.228*	3.604*	2.519	3.305*	5.190*
	(1.647)	(1.833)	(2.707)	(1.679)	(3.121)
Log electricity access index	0.214	0.166	2.776**	0.173	1.023
	(0.574)	(0.571)	(1.062)	(0.576)	(1.015)
Log geographic isolation index	0.063	0.508	-1.330	0.076	-2.424**
	(0.326)	(0.556)	(1.068)	(0.358)	(1.109)
Log household asset index	2.418	4.652*	-8.111	3.587	-12.963*
	(2.151)	(2.417)	(7.252)	(2.511)	(6.647)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.010	-0.002	-0.014**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.020*	0.004	-0.004
	(0.005)	(0.006)	(0.012)	(0.005)	(0.014)
% revenue: Private donor contributions	-0.003	-0.001	-0.004	-0.003	-0.007
	(0.002)	(0.003)	(0.016)	(0.003)	(0.014)
Log number of SMC meetings	-0.081	-0.111	0.399*	-0.095	0.549**
	(0.067)	(0.103)	(0.220)	(0.070)	(0.258)
Log number of other schools	-0.072	-0.262	0.594*	-0.074	0.888***
	(0.167)	(0.221)	(0.299)	(0.183)	(0.294)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.018	0.283	0.042	0.054	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.31.
Robustness Check for Efficiency Analysis: Quadratic Form for Log Enrollment (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.206	3.806	-5.626***	3.594	-0.206
	(0.885)	(3.152)	(1.823)	(3.085)	(3.688)
Log village-mean monthly teacher salary	0.344	1.616	-2.313	1.373	0.064
	(0.683)	(1.422)	(1.887)	(1.123)	(2.604)
Log enrollment	3.334	12.937	-7.836	10.406	-19.439*
	(2.899)	(8.736)	(8.953)	(8.076)	(11.226)
Log enrollment squared	-0.450	-1.456*	0.538	-1.142	2.165*
	(0.290)	(0.861)	(0.907)	(0.751)	(1.147)
% students: Pre-primary	-0.009	-0.026	0.042	-0.021	-0.022
	(0.008)	(0.019)	(0.028)	(0.017)	(0.025)
% students: Middle	0.029**	0.047	0.054*	0.027	-0.099**
	(0.014)	(0.029)	(0.027)	(0.018)	(0.047)
% students: Secondary	0.041*	0.141*	0.049	0.018	-0.071
	(0.024)	(0.072)	(0.049)	(0.031)	(0.072)
Log school facility index	-0.929	-0.337	-8.131**	0.061	2.536
	(0.819)	(1.694)	(3.145)	(1.179)	(3.338)
Log electricity access index	0.223	0.258	-1.560	0.312	-4.724***
	(0.235)	(0.563)	(2.070)	(0.418)	(1.097)
Log geographic isolation index	0.411	0.760	0.882	0.547	0.607
	(0.288)	(0.744)	(0.878)	(0.510)	(1.114)
Log household asset index	1.009	3.418	-8.654	3.014	3.334
	(1.158)	(3.270)	(7.514)	(2.586)	(9.346)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.003	-0.007	-0.010	-0.004	-0.019**
	(0.002)	(0.004)	(0.007)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.005	-0.014	-0.002	-0.036***
	(0.002)	(0.006)	(0.012)	(0.004)	(0.012)
% revenue: Private donor contributions	-0.002	0.004	-0.044***	0.005	-0.080***
	(0.003)	(0.010)	(0.011)	(0.009)	(0.012)
Log number of SMC meetings	-0.001	-0.066	0.060	-0.059	0.150
	(0.029)	(0.080)	(0.166)	(0.073)	(0.225)
Log number of other schools	0.009	0.040	-0.041	0.000	0.191
	(0.070)	(0.182)	(0.291)	(0.109)	(0.361)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.039	0.175	< 0.001	0.318	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.32.
Robustness Check for Efficiency Analysis: Quadratic Form for Private Funds (All Schools)

Variable	Log per-pupil expenditure (1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.028 (0.183)	-0.018 (0.505)	-1.147 (1.000)	0.216 (0.450)	-0.047 (1.055)
Log village-mean monthly teacher salary	0.157 (0.370)	0.262 (0.495)	-1.127 (1.229)	0.506 (0.493)	1.260 (1.285)
Log enrollment	-0.973*** (0.112)	-0.889*** (0.211)	-1.279** (0.584)	-0.831*** (0.199)	-0.816 (0.583)
% students: Pre-primary	0.001 (0.002)	0.002 (0.003)	-0.002 (0.010)	0.002 (0.003)	-0.007 (0.010)
% students: Middle	0.016* (0.009)	0.032* (0.017)	0.021 (0.024)	0.019* (0.010)	0.021 (0.028)
% students: Secondary	0.015 (0.010)	0.017 (0.026)	0.048 (0.059)	0.011 (0.011)	-0.058* (0.032)
Log school facility index	0.392 (0.384)	0.288 (0.472)	1.836 (1.420)	0.237 (0.435)	2.297* (1.383)
Log electricity access index	0.273 (0.268)	0.177 (0.271)	2.748*** (0.713)	0.206 (0.268)	-0.278 (0.655)
Log geographic isolation index	0.041 (0.121)	0.320 (0.254)	-0.503 (0.555)	0.208 (0.184)	-1.225** (0.612)
Log household asset index	0.794 (0.575)	1.143* (0.661)	-3.000 (3.140)	0.838 (0.684)	0.888 (2.783)
% female students	0.001 (0.002)	-0.001 (0.001)	0.019* (0.011)	-0.001 (0.001)	0.016 (0.010)
% revenue: Parents' education fees	0.001 (0.004)	0.007 (0.006)	-0.028 (0.019)	0.005 (0.005)	-0.043** (0.020)
% revenue: Parents' education fees squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
% revenue: Local community contributions	0.001 (0.004)	-0.005 (0.007)	0.011 (0.020)	0.000 (0.005)	-0.019 (0.023)
% revenue: Local community contributions squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
% revenue: Private donor contributions	0.002 (0.008)	-0.002 (0.010)	-0.060 (0.042)	-0.004 (0.012)	-0.034 (0.033)
% revenue: Private donor contributions squared	0.000 (0.000)	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)
Log number of SMC meetings	-0.043** (0.020)	-0.064** (0.031)	0.184* (0.111)	-0.050** (0.025)	0.126 (0.107)
Log number of other schools	-0.069 (0.054)	-0.135* (0.080)	0.084 (0.151)	-0.100 (0.071)	0.288 (0.177)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.004	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.33.
Robustness Check for Efficiency Analysis: Quadratic Form for Private Funds (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.108 (0.275)	0.456 (0.510)	0.204 (2.330)	0.485 (0.514)	0.029 (2.122)
Log village-mean monthly teacher salary	1.335** (0.556)	1.266* (0.673)	3.423 (2.452)	1.441** (0.718)	2.449 (2.512)
Log enrollment	-0.858*** (0.133)	-0.658** (0.291)	-1.192 (0.883)	-0.683** (0.296)	-1.031 (0.875)
% students: Pre-primary	0.003 (0.002)	0.007 (0.005)	-0.007 (0.019)	0.007 (0.005)	-0.007 (0.015)
% students: Middle	-0.012 (0.007)	-0.013 (0.010)	-0.038 (0.111)	-0.016 (0.010)	0.082 (0.101)
% students: Secondary	0.040*** (0.006)	0.030*** (0.007)	0.316*** (0.038)	0.037*** (0.007)	-0.039 (0.047)
Log school facility index	-0.395 (0.660)	-0.734 (0.672)	3.388 (2.127)	-0.830 (0.809)	1.339 (2.190)
Log electricity access index	0.240 (0.162)	0.085 (0.197)	4.604*** (1.113)	0.087 (0.176)	0.575 (1.080)
Log geographic isolation index	0.220 (0.216)	0.505 (0.431)	-1.545 (1.163)	0.554 (0.438)	-0.528 (1.260)
Log household asset index	1.163 (0.750)	0.857 (0.910)	-2.266 (4.306)	0.875 (0.955)	2.944 (3.731)
% female students	-0.002 (0.004)	-0.002 (0.006)	0.004 (0.022)	-0.004 (0.006)	0.021 (0.023)
% revenue: Parents' education fees	0.002 (0.007)	0.008 (0.009)	-0.014 (0.035)	0.009 (0.009)	-0.049 (0.036)
% revenue: Parents' education fees squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
% revenue: Local community contribution	-0.002 (0.007)	0.004 (0.011)	0.014 (0.036)	0.000 (0.01)	-0.026 (0.056)
% revenue: Local community contributions squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
% revenue: Private donor contributions	0.014* (0.007)	0.006 (0.009)	-0.103 (0.076)	0.008 (0.011)	-0.004 (0.049)
% revenue: Private donor contributions squared	0.000* (0.000)	0.000 (0.000)	0.001 (0.001)	0.000 (0.000)	0.000 (0.001)
Log number of SMC meetings	-0.034 (0.021)	-0.029 (0.026)	0.003 (0.239)	-0.031 (0.028)	-0.056 (0.190)
Log number of other schools	-0.153 (0.107)	-0.205 (0.152)	0.052 (0.254)	-0.234 (0.168)	-0.117 (0.402)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.008
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.34.
Robustness Check for Efficiency Analysis: Quadratic Form for Private Funds (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.487	-1.187**	-1.973	-0.677**	0.256
	(0.312)	(0.496)	(1.404)	(0.315)	(1.405)
Log village-mean monthly teacher salary	-0.395	-1.170	-1.142	-0.066	3.385
	(0.940)	(1.157)	(2.375)	(1.199)	(2.573)
Log enrollment	-1.155***	-1.333***	-0.361	-1.152***	0.091
	(0.378)	(0.503)	(1.134)	(0.386)	(1.033)
% students: Pre-primary	-0.003	0.001	-0.006	-0.002	-0.023
	(0.006)	(0.007)	(0.021)	(0.005)	(0.022)
% students: Middle	0.024	0.063*	0.043	0.024	0.086**
	(0.019)	(0.037)	(0.047)	(0.021)	(0.037)
% students: Secondary	0.020	0.004	-0.054	0.024	-0.215***
	(0.016)	(0.030)	(0.049)	(0.018)	(0.063)
Log school facility index	3.270**	3.629**	2.278	3.395**	4.577
	(1.629)	(1.807)	(2.734)	(1.666)	(3.083)
Log electricity access index	0.207	0.147	2.725**	0.146	1.050
	(0.585)	(0.581)	(1.058)	(0.589)	(1.017)
Log geographic isolation index	0.070	0.454	-1.475	0.073	-2.587**
	(0.345)	(0.552)	(1.096)	(0.379)	(1.149)
Log household asset index	2.460	4.714*	-7.978	3.688	-12.997*
	(2.143)	(2.417)	(7.273)	(2.485)	(6.682)
% female students	-	-	-	-	-
% revenue: Parents' education fees	0.006	0.012	-0.039	0.011	-0.055
	(0.010)	(0.017)	(0.038)	(0.011)	(0.037)
% revenue: Parents' education fees squared	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% revenue: Local community contribution	0.009	-0.011	-0.054	0.008	-0.029
	(0.021)	(0.035)	(0.051)	(0.022)	(0.043)
% revenue: Local community contributions squared	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
% revenue: Private donor contributions	-0.011	-0.015	-0.039	-0.026	0.000
	(0.022)	(0.026)	(0.098)	(0.034)	(0.069)
% revenue: Private donor contributions squared	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Log number of SMC meetings	-0.073	-0.106	0.384*	-0.084	0.523**
	(0.066)	(0.097)	(0.229)	(0.071)	(0.245)
Log number of other schools	-0.075	-0.250	0.618*	-0.079	0.930***
	(0.168)	(0.215)	(0.313)	(0.185)	(0.301)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.020	0.362	0.035	0.089	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.35.
Robustness Check for Efficiency Analysis: Quadratic Form for Private Funds (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.297	4.348	-5.729***	4.056	-0.839
	(1.017)	(3.605)	(1.849)	(3.525)	(3.996)
Log village-mean monthly teacher salary	0.327	1.463	-2.236	1.252	0.203
	(0.686)	(1.387)	(1.880)	(1.080)	(2.621)
Log enrollment	-1.062**	-1.130	-2.508	-0.579	1.559
	(0.473)	(1.804)	(1.655)	(1.404)	(2.010)
% students: Pre-primary	-0.010	-0.031	0.045	-0.025	-0.015
	(0.008)	(0.021)	(0.027)	(0.018)	(0.026)
% students: Middle	0.021	0.022	0.064***	0.007	-0.060
	(0.013)	(0.029)	(0.024)	(0.022)	(0.041)
% students: Secondary	0.038	0.127*	0.056	0.006	-0.052
	(0.023)	(0.075)	(0.049)	(0.036)	(0.071)
Log school facility index	-1.099	-0.590	-8.190**	-0.124	3.145
	(0.882)	(1.819)	(3.230)	(1.262)	(3.389)
Log electricity access index	0.248	0.419	-1.636	0.436	-4.887***
	(0.244)	(0.536)	(2.109)	(0.416)	(1.198)
Log geographic isolation index	0.494	0.899	0.902	0.662	0.277
	(0.334)	(0.816)	(0.936)	(0.575)	(1.188)
Log household asset index	0.982	3.101	-8.641	2.724	3.673
	(1.159)	(3.057)	(7.458)	(2.312)	(9.618)
% female students	-	-	-	-	-
% revenue: Parents' education fees	0.008	0.008	-0.005	0.006	-0.056
	(0.008)	(0.015)	(0.034)	(0.012)	(0.038)
% revenue: Parents' education fees squared	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% revenue: Local community contributions	-0.008*	-0.017	-0.018	-0.010	-0.016
	(0.005)	(0.014)	(0.028)	(0.009)	(0.039)
% revenue: Local community contributions squared	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% revenue: Private donor contributions	-0.008	-0.029	-0.059	-0.027	-0.036
	(0.010)	(0.030)	(0.046)	(0.024)	(0.037)
% revenue: Private donor contributions squared	0.000	0.000	0.000	0.000	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Log number of SMC meetings	-0.007	-0.090	0.060	-0.080	0.184
	(0.032)	(0.092)	(0.168)	(0.086)	(0.234)
Log number of other schools	-0.001	-0.020	-0.018	-0.046	0.254
	(0.073)	(0.190)	(0.296)	(0.123)	(0.367)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.36.
Robustness Check for Efficiency Analysis: Quadratic Form for Log SMC Meetings (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.031	-0.042	-1.151	0.207	-0.143
	(0.183)	(0.508)	(1.002)	(0.450)	(1.051)
Log village-mean monthly teacher salary	0.154	0.259	-0.993	0.507	1.352
	(0.368)	(0.492)	(1.232)	(0.490)	(1.299)
Log enrollment	-0.968***	-0.876***	-1.350**	-0.822***	-0.876
	(0.111)	(0.212)	(0.579)	(0.200)	(0.584)
% students: Pre-primary	0.001	0.002	-0.001	0.002	-0.006
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.016*	0.033*	0.017	0.019*	0.019
	(0.009)	(0.017)	(0.024)	(0.010)	(0.028)
% students: Secondary	0.014	0.016	0.057	0.010	-0.054*
	(0.010)	(0.026)	(0.056)	(0.011)	(0.031)
Log school facility index	0.394	0.308	1.731	0.252	2.145
	(0.381)	(0.471)	(1.420)	(0.431)	(1.398)
Log electricity access index	0.271	0.186	2.803***	0.214	-0.257
	(0.265)	(0.269)	(0.717)	(0.265)	(0.649)
Log geographic isolation index	0.040	0.334	-0.548	0.211	-1.201*
	(0.120)	(0.255)	(0.550)	(0.182)	(0.609)
Log household asset index	0.751	1.103*	-2.977	0.819	0.570
	(0.576)	(0.666)	(3.151)	(0.689)	(2.770)
% female students	0.001	-0.001	0.019*	-0.001	0.016
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.002	0.004	-0.006	0.004	-0.013*
	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.014
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
Log number of SMC meetings	-0.040**	-0.063**	0.173	-0.049**	0.137
	(0.018)	(0.028)	(0.113)	(0.023)	(0.110)
Log number of SMC meetings squared	-0.010	-0.002	-0.011	-0.002	-0.063
	(0.012)	(0.020)	(0.070)	(0.014)	(0.065)
Log number of other schools	-0.068	-0.135*	0.097	-0.100	0.311*
	(0.054)	(0.080)	(0.151)	(0.071)	(0.178)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.006	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.37.

Robustness Check for Efficiency Analysis: Quadratic Form for Log SMC Meetings (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.066 (0.273)	0.379 (0.485)	0.405 (2.282)	0.396 (0.490)	0.219 (2.021)
Log village-mean monthly teacher salary	1.232** (0.539)	1.180* (0.648)	4.156* (2.292)	1.341* (0.695)	2.421 (2.358)
Log enrollment	-0.865*** (0.134)	-0.673** (0.289)	-1.168 (0.870)	-0.696** (0.294)	-0.985 (0.866)
% students: Pre-primary	0.002 (0.002)	0.006 (0.005)	-0.006 (0.018)	0.006 (0.005)	-0.007 (0.014)
% students: Middle	-0.012* (0.007)	-0.009 (0.013)	-0.032 (0.125)	-0.011 (0.012)	0.058 (0.109)
% students: Secondary	0.044*** (0.006)	0.036*** (0.007)	0.300*** (0.042)	0.044*** (0.007)	-0.049 (0.048)
Log school facility index	-0.432 (0.670)	-0.761 (0.681)	3.369* (1.987)	-0.859 (0.822)	0.957 (2.213)
Log electricity access index	0.244 (0.163)	0.091 (0.184)	4.643*** (1.091)	0.100 (0.173)	0.676 (1.065)
Log geographic isolation index	0.211 (0.218)	0.516 (0.437)	-1.537 (1.129)	0.563 (0.444)	-0.742 (1.266)
Log household asset index	1.270 (0.773)	1.036 (0.935)	-2.594 (4.331)	1.037 (0.981)	2.663 (3.784)
% female students	-0.002 (0.005)	-0.003 (0.006)	0.010 (0.021)	-0.005 (0.006)	0.020 (0.022)
% revenue: Parents' education fees	0.000 (0.001)	0.001 (0.001)	0.004 (0.005)	0.001 (0.001)	-0.002 (0.004)
% revenue: Local community contributions	0.002 (0.003)	0.009 (0.008)	-0.010 (0.013)	0.009 (0.008)	-0.020 (0.013)
% revenue: Private donor contributions	0.000 (0.001)	-0.001 (0.002)	0.011 (0.014)	-0.001 (0.002)	-0.014* (0.007)
Log number of SMC meetings	-0.026 (0.022)	-0.019 (0.027)	-0.042 (0.232)	-0.020 (0.029)	-0.069 (0.184)
Log number of SMC meetings squared	0.024 (0.016)	0.037* (0.020)	-0.100 (0.133)	0.038* (0.021)	-0.051 (0.119)
Log number of other schools	-0.153 (0.105)	-0.209 (0.150)	0.061 (0.255)	-0.235 (0.165)	-0.078 (0.387)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.38.
Robustness Check for Efficiency Analysis: Quadratic Form for Log SMC Meetings (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.433	-1.178**	-1.988	-0.621**	-0.099
	(0.291)	(0.504)	(1.360)	(0.302)	(1.371)
Log village-mean monthly teacher salary	-0.413	-1.227	-1.236	-0.083	3.568
	(0.933)	(1.166)	(2.295)	(1.188)	(2.576)
Log enrollment	-1.163***	-1.266***	-0.175	-1.159***	0.055
	(0.371)	(0.467)	(1.122)	(0.381)	(1.017)
% students: Pre-primary	-0.003	0.002	-0.002	-0.001	-0.022
	(0.006)	(0.007)	(0.021)	(0.005)	(0.022)
% students: Middle	0.025	0.065*	0.044	0.025	0.080**
	(0.020)	(0.038)	(0.044)	(0.022)	(0.039)
% students: Secondary	0.019	0.002	-0.042	0.022	-0.208***
	(0.016)	(0.030)	(0.045)	(0.019)	(0.068)
Log school facility index	3.202*	3.556*	2.651	3.301**	4.861
	(1.622)	(1.796)	(2.676)	(1.655)	(3.080)
Log electricity access index	0.216	0.177	2.827***	0.173	1.036
	(0.578)	(0.576)	(1.047)	(0.580)	(1.006)
Log geographic isolation index	0.057	0.503	-1.248	0.075	-2.515**
	(0.320)	(0.553)	(1.082)	(0.351)	(1.136)
Log household asset index	2.414	4.699*	-7.732	3.585	-13.006*
	(2.165)	(2.435)	(6.979)	(2.524)	(6.653)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.011*	-0.002	-0.014**
	(0.001)	(0.002)	(0.007)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.022*	0.004	-0.003
	(0.005)	(0.007)	(0.012)	(0.005)	(0.014)
% revenue: Private donor contributions	-0.003	-0.001	-0.003	-0.003	-0.008
	(0.003)	(0.004)	(0.016)	(0.003)	(0.015)
Log number of SMC meetings	-0.078	-0.145*	0.136	-0.096	0.603**
	(0.056)	(0.085)	(0.230)	(0.062)	(0.265)
Log number of SMC meetings squared	-0.002	0.030	0.233*	0.001	-0.046
	(0.033)	(0.065)	(0.137)	(0.036)	(0.139)
Log number of other schools	-0.069	-0.263	0.552*	-0.074	0.918***
	(0.167)	(0.224)	(0.301)	(0.182)	(0.303)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.016	0.244	0.027	0.054	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.39.

Robustness Check for Efficiency Analysis: Quadratic Form for Log SMC Meetings (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.356 (0.979)	4.172 (3.439)	-5.714*** (1.736)	3.910 (3.356)	-1.474 (3.821)
Log village-mean monthly teacher salary	0.296 (0.697)	1.457 (1.431)	-2.253 (1.861)	1.249 (1.116)	0.273 (2.636)
Log enrollment	-1.061** (0.420)	-1.293 (1.616)	-2.580 (1.620)	-0.754 (1.245)	1.726 (1.816)
% students: Pre-primary	-0.010 (0.008)	-0.031 (0.021)	0.044 (0.027)	-0.025 (0.018)	-0.013 (0.026)
% students: Middle	0.021 (0.013)	0.022 (0.030)	0.064** (0.025)	0.007 (0.024)	-0.067 (0.041)
% students: Secondary	0.037 (0.024)	0.124 (0.075)	0.056 (0.052)	0.005 (0.037)	-0.062 (0.074)
Log school facility index	-0.960 (0.844)	-0.423 (1.738)	-8.106** (3.157)	-0.010 (1.202)	2.749 (3.252)
Log electricity access index	0.264 (0.241)	0.416 (0.580)	-1.627 (2.102)	0.430 (0.437)	-4.815*** (1.178)
Log geographic isolation index	0.436 (0.303)	0.837 (0.781)	0.855 (0.874)	0.610 (0.540)	0.457 (1.151)
Log household asset index	0.896 (1.142)	3.204 (3.057)	-8.626 (7.524)	2.808 (2.414)	4.535 (9.448)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002 (0.002)	-0.005 (0.004)	-0.011* (0.006)	-0.003 (0.003)	-0.022*** (0.008)
% revenue: Local community contributions	-0.002 (0.002)	-0.003 (0.006)	-0.015 (0.011)	0.000 (0.004)	-0.039*** (0.011)
% revenue: Private donor contributions	-0.002 (0.002)	0.006 (0.008)	-0.045*** (0.011)	0.007 (0.008)	-0.081*** (0.010)
Log number of SMC meetings	-0.006 (0.031)	-0.078 (0.087)	0.064 (0.171)	-0.069 (0.080)	0.181 (0.231)
Log number of SMC meetings squared	0.007 (0.019)	-0.001 (0.037)	0.009 (0.108)	0.005 (0.030)	-0.137 (0.111)
Log number of other schools	-0.007 (0.072)	-0.014 (0.193)	-0.020 (0.292)	-0.042 (0.122)	0.259 (0.385)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.009	0.144	< 0.001	0.288	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.40.

Robustness Check for Efficiency Analysis: Adding 0.01 for Log Transformation (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.017	0.007	-1.621	0.322	-0.278
	(0.182)	(0.612)	(1.288)	(0.540)	(1.321)
Log village-mean monthly teacher salary	0.140	0.304	-0.832	0.664	2.152
	(0.372)	(0.521)	(1.539)	(0.580)	(1.567)
Log enrollment	-0.985***	-0.860***	-1.541**	-0.798***	-0.876
	(0.118)	(0.248)	(0.755)	(0.237)	(0.743)
% students: Pre-primary	0.000	0.002	0.001	0.001	-0.006
	(0.002)	(0.004)	(0.014)	(0.003)	(0.012)
% students: Middle	0.017*	0.035*	0.023	0.019*	0.019
	(0.009)	(0.018)	(0.030)	(0.010)	(0.034)
% students: Secondary	0.014	0.014	0.068	0.010	-0.064*
	(0.011)	(0.027)	(0.071)	(0.012)	(0.037)
Log school facility index	0.432	0.349	2.407	0.245	2.401
	(0.405)	(0.503)	(1.798)	(0.510)	(1.734)
Log electricity access index	0.327	0.240	3.703***	0.269	-0.536
	(0.315)	(0.319)	(0.914)	(0.316)	(0.813)
Log geographic isolation index	0.058	0.397	-0.519	0.270	-1.702**
	(0.125)	(0.307)	(0.714)	(0.206)	(0.747)
Log household asset index	0.864	1.148	-3.817	0.971	0.351
	(0.605)	(0.719)	(3.794)	(0.808)	(3.478)
% female students	0.001	-0.001	0.023*	-0.002	0.021*
	(0.002)	(0.001)	(0.013)	(0.001)	(0.012)
% revenue: Parents' education fees	-0.001	0.000	-0.001	0.000	-0.010***
	(0.001)	(0.001)	(0.004)	(0.001)	(0.004)
% revenue: Local community contributions	0.001	0.004	-0.007	0.004	-0.014
	(0.001)	(0.003)	(0.008)	(0.003)	(0.009)
% revenue: Private donor contributions	0.000	0.001	0.005	0.001	-0.017
	(0.001)	(0.001)	(0.011)	(0.001)	(0.011)
Log number of SMC meetings	-0.027**	-0.042**	0.147	-0.034**	0.100
	(0.012)	(0.019)	(0.100)	(0.016)	(0.098)
Log number of other schools	-0.067	-0.138*	0.136	-0.102	0.280
	(0.052)	(0.082)	(0.173)	(0.076)	(0.234)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.008	< 0.001	0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.41.

Robustness Check for Efficiency Analysis: Adding 0.01 for Log Transformation (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.122	0.547	0.052	0.553	0.038
	(0.263)	(0.565)	(2.994)	(0.573)	(2.511)
Log village-mean monthly teacher salary	1.259**	1.280*	5.438*	1.565*	2.908
	(0.546)	(0.701)	(2.968)	(0.831)	(2.909)
Log enrollment	-0.859***	-0.601*	-1.552	-0.643*	-1.084
	(0.132)	(0.342)	(1.155)	(0.352)	(1.120)
% students: Pre-primary	0.002	0.008	-0.010	0.008	-0.016
	(0.002)	(0.006)	(0.025)	(0.006)	(0.018)
% students: Middle	-0.013**	-0.012	-0.007	-0.014	0.109
	(0.006)	(0.011)	(0.163)	(0.010)	(0.137)
% students: Secondary	0.041***	0.030***	0.417***	0.038***	-0.048
	(0.005)	(0.007)	(0.050)	(0.008)	(0.057)
Log school facility index	-0.408	-0.736	4.506*	-1.010	0.725
	(0.658)	(0.681)	(2.646)	(0.985)	(2.898)
Log electricity access index	0.255	0.095	6.010***	0.128	0.573
	(0.163)	(0.189)	(1.373)	(0.196)	(1.403)
Log geographic isolation index	0.224	0.618	-1.804	0.699	-0.852
	(0.226)	(0.523)	(1.552)	(0.543)	(1.696)
Log household asset index	1.228	0.767	-3.294	0.875	3.108
	(0.757)	(1.024)	(5.387)	(1.129)	(5.013)
% female students	-0.002	-0.004	0.012	-0.006	0.021
	(0.005)	(0.006)	(0.027)	(0.007)	(0.028)
% revenue:	0.000	0.001	0.007	0.001	-0.002
Parents' education fees	(0.001)	(0.001)	(0.006)	(0.001)	(0.005)
% revenue:	0.002	0.011	-0.015	0.010	-0.023
Local community contributions	(0.003)	(0.009)	(0.017)	(0.009)	(0.018)
% revenue:	0.000	-0.001	0.014	-0.001	-0.020*
Private donor contributions	(0.001)	(0.002)	(0.018)	(0.002)	(0.011)
Log number of SMC meetings	-0.024*	-0.021	0.012	-0.021	-0.055
	(0.014)	(0.017)	(0.205)	(0.019)	(0.173)
Log number of other schools	-0.108	-0.161	0.106	-0.196	-0.064
	(0.077)	(0.123)	(0.285)	(0.146)	(0.482)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.003
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.42.
Robustness Check for Efficiency Analysis: Adding 0.01 for Log Transformation (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.418	-1.314**	-3.238*	-0.620**	-0.650
	(0.275)	(0.598)	(1.745)	(0.288)	(1.768)
Log village-mean monthly teacher salary	-0.490 (0.977)	-1.364 (1.224)	-0.775 (2.976)	0.084 (1.444)	5.408* (3.077)
Log enrollment	-1.225***	-1.39**	-0.002	-1.210***	0.439
	(0.428)	(0.544)	(1.436)	(0.440)	(1.253)
% students: Pre-primary	-0.003	0.002	-0.005	-0.002	-0.030
	(0.006)	(0.008)	(0.027)	(0.006)	(0.026)
% students: Middle	0.026	0.071*	0.049	0.025	0.086*
	(0.020)	(0.039)	(0.060)	(0.023)	(0.045)
% students: Secondary	0.020	-0.001	-0.069	0.023	-0.242***
	(0.017)	(0.032)	(0.061)	(0.019)	(0.081)
Log school facility index	3.568*	3.880*	3.526	3.753*	5.449
	(1.924)	(2.082)	(3.414)	(1.980)	(3.747)
Log electricity access index	0.342	0.306	3.748***	0.280	1.180
	(0.693)	(0.687)	(1.383)	(0.700)	(1.279)
Log geographic isolation index	0.145	0.571	-1.528	0.130	-3.481**
	(0.372)	(0.680)	(1.389)	(0.415)	(1.374)
Log household asset index	2.607	4.867*	-10.812	4.179	-17.036**
	(2.285)	(2.609)	(9.249)	(2.968)	(8.507)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002 (0.001)	-0.002 (0.002)	-0.012 (0.008)	-0.002 (0.002)	-0.014* (0.008)
% revenue: Local community contributions	0.004 (0.005)	0.004 (0.006)	-0.024 (0.015)	0.004 (0.005)	-0.004 (0.018)
% revenue: Private donor contributions	-0.003 (0.003)	-0.002 (0.004)	-0.001 (0.020)	-0.004 (0.004)	-0.005 (0.016)
Log number of SMC meetings	-0.053	-0.078	0.341*	-0.063	0.480**
	(0.042)	(0.067)	(0.196)	(0.046)	(0.221)
Log number of other schools	-0.095	-0.321	0.731*	-0.073	0.988***
	(0.190)	(0.256)	(0.378)	(0.220)	(0.356)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.018	0.278	0.028	0.076	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.43.

Robustness Check for Efficiency Analysis: Adding 0.01 for Log Transformation (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.345	4.913	-6.161**	4.790	0.490
	(0.969)	(4.224)	(2.873)	(4.107)	(4.908)
Log village-mean monthly teacher salary	0.296	1.765	-2.594	1.430	0.660
	(0.691)	(1.604)	(2.183)	(1.236)	(3.112)
Log enrollment	-1.064**	-1.342	-3.134	-0.509	1.850
	(0.419)	(1.963)	(2.007)	(1.425)	(2.076)
% students: Pre-primary	-0.010	-0.038	0.064*	-0.029	-0.004
	(0.008)	(0.024)	(0.034)	(0.022)	(0.030)
% students: Middle	0.021*	0.020	0.074**	0.002	-0.086
	(0.013)	(0.032)	(0.028)	(0.027)	(0.054)
% students: Secondary	0.036	0.117	0.065	-0.001	-0.061
	(0.024)	(0.079)	(0.056)	(0.039)	(0.086)
Log school facility index	-0.929	-0.234	-9.133**	0.179	4.675
	(0.819)	(1.828)	(3.934)	(1.308)	(3.821)
Log electricity access index	0.264	0.335	-2.008	0.442	-6.133***
	(0.250)	(0.666)	(2.680)	(0.475)	(1.283)
Log geographic isolation index	0.452	1.008	1.167	0.670	0.082
	(0.301)	(0.890)	(1.030)	(0.553)	(1.306)
Log household asset index	0.958	3.944	-10.260	3.224	7.039
	(1.131)	(3.631)	(7.789)	(2.691)	(10.286)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.006	-0.011	-0.003	-0.023***
	(0.002)	(0.004)	(0.008)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.004	-0.018	0.000	-0.044***
	(0.002)	(0.007)	(0.014)	(0.005)	(0.014)
% revenue: Private donor contributions	-0.001	0.007	-0.049***	0.009	-0.099***
	(0.002)	(0.009)	(0.015)	(0.009)	(0.018)
Log number of SMC meetings	-0.005	-0.061	0.014	-0.057	0.164
	(0.021)	(0.067)	(0.152)	(0.061)	(0.186)
Log number of other schools	-0.012	-0.001	-0.117	-0.051	0.356
	(0.069)	(0.189)	(0.327)	(0.131)	(0.427)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.003	0.182	0.003	0.288	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.44.

Robustness Check for Efficiency Analysis: Adding 0.001 for Log Transformation (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.027	0.024	-2.259	0.400	-0.567
	(0.183)	(0.703)	(1.652)	(0.618)	(1.580)
Log village-mean monthly teacher salary	0.127	0.351	-0.697	0.824	2.939
	(0.374)	(0.551)	(1.861)	(0.670)	(1.870)
Log enrollment	-1.001***	-0.842***	-1.705*	-0.777***	-0.844
	(0.126)	(0.283)	(0.933)	(0.275)	(0.903)
% students: Pre-primary	0.000	0.001	0.003	0.001	-0.006
	(0.002)	(0.004)	(0.017)	(0.004)	(0.015)
% students: Middle	0.017*	0.037*	0.028	0.019*	0.019
	(0.009)	(0.019)	(0.037)	(0.010)	(0.041)
% students: Secondary	0.014	0.012	0.077	0.008	-0.071*
	(0.011)	(0.028)	(0.085)	(0.012)	(0.043)
Log school facility index	0.474	0.385	2.969	0.244	2.615
	(0.431)	(0.538)	(2.197)	(0.593)	(2.106)
Log electricity access index	0.383	0.295	4.588***	0.323	-0.842
	(0.367)	(0.371)	(1.121)	(0.369)	(0.993)
Log geographic isolation index	0.053	0.349	-0.631	0.290	-2.09**
	(0.129)	(0.344)	(0.876)	(0.226)	(0.904)
Log household asset index	0.979	1.223	-3.111	1.149	0.713
	(0.627)	(0.770)	(4.954)	(0.927)	(4.330)
% female students	0.001	-0.001	0.026*	-0.002	0.025*
	(0.002)	(0.001)	(0.016)	(0.002)	(0.014)
% revenue: Parents' education fees	-0.001	0.000	-0.001	0.000	-0.010**
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.001	0.004	-0.009	0.005	-0.015
	(0.001)	(0.003)	(0.010)	(0.003)	(0.011)
% revenue: Private donor contributions	0.000	0.001	0.007	0.001	-0.021
	(0.001)	(0.001)	(0.014)	(0.001)	(0.013)
Log number of SMC meetings	-0.019**	-0.032**	0.128	-0.026**	0.082
	(0.009)	(0.014)	(0.094)	(0.012)	(0.093)
Log number of other schools	-0.055	-0.106	0.166	-0.077	0.271
	(0.052)	(0.124)	(0.188)	(0.120)	(0.297)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.011	< 0.001	0.007
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.45.

Robustness Check for Efficiency Analysis: Adding 0.001 for Log Transformation (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.121	0.572	-0.606	0.571	0.254
	(0.268)	(0.632)	(3.833)	(0.647)	(3.035)
Log village-mean monthly teacher salary	1.239**	1.319*	6.924*	1.736*	3.407
	(0.537)	(0.742)	(3.690)	(0.955)	(3.516)
Log enrollment	-0.867***	-0.563	-1.855	-0.625	-1.121
	(0.133)	(0.392)	(1.428)	(0.408)	(1.366)
% students: Pre-primary	0.002	0.008	-0.011	0.008	-0.023
	(0.002)	(0.007)	(0.032)	(0.007)	(0.023)
% students: Middle	-0.013**	-0.012	0.001	-0.015	0.160
	(0.006)	(0.012)	(0.214)	(0.012)	(0.170)
% students: Secondary	0.042***	0.032***	0.509***	0.040***	-0.044
	(0.005)	(0.008)	(0.062)	(0.009)	(0.066)
Log school facility index	-0.415	-0.784	5.482*	-1.254	0.502
	(0.665)	(0.720)	(3.294)	(1.199)	(3.637)
Log electricity access index	0.267	0.116	7.365***	0.175	0.510
	(0.165)	(0.202)	(1.689)	(0.229)	(1.793)
Log geographic isolation index	0.230	0.700	-2.510	0.811	-0.964
	(0.232)	(0.605)	(1.956)	(0.639)	(1.935)
Log household asset index	1.203*	0.640	-4.008	0.864	2.858
	(0.722)	(1.060)	(7.534)	(1.239)	(6.474)
% female students	-0.003	-0.005	0.014	-0.009	0.020
	(0.005)	(0.007)	(0.034)	(0.009)	(0.035)
% revenue: Parents' education fees	0.000	0.001	0.009	0.002	-0.002
	(0.001)	(0.001)	(0.008)	(0.002)	(0.007)
% revenue: Local community contributions	0.002	0.012	-0.020	0.012	-0.026
	(0.003)	(0.011)	(0.020)	(0.011)	(0.024)
% revenue: Private donor contributions	0.000	-0.001	0.018	0.000	-0.026*
	(0.001)	(0.002)	(0.023)	(0.002)	(0.015)
Log number of SMC meetings	-0.019**	-0.019	0.025	-0.019	-0.050
	(0.010)	(0.012)	(0.190)	(0.014)	(0.167)
Log number of other schools	-0.070	-0.087	0.142	-0.126	-0.041
	(0.067)	(0.191)	(0.280)	(0.208)	(0.546)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.018
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.46.
Robustness Check for Efficiency Analysis: Adding 0.001 for Log Transformation (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.437	-1.440**	-4.230*	-0.644**	-1.397
	(0.283)	(0.680)	(2.215)	(0.301)	(2.207)
Log village-mean monthly teacher salary	-0.577	-1.515	-0.744	0.245	7.109*
	(1.010)	(1.276)	(3.624)	(1.687)	(3.641)
Log enrollment	-1.322***	-1.534**	0.420	-1.306**	0.891
	(0.491)	(0.612)	(1.798)	(0.505)	(1.525)
% students: Pre-primary	-0.003	0.001	-0.008	-0.002	-0.041
	(0.006)	(0.008)	(0.033)	(0.006)	(0.030)
% students: Middle	0.027	0.076*	0.056	0.025	0.086
	(0.020)	(0.041)	(0.072)	(0.023)	(0.054)
% students: Secondary	0.021	-0.002	-0.085	0.025	-0.269***
	(0.017)	(0.034)	(0.072)	(0.020)	(0.095)
Log school facility index	3.910*	4.101*	4.877	4.168*	6.436
	(2.233)	(2.357)	(4.162)	(2.311)	(4.488)
Log electricity access index	0.463	0.444	4.674***	0.381	1.254
	(0.811)	(0.805)	(1.721)	(0.822)	(1.584)
Log geographic isolation index	0.144	0.343	-1.687	0.089	-4.035**
	(0.406)	(0.774)	(1.712)	(0.468)	(1.690)
Log household asset index	3.084	5.410*	-10.263	5.028	-17.91
	(2.457)	(2.776)	(11.572)	(3.478)	(11.022)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.013	-0.002	-0.014
	(0.001)	(0.002)	(0.009)	(0.002)	(0.009)
% revenue: Local community contributions	0.004	0.004	-0.026	0.003	-0.002
	(0.005)	(0.007)	(0.019)	(0.006)	(0.022)
% revenue: Private donor contributions	-0.004	-0.001	-0.001	-0.005	-0.007
	(0.003)	(0.004)	(0.024)	(0.004)	(0.018)
Log number of SMC meetings	-0.038	-0.060	0.286	-0.046	0.425**
	(0.029)	(0.047)	(0.180)	(0.033)	(0.210)
Log number of other schools	-0.128	-0.388	0.867*	-0.082	1.068**
	(0.214)	(0.296)	(0.461)	(0.257)	(0.424)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.029	0.365	0.041	0.125	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.47.
Robustness Check for Efficiency Analysis: Adding 0.001 for Log Transformation (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.366	5.724	-7.501***	5.793	0.934
	(0.989)	(5.077)	(2.384)	(4.918)	(5.475)
Log village-mean monthly teacher salary	0.298	2.099	-2.949	1.624	1.087
	(0.688)	(1.785)	(2.553)	(1.368)	(3.712)
Log enrollment	-1.049**	-1.359	-3.670	-0.253	1.985
	(0.419)	(2.301)	(2.438)	(1.607)	(2.377)
% students: Pre-primary	-0.010	-0.043	0.082**	-0.033	0.006
	(0.008)	(0.028)	(0.041)	(0.025)	(0.035)
% students: Middle	0.021*	0.016	0.086**	-0.003	-0.110
	(0.013)	(0.036)	(0.033)	(0.031)	(0.068)
% students: Secondary	0.037	0.107	0.075	-0.006	-0.073
	(0.024)	(0.084)	(0.067)	(0.043)	(0.097)
Log school facility index	-0.918	-0.005	-10.293**	0.413	6.389
	(0.815)	(1.939)	(4.796)	(1.452)	(4.466)
Log electricity access index	0.267	0.314	-2.427	0.477	-7.284***
	(0.252)	(0.744)	(3.260)	(0.517)	(1.536)
Log geographic isolation index	0.439	1.045	1.439	0.665	-0.243
	(0.301)	(1.053)	(1.221)	(0.596)	(1.514)
Log household asset index	1.034	4.867	-11.772	3.677	10.827
	(1.141)	(4.230)	(8.526)	(3.083)	(11.83)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.007	-0.012	-0.003	-0.024***
	(0.002)	(0.005)	(0.010)	(0.003)	(0.008)
% revenue: Local community contributions	-0.002	-0.005	-0.021	0.000	-0.048***
	(0.002)	(0.008)	(0.016)	(0.005)	(0.016)
% revenue: Private donor contributions	-0.001	0.009	-0.056***	0.010	-0.118***
	(0.002)	(0.010)	(0.018)	(0.010)	(0.019)
Log number of SMC meetings	-0.004	-0.050	-0.008	-0.048	0.150
	(0.015)	(0.056)	(0.142)	(0.051)	(0.160)
Log number of other schools	0.008	0.029	-0.160	-0.053	0.470
	(0.069)	(0.215)	(0.390)	(0.146)	(0.478)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.003	0.330	0.001	0.349	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.48.

Robustness Check for Efficiency Analysis: Without SMC Meetings and School Competition (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.033	-0.065	-1.058	0.195	0.146
	(0.191)	(0.522)	(1.010)	(0.458)	(1.071)
Log village-mean monthly teacher salary	0.127	0.225	-0.897	0.479	1.384
	(0.369)	(0.490)	(1.234)	(0.488)	(1.295)
Log enrollment	-0.994***	-0.914***	-1.260**	-0.851***	-0.792
	(0.117)	(0.215)	(0.585)	(0.202)	(0.584)
% students: Pre-primary	0.000	0.001	-0.001	0.001	-0.004
	(0.002)	(0.003)	(0.010)	(0.003)	(0.010)
% students: Middle	0.017*	0.033*	0.017	0.019*	0.019
	(0.009)	(0.017)	(0.024)	(0.010)	(0.028)
% students: Secondary	0.013	0.015	0.061	0.010	-0.050
	(0.011)	(0.027)	(0.054)	(0.012)	(0.033)
Log school facility index	0.387	0.307	1.856	0.252	2.111
	(0.375)	(0.470)	(1.420)	(0.422)	(1.399)
Log electricity access index	0.279	0.194	2.757***	0.221	-0.261
	(0.267)	(0.272)	(0.721)	(0.267)	(0.644)
Log geographic isolation index	0.034	0.305	-0.458	0.204	-1.189*
	(0.118)	(0.267)	(0.558)	(0.181)	(0.612)
Log household asset index	0.757	0.990	-2.144	0.755	1.634
	(0.556)	(0.645)	(3.136)	(0.679)	(2.764)
% female students	0.001	-0.001	0.019*	-0.001	0.016
	(0.002)	(0.001)	(0.011)	(0.001)	(0.010)
% revenue: Parents' education fees	-0.001	0.000	-0.002	0.000	-0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.003)
% revenue: Local community contributions	0.001	0.003	-0.006	0.004	-0.013*
	(0.001)	(0.003)	(0.006)	(0.002)	(0.007)
% revenue: Private donor contributions	0.000	0.001	0.003	0.001	-0.014*
	(0.001)	(0.001)	(0.009)	(0.001)	(0.008)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	0.011	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.49.

Robustness Check for Efficiency Analysis: Without SMC Meetings and School Competition (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	0.050	0.368	0.112	0.358	0.118
	(0.289)	(0.477)	(2.202)	(0.484)	(1.951)
Log village-mean monthly teacher salary	1.183**	1.129*	4.065*	1.282**	2.284
	(0.508)	(0.597)	(2.248)	(0.637)	(2.370)
Log enrollment	-0.897***	-0.703**	-1.212	-0.732**	-1.054
	(0.140)	(0.286)	(0.857)	(0.293)	(0.840)
% students: Pre-primary	0.002	0.005	-0.008	0.006	-0.008
	(0.002)	(0.005)	(0.019)	(0.005)	(0.014)
% students: Middle	-0.008	-0.006	-0.024	-0.008	0.069
	(0.005)	(0.007)	(0.109)	(0.007)	(0.102)
% students: Secondary	0.044***	0.034***	0.317***	0.043***	-0.037
	(0.005)	(0.006)	(0.038)	(0.006)	(0.042)
Log school facility index	-0.451	-0.762	3.256	-0.864	0.830
	(0.673)	(0.682)	(1.997)	(0.825)	(2.159)
Log electricity access index	0.304*	0.162	4.621***	0.179	0.735
	(0.174)	(0.185)	(1.049)	(0.176)	(1.014)
Log geographic isolation index	0.183	0.476	-1.523	0.519	-0.742
	(0.208)	(0.419)	(1.147)	(0.426)	(1.232)
Log household asset index	1.023	0.661	-1.641	0.661	3.040
	(0.693)	(0.894)	(4.201)	(0.919)	(3.467)
% female students	-0.003	-0.004	0.010	-0.006	0.019
	(0.005)	(0.006)	(0.020)	(0.007)	(0.022)
% revenue: Parents' education fees	0.000	0.001	0.005	0.001	-0.002
	(0.001)	(0.001)	(0.005)	(0.001)	(0.004)
% revenue: Local community contributions	0.001	0.008	-0.009	0.007	-0.020
	(0.003)	(0.008)	(0.012)	(0.007)	(0.013)
% revenue: Private donor contributions	0.000	0.000	0.011	0.000	-0.014*
	(0.001)	(0.001)	(0.014)	(0.001)	(0.007)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.50.

Robustness Check for Efficiency Analysis: Without SMC Meetings and School Competition (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.422	-1.205**	-2.281	-0.615**	0.036
	(0.283)	(0.537)	(1.432)	(0.290)	(1.502)
Log village-mean monthly teacher salary	-0.434	-1.098	-1.188	-0.106	3.211
	(0.880)	(1.061)	(2.483)	(1.121)	(2.656)
Log enrollment	-1.205***	-1.306***	-0.208	-1.216***	0.299
	(0.356)	(0.439)	(1.182)	(0.363)	(1.121)
% students: Pre-primary	-0.003	0.000	0.000	-0.001	-0.017
	(0.006)	(0.007)	(0.021)	(0.006)	(0.023)
% students: Middle	0.026	0.064*	0.038	0.026	0.079*
	(0.020)	(0.038)	(0.047)	(0.022)	(0.04)
% students: Secondary	0.015	-0.008	-0.022	0.018	-0.169**
	(0.016)	(0.031)	(0.046)	(0.018)	(0.075)
Log school facility index	3.336*	3.770*	1.929	3.444*	3.866
	(1.716)	(1.920)	(2.736)	(1.741)	(3.122)
Log electricity access index	0.220	0.168	2.725**	0.178	1.017
	(0.568)	(0.577)	(1.084)	(0.571)	(1.006)
Log geographic isolation index	0.098	0.436	-1.146	0.120	-2.514**
	(0.319)	(0.636)	(1.098)	(0.348)	(1.187)
Log household asset index	2.509	4.648*	-7.305	3.653	-12.161*
	(2.154)	(2.439)	(7.606)	(2.533)	(7.121)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002	-0.002	-0.011*	-0.002	-0.015**
	(0.001)	(0.002)	(0.006)	(0.002)	(0.007)
% revenue: Local community contributions	0.004	0.004	-0.020*	0.004	-0.004
	(0.005)	(0.006)	(0.011)	(0.005)	(0.013)
% revenue: Private donor contributions	-0.003	-0.002	-0.001	-0.004	-0.004
	(0.003)	(0.004)	(0.016)	(0.003)	(0.014)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.007	0.200	0.056	0.023	0.003
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.51.
Robustness Check for Efficiency Analysis: Without SMC Meetings and School Competition (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	1.383 (0.979)	4.318 (3.558)	-5.173** (1.976)	4.013 (3.478)	-0.212 (4.058)
Log village-mean monthly teacher salary	0.290 (0.681)	1.352 (1.387)	-2.071 (1.881)	1.158 (1.049)	0.564 (2.628)
Log enrollment	-1.057** (0.416)	-1.296 (1.624)	-2.628 (1.598)	-0.738 (1.251)	1.586 (1.849)
% students: Pre-primary	-0.010 (0.008)	-0.031 (0.02)	0.044 (0.027)	-0.025 (0.018)	-0.013 (0.025)
% students: Middle	0.022* (0.013)	0.024 (0.030)	0.064*** (0.024)	0.008 (0.023)	-0.061 (0.038)
% students: Secondary	0.037 (0.023)	0.128* (0.074)	0.052 (0.043)	0.009 (0.033)	-0.065 (0.071)
Log school facility index	-0.956 (0.822)	-0.506 (1.69)	-7.792** (3.172)	-0.089 (1.118)	3.000 (3.229)
Log electricity access index	0.258 (0.237)	0.419 (0.570)	-1.658 (2.112)	0.433 (0.438)	-4.861*** (1.105)
Log geographic isolation index	0.461 (0.307)	0.897 (0.797)	0.927 (0.860)	0.648 (0.547)	0.453 (1.155)
Log household asset index	1.023 (1.118)	3.512 (3.060)	-7.656 (6.987)	3.149 (2.472)	4.347 (9.221)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.002 (0.002)	-0.005 (0.004)	-0.011* (0.007)	-0.003 (0.003)	-0.022*** (0.008)
% revenue: Local community contributions	-0.002 (0.002)	-0.003 (0.006)	-0.015 (0.011)	0.000 (0.004)	-0.039*** (0.012)
% revenue: Private donor contributions	-0.001 (0.002)	0.006 (0.007)	-0.044*** (0.011)	0.007 (0.007)	-0.080*** (0.012)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	0.058	< 0.001	0.160	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.52.

Robustness Check for Efficiency Analysis: Excluding Teacher Allowance From Expenditures (All Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-1.627**	1.611***	-1.261	0.492	-0.097
	(0.805)	(0.572)	(0.965)	(0.629)	(1.028)
Log village-mean monthly teacher salary	-0.180	1.014	-0.976	-1.582*	1.335
	(1.017)	(0.630)	(1.229)	(0.882)	(1.293)
Log enrollment	-1.748***	-0.236	-1.358**	-0.238	-0.890
	(0.472)	(0.285)	(0.581)	(0.587)	(0.585)
% students: Pre-primary	0.002	-0.004	-0.001	0.007	-0.006
	(0.009)	(0.005)	(0.010)	(0.010)	(0.010)
% students: Middle	0.023	0.034*	0.017	0.017	0.019
	(0.018)	(0.019)	(0.024)	(0.021)	(0.028)
% students: Secondary	0.044	-0.062***	0.058	0.044	-0.052*
	(0.039)	(0.020)	(0.057)	(0.047)	(0.031)
Log school facility index	0.786	-0.749	1.750	0.060	2.136
	(1.179)	(0.835)	(1.421)	(0.973)	(1.393)
Log electricity access index	1.710***	0.416	2.794***	3.500***	-0.258
	(0.550)	(0.386)	(0.716)	(0.610)	(0.646)
Log geographic isolation index	-0.570	-0.072	-0.502	-0.317	-1.256**
	(0.456)	(0.356)	(0.555)	(0.435)	(0.614)
Log household asset index	-2.938	-0.298	-2.996	-3.535	0.943
	(2.347)	(1.396)	(3.116)	(2.303)	(2.807)
% female students	0.017*	0.002	0.019*	0.004	0.016
	(0.009)	(0.004)	(0.011)	(0.005)	(0.010)
% revenue: Parents' education fees	-0.002	0.000	-0.002	0.002	-0.010***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
% revenue: Local community contributions	-0.005	0.001	-0.006	0.005	-0.013*
	(0.006)	(0.003)	(0.006)	(0.004)	(0.007)
% revenue: Private donor contributions	0.008	-0.007*	0.003	0.014**	-0.013
	(0.006)	(0.004)	(0.009)	(0.006)	(0.008)
Log number of SMC meetings	0.170*	0.078	0.171	-0.064	0.122
	(0.100)	(0.060)	(0.110)	(0.085)	(0.107)
Log number of other schools	-0.019	-0.037	0.093	-0.152	0.310*
	(0.152)	(0.112)	(0.151)	(0.118)	(0.176)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.001	0.012	0.006	< 0.001	< 0.001
Observations	1,125	1,125	1,125	1,125	1,125

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.53.

Robustness Check for Efficiency Analysis: Excluding Teacher Allowance From Expenditures (Co-Educational Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-0.604	1.313	-0.146	0.153	0.001
	(1.781)	(1.276)	(2.205)	(1.455)	(1.941)
Log village-mean monthly teacher salary	2.510	1.707	3.984*	0.651	2.285
	(2.148)	(1.299)	(2.291)	(1.792)	(2.365)
Log enrollment	-1.778**	-0.103	-1.241	-0.440	-1.032
	(0.709)	(0.462)	(0.886)	(1.031)	(0.868)
% students: Pre-primary	0.002	-0.006	-0.007	0.004	-0.008
	(0.015)	(0.008)	(0.019)	(0.020)	(0.014)
% students: Middle	-0.021	-0.078	-0.028	-0.102	0.059
	(0.074)	(0.060)	(0.115)	(0.070)	(0.104)
% students: Secondary	0.215***	-0.071***	0.321***	0.278***	-0.041
	(0.031)	(0.024)	(0.039)	(0.043)	(0.045)
Log school facility index	1.816	-1.397	3.221	0.940	0.921
	(1.978)	(1.214)	(2.059)	(1.588)	(2.193)
Log electricity access index	2.936***	0.407	4.647***	4.047***	0.657
	(1.082)	(0.607)	(1.076)	(0.919)	(1.048)
Log geographic isolation index	-1.025	0.235	-1.479	-1.146	-0.715
	(0.925)	(0.713)	(1.161)	(0.967)	(1.295)
Log household asset index	-2.234	0.476	-2.967	-4.058	2.837
	(3.438)	(2.157)	(4.279)	(3.977)	(3.760)
% female students	0.011	0.007	0.009	0.003	0.020
	(0.017)	(0.013)	(0.021)	(0.022)	(0.022)
% revenue: Parents' education fees	0.004	-0.002	0.005	0.005	-0.002
	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)
% revenue: Local community contributions	-0.001	0.007	-0.009	0.010	-0.020
	(0.011)	(0.009)	(0.012)	(0.009)	(0.013)
% revenue: Private donor contributions	0.017	-0.012	0.011	0.022*	-0.013*
	(0.012)	(0.008)	(0.014)	(0.011)	(0.007)
Log number of SMC meetings	-0.124	-0.077	-0.018	-0.129	-0.061
	(0.214)	(0.113)	(0.234)	(0.194)	(0.186)
Log number of other schools	-0.024	-0.228	0.029	0.056	-0.099
	(0.357)	(0.250)	(0.272)	(0.210)	(0.384)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Observations	330	330	330	330	330

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.54.

Robustness Check for Efficiency Analysis: Excluding Teacher Allowance From Expenditures (Boys' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-2.103**	1.969*	-2.552**	-0.347	-0.129
	(0.984)	(1.022)	(1.259)	(0.969)	(1.272)
Log village-mean monthly teacher salary	0.850	2.089*	-1.025	-1.120	3.478
	(1.946)	(1.132)	(2.329)	(1.626)	(2.549)
Log enrollment	-0.842	-1.039*	-0.357	-0.117	0.119
	(0.867)	(0.577)	(1.110)	(0.760)	(1.008)
% students: Pre-primary	-0.011	-0.007	-0.004	0.014	-0.021
	(0.016)	(0.012)	(0.021)	(0.017)	(0.022)
% students: Middle	0.028	0.073***	0.038	0.005	0.079**
	(0.031)	(0.027)	(0.047)	(0.027)	(0.038)
% students: Secondary	-0.024	-0.123***	-0.046	0.019	-0.206***
	(0.032)	(0.032)	(0.049)	(0.043)	(0.068)
Log school facility index	0.391	-1.818	2.478	1.532	4.652
	(2.267)	(2.350)	(2.710)	(2.051)	(3.074)
Log electricity access index	1.617*	1.305*	2.782**	2.955***	1.104
	(0.836)	(0.670)	(1.065)	(0.810)	(1.003)
Log geographic isolation index	-1.434	-0.919	-1.342	-0.913	-2.716**
	(0.888)	(0.839)	(1.099)	(0.895)	(1.139)
Log household asset index	-7.020	-1.720	-7.700	2.886	-12.978*
	(5.223)	(3.443)	(7.232)	(3.976)	(6.999)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.010*	0.006	-0.011*	-0.004	-0.014**
	(0.005)	(0.004)	(0.006)	(0.005)	(0.007)
% revenue: Local community contributions	-0.012	0.005	-0.020*	-0.017**	-0.004
	(0.008)	(0.007)	(0.011)	(0.008)	(0.013)
% revenue: Private donor contributions	0.004	0.003	-0.003	0.000	-0.006
	(0.009)	(0.009)	(0.016)	(0.013)	(0.015)
Log number of SMC meetings	0.231	0.234	0.396*	-0.275	0.545**
	(0.169)	(0.162)	(0.218)	(0.186)	(0.252)
Log number of other schools	0.127	0.099	0.594**	-0.124	0.909***
	(0.225)	(0.173)	(0.299)	(0.209)	(0.299)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.137	0.001	0.021	0.051	< 0.001
Observations	324	324	324	324	324

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.55.
Robustness Check for Efficiency Analysis: Excluding Teacher Allowance From Expenditures (Girls' Schools)

Variable	Log per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Log achievement (3 subjects)	-2.563 (2.215)	3.622** (1.482)	-5.012** (1.968)	-3.263** (1.614)	-0.094 (3.947)
Log village-mean monthly teacher salary	-2.840* (1.660)	0.688 (1.352)	-2.165 (1.880)	-1.175 (1.167)	0.347 (2.588)
Log enrollment	-1.470 (1.180)	-0.122 (1.148)	-2.657 (1.635)	-1.964* (1.011)	1.703 (1.826)
% students: Pre-primary	0.030 (0.023)	-0.029** (0.014)	0.045 (0.028)	0.046** (0.020)	-0.013 (0.025)
% students: Middle	0.043* (0.022)	-0.023 (0.031)	0.065** (0.024)	0.084*** (0.022)	-0.061 (0.041)
% students: Secondary	0.060 (0.047)	-0.062 (0.051)	0.053 (0.049)	0.010 (0.044)	-0.044 (0.075)
Log school facility index	-5.974** (2.481)	4.182** (1.795)	-7.975** (3.163)	-8.118*** (2.391)	2.752 (3.224)
Log electricity access index	-1.451 (1.266)	-0.606 (1.033)	-1.588 (2.101)	1.706 (2.250)	-4.912*** (1.159)
Log geographic isolation index	0.631 (0.890)	-0.117 (0.650)	0.898 (0.864)	0.351 (0.737)	0.479 (1.135)
Log household asset index	-6.936 (6.054)	2.639 (4.230)	-7.678 (6.927)	-6.498 (4.703)	4.532 (8.943)
% female students	-	-	-	-	-
% revenue: Parents' education fees	-0.008 (0.005)	0.003 (0.004)	-0.011* (0.006)	-0.006* (0.003)	-0.022*** (0.008)
% revenue: Local community contributions	-0.014 (0.009)	-0.001 (0.006)	-0.016 (0.011)	0.015** (0.006)	-0.040*** (0.011)
% revenue: Private donor contributions	-0.020 (0.018)	-0.010 (0.012)	-0.046*** (0.012)	0.004 (0.006)	-0.082*** (0.013)
Log number of SMC meetings	0.289** (0.141)	0.175 (0.116)	0.067 (0.165)	-0.066 (0.172)	0.172 (0.231)
Log number of other schools	0.028 (0.251)	0.067 (0.261)	-0.039 (0.288)	-0.055 (0.248)	0.311 (0.375)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.126	0.052	< 0.001	0.050	< 0.001
Observations	219	219	219	219	219

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Appendix 1D: Results of Robustness Checks for Equity Analysis

Table 1.56.
Robustness Check for Equity Analysis: Using 9-Month-Based Expenditures

Variable	Within-village inequality in per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Per-pupil revenue: Government	0.000*** (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000** (0.000)
Per-pupil revenue: Parents' education fees	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Per-pupil revenue: Local community contributions	0.001 (0.001)	0.000 (0.002)	-0.002*** (0.001)	0.001* (0.001)	-0.002* (0.001)
Per-pupil revenue: Private donor contributions	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001* (0.000)
Enrollment	0.000 (0.000)	0.000 (0.000)	-0.001** (0.000)	0.000 (0.001)	-0.001 (0.001)
% students: Pre-primary	0.000 (0.002)	-0.002 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.001 (0.002)
% students: Middle	-0.006 (0.004)	-0.005 (0.004)	0.001 (0.003)	-0.006* (0.004)	0.001 (0.005)
% students: Secondary	0.010** (0.005)	0.009* (0.005)	0.008 (0.005)	0.009* (0.005)	0.003 (0.006)
School facility index	0.061 (0.137)	-0.210 (0.133)	-0.174 (0.148)	-0.034 (0.119)	0.125 (0.171)
Electricity access index	-0.064 (0.044)	-0.032 (0.049)	-0.029 (0.054)	-0.036 (0.040)	0.025 (0.065)
Geographic isolation index	-0.016 (0.025)	-0.041* (0.024)	0.013 (0.027)	-0.016 (0.023)	-0.004 (0.040)
Achievement (3-subject average)	0.000 (0.001)	0.000 (0.001)	0.001* (0.001)	0.000 (0.001)	0.000 (0.001)
Household asset index	0.146 (0.252)	-0.018 (0.249)	-0.131 (0.228)	0.079 (0.243)	0.298 (0.364)
% female students	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.002)	-0.001 (0.001)	-0.001 (0.001)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	0.139	< 0.000	0.390	0.141
Observations	1,071	1,071	1,071	1,071	1,071

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.57.
Robustness Check for Equity Analysis: Using Math Scores

Variable	Within-village inequality in per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Per-pupil revenue: Government	0.000***	0.000	0.000***	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Parents' education fees	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Local community contributions	0.001	0.001	-0.002**	0.002*	-0.002*
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Per-pupil revenue: Private donor contributions	0.000	0.000	0.000	0.000	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Enrollment	0.000	0.000	-0.001**	0.000	-0.001
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
% students: Pre-primary	0.000	-0.002	0.001	-0.001	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
% students: Middle	-0.006*	-0.005	0.001	-0.006*	0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
% students: Secondary	0.011**	0.009*	0.008	0.009*	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
School facility index	0.036	-0.215	-0.153	-0.039	0.128
	(0.132)	(0.133)	(0.147)	(0.119)	(0.171)
Electricity access index	-0.056	-0.030	-0.025	-0.036	0.026
	(0.043)	(0.049)	(0.053)	(0.039)	(0.065)
Geographic isolation index	-0.013	-0.040*	0.011	-0.014	-0.003
	(0.025)	(0.024)	(0.027)	(0.024)	(0.041)
Achievement (math)	-0.001	-0.001	0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Household asset index	0.149	-0.030	-0.217	0.087	0.276
	(0.257)	(0.253)	(0.242)	(0.251)	(0.373)
% female students	-0.001	-0.001*	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	0.001	0.111	< 0.001	0.343	0.130
Observations	1,071	1,071	1,071	1,071	1,071

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

Table 1.58.

Robustness Check for Equity Analysis: Excluding Teacher Allowance From Expenditures

Variable	Within-village inequality in per-pupil expenditure				
	(1) Total	(2) Instructional	(3) Non-instructional	(4) Current	(5) Capital
Per-pupil revenue: Government	0.000***	0.000	0.000***	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Parents' education fees	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per-pupil revenue: Local community contributions	-0.002**	0.000	-0.002**	0.000	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Per-pupil revenue: Private donor contributions	0.000	0.000	0.000	0.000	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Enrollment	-0.001**	0.000	-0.001**	-0.001*	-0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
% students: Pre-primary	0.002*	0.001	0.001	0.001	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
% students: Middle	0.001	-0.001	0.001	0.001	0.001
	(0.003)	(0.005)	(0.003)	(0.004)	(0.005)
% students: Secondary	0.008	0.009*	0.008	0.006	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
School facility index	-0.161	-0.048	-0.156	-0.010	0.127
	(0.141)	(0.203)	(0.148)	(0.145)	(0.172)
Electricity access index	0.007	0.104	-0.025	-0.025	0.025
	(0.053)	(0.067)	(0.053)	(0.057)	(0.065)
Geographic isolation index	-0.003	-0.017	0.011	-0.002	-0.007
	(0.026)	(0.035)	(0.026)	(0.025)	(0.041)
Achievement (math)	0.001	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Household asset index	-0.358	-0.293	-0.175	-0.308	0.316
	(0.235)	(0.327)	(0.241)	(0.279)	(0.364)
% female students	0.000	0.000	0.000	0.000	-0.001
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
School fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Probability (F statistic)	< 0.001	0.851	< 0.001	0.172	0.123
Observations	1,071	1,071	1,071	1,071	1,071

Note. Coefficients and standard errors in parentheses. Significance level: * p<0.1; ** p<0.05; *** p<0.01.

REFERENCES

REFERENCES

Ahmad, S. M., & Ullah, O. (2014). Parent-teacher councils in public secondary schools in Northern Pakistan: A qualitative case study. *Journal of Applied Environmental and Biological Sciences, 4*(7S), 121-134.

Ahsan, M. (2003). An analytical review of Pakistan's educational policies and plans. *Research papers in Education, 18*(3), 259-280.

Anderson, D. (1992). The interaction of public and private school systems. *Australian Journal of Education, 36*(3), 213-236.

Andrabi, T., Das, J., & Khwaja, A. I. (2002). *The rise of private schooling in Pakistan: Catering to the urban elite or educating the rural poor?* The World Bank and Harvard University.

Andrabi, T., Das, J., & Khwaja, A. I. (2008a). A Dime a Day: The Possibilities and Limits of Private Schooling in Pakistan. *Comparative Education Review, 52*(3), 329–355.

Andrabi, T., Das, J., & Khwaja, A. I. (2017). Report cards: The impact of providing school and child test scores on educational markets. *American Economic Review, 107*(6), 1535-1563.

Andrabi, T., Das, J., Khwaja, A. I., Vishwanath, T., Zajonc, T. & LEAPS team. (2008b). *Pakistan Learning and Educational Achievements in Punjab Schools (LEAPS): Insights to inform the education policy debate*. Washington, DC: The World Bank.

Andreoni, J. (1989). Giving with impure altruism: Applications to charity and Ricardian equivalence. *Journal of Political Economy, 97*(6), 1447-1458.

Andreoni, J. (1990). Impure altruism and donations to public goods: Theory of warm-glow giving. *The Economic Journal, 100*(401), 464-477,

Areba, N. G., Ondimm, P. C., Monga're, E., & Zablon, N. O. (2013). The hidden costs of free primary education and their impolication on enrolment in Kisii Central District, Kenya. *Journal of Education and Practice, 4*(18), 97-106.

ASER Pakistan (2018). *Annual status of education report: ASER-Pakistan 2018*. Lahore: ASER Pakistan.

Barrera-Osorio, F., Fasih, T., Patrinos, H. A. (2009). *Decentralized decision-making in schools: The theory and evidence on school-based management*. Washington, DC: The World Bank.

Bashir, S., & Batool, F. (2017). English as medium of instruction in Punjab: The 2009 experiment. *Lahore Journal of Policy Studies, 7*(1), 13-45.

Bengali, K. (1999). *History of educational policy making and planning in Pakistan* (SDPI Working Paper Series #40). Islamabad: Sustainable Development Policy Institute.

Bold, T., Kimenyi, M., Mwabu, G., & Sandefur, J. (2010). *Does abolishing fees reduce school quality? Evidence from Kenya* (CSAE Working Paper WPS/2011-04). Oxford: Centre for the Study of African Economics.

Bray, M. (1999). *The private costs of public schooling: Household and community financing of primary education in Cambodia*. Paris: UNESCO-IIEP.

Bruns, B., Filmer, D., & Patrinos, H. A. (2011). *Making schools work: New evidence on accountability reforms*. Washington, DC: The World Bank.

Central Intelligence Agency (2018). *CIA Maps*. Langley, VA. Retrieved from https://www.cia.gov/library/publications/resources/cia-maps-publications

Central Intelligence Agency (2019). *The World Factbook*. Langley, VA. Retrieved from https://www.cia.gov/library/publications/the-world-factbook

Centre for Peace and Development Initiatives (2014). *Following the school paisa! Report II – District Toba Tek Singh*. Islamabad: CPDI.

Duncombe, W., & Yinger, J. (2005). *Estimating the costs of meeting student performance outcomes adopted by Kansas state board of education*. Report prepared for the Kansas Legislative Division of Post Audit. Retrieved August 25, 2018, from https://www.maxwell.syr.edu/uploadedFiles/cpr/research/cpr_research_education_finance_policy/Kansas_Report.pdf

Earthquake Engineering Research Institute (2006, February 28). *The Kashmir earthquake of October 8, 2005*: *Impacts in Pakistan*. Retrieved September 1, 2019, from https://reliefweb.int/report/pakistan/kashmir-earthquake-october-8-2005-impacts-pakistan

Edwards, D. B., Jr., & DeMatthews, D. E. (2014). Historical trends in educational decentralization in the United States and developing countries: A periodization and comparison in the post-WWII context. *Education Policy Analysis Archives, 22*(40).

Fisher, R. C. (2006). *State and local public finance* (3rd ed.). Mason: South-Western College.

Gershberg, A. I. (2002). *Empowering parents while making them pay: Autonomous schools and education reform process in Nicaragua*. Paper prepared for the Woodrow Wilson Center's Workshops on the Politics of Education and Health Sector Reforms, Washington, DC, 4-5 April 2002.

Gershberg, A. I., & Meade, B. (2005). Parental contributions, school-level finances and decentralization: An analysis of Nicaraguan autonomous school budgets. *Comparative Education, 41*(3), 291-308.

Glewwe, P. W., Hanushek, E. A., Humpage, S. D., & Ravina R. (2011). *School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010* (NBER Working Paper 17554). Cambridge, MA: National Bureau of Economic Research.

Golebiewski, J. A. (2011). An overview of the literature measuring education cost differentials. *Peabody Journal of Education, 86*(1), 84-112.

Government of Punjab (2018). *Punjab Portal*. Retrieved December 10, 2018, from https://www.punjab.gov.pk/

Government of the Punjab School Education Department (2000). *No, US(F-aid)24-I/99: Constitution of School Councils*. Retrieved June 14, 2018, from https://schools.punjab.gov.pk/system/files/unit%2010_0.pdf

Greenwald, R., Hedges, L. V., & Laine, R. D. (1996). The effect of school resources on student achievement. *Review of Educational Research, 66*(3), 361-396.

Grubb, W. N. (2008). Multiple resources, multiple outcomes: Testing the “improved” school finance with NELS88. *American Educational Research Journal, 45*(1), 104-144.

Hanushek, E. A. (2006). School resources. In E. A. Hanushek & F. Welch (Eds.), *Handbook of the economics of education, volume 2* (pp. 865-908). Amsterdam: North-Holland.

Hernández-Murillo, R. & Roisman, D. (2005). The economics of charitable giving: What gives? *The Regional Economist, October 2005*, 12-13.

Hoxby, C. M. (1997). *Local property tax-based funding of public schools* (Heartland Policy Study No. 82). Chicago, IL: Heartland Institute.

Husain, F., Qasim, M. A., & Sheikh, K. H. (2003). An analysis of public expenditure on education in Pakistan. *The Pakistan Development Review, 42*(4), 771-780

Iftene, C. (2014). Educational systems’ autonomy: Facts and analysis. *Procedia - Social and Behavioral Sciences, 142*, 47-53.

James, E., King, E. M., & Suryadi, A. (1996). Finance, management, and costs of public and private schools in Indonesia. *Economics of Education Review, 15*(4), 387-398.

Jimenez, E., & Paqueo, V. (1996). Do local contributions affect the efficiency of public primary schools? *Economics of Education Review, 15*(4), pp. 337-386.

Kattan, R. B., & Burnett, N. (2004). *User fees in primary education*. Washington, DC: The World Bank.

Khan, S. R. (2003). Participation via collective action in government and NGO schools in Pakistan. *Development in Practice, 13*(4), 361-376.

Khan, F. (2007). School management councils: A lever for mobilizing social capital in rural Punjab, Pakistan? *Prospects, XXXVII* (1), 57-79.

Khan, S. H., & Saeed, M., & Fatima, K. (2009). Assessing the performance of secondary school headteachers: A survey study based on teachers' views in Punjab. *Educational management Administration and Leadership, 37*(6), 766-783,

King, E. M., & Guerra, S. C. (2005). Education reforms in East Asia: Policy, process, and impact. In The World Bank, *East Asia decentralizes: Making local government work* (pp. 179-207). Washington, DC: The World Bank.

Malik, R. (2013). Differential effects of single sex versus coed education on the personality development of primary school students. *Pakistan Journal of Social Sciences, 33*(1), 149-162.

McGinn, N., & Welsh, T. (1999). *Decentralization of education: Why, when, what and how* (Fundamentals of Education Planning – 64). Paris: UNESCO.

Mensah, Y. M., Schoderbek, M. P., & Sahay, S. P. (2013). The effect of administrative pay and local property taxes on student achievement scores: Evidence from New Jersey public schools. *Economics of Education Review, 34*, 1-16.

Ministry of Education of Government of Pakistan (1998). *National Education Policy 1998-2010*. Islamabad: Ministry of Education. Retrieved August 4, 2019, from https://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/pakistan_educational_policy_1998-2010.pdf

Morris, T. P., White, I. R., & Royston, P. (2014). Tuning multiple imputation by predictive mean matching and local residual draws. *BMC Medical Research Methodology, 14*(75), 1-13.

Odden, A. R., & Picus, L. O. (2014). *School finance: A policy perspective*. New York, NY: McGnaw-Hill.

Oumer, J. (2009). *The challenges of free primary education in Ethiopia*. Paris: UNESCO-IIEP.

Pakistan Bureau of Statistics (2019). *Population census*. Retrieved October 20, 2019, from http://www.pbs.gov.pk/population-tables

Penrose, P. (1993). *Planning and financing sustainable education systems in sub-Saharan Africa* (Education Research Paper No. 07). London: DFID.

Pfeffer, J., & Salancik, G. R. (1978). T*he external control of organizations: A resource dependence perspective*. New York, NY: Harper & Row.

Posey-Maddox, L. (2016). Beyond the consumer: Parents, privatization, and fundraising in US urban public schooling. *Journal of Education Policy, 31*(2), 178-197.

Punjab Education Sector Reform Programme (2013). *Annual School Census 2012*. Retrieved September 5, 2019, from http://www.pesrp.edu.pk/datacenter

Punjab Education Sector Reform Programme (2018). *School councils*. Retrieved June 14, 2018, from http://www.pesrp.edu.pk/pages/School-Councils

Rahim, B. (2017). Improving primary education in Pakistan: An examination of the association between school autonomy and children's learning outcomes. *FIRE: Forum for International Research in Education, 4*(1), 94-112.

Rahman, T. (1997). The medium of instruction controversy in Pakistan. *Journal of Multilingual and Multicultural Development, 18*(2), 145-514.

Razzaque, A., & Magno, C. (2013). Perspectives from Pakistan: Whose voice converge in Punjab and Sindh? Macro- and micro-local divergence regarding school leadership development. In C. S. Magno (Ed.), *Comparative perspectives on international school leadership: Policy, preparation, and practice* (pp. 148-178). New York, NY: Routledge.

School Education Department of the Government of Punjab (2018). *Functions*. Retrieved December 5, 2018, from https://schools.punjab.gov.pk/ourfunctions

Shah, D. (2003). *Country report on decentralization in the education system of Pakistan: Policies and strategies*. Islamabad: Academy of Educational Planning and Management, Ministry of Education, Government of Pakistan.

Springer, M. G., Liu, K., & Guthrie, J. W. (2009). The impact of school finance litigation on resource distribution: A comparison of court-mandated equity and adequacy reforms. *Education Economics, 17*(4), 421-444.

Srivastava, P., & Oh, S. (2010). Private foundations, philanthropy, and partnership in education and development: Mapping the terrain. *International Journal of Educational Development, 30*, 460-471.

StataCorp (2017). *Stata multiple-imputation reference manual: Release 15*. College Station, TX: A Stata Press publication.

Steiner-Khamsi, G. (2008). Donor logic in the era of Gates, Buffett, and Soros. *Current Issues in Comparative Education, 10*(1/2), 10-15.

Templin, J. (2012). *Equating*. Materials for the University of Michigan Inter-University Consortium for Political and Social Research (ICPSR) summer workshop on item response theory. Retrieved October 1, 2019, from https://jonathantemplin.com/teaching/

The World Bank (2009). *Six steps to abolishing primary school fees: Operational guide*. Washington, DC: The World Bank.

UNESCO (2003). *EFA global monitoring report 2003/04: Gender and education for all: The leap to equality.* Paris: UNESCO.

UNESCO (2008). *EFA Global Monitoring Report 2009. Overcoming inequality: Why governance matters*. Pars: UNESCO.

UNESCO (2013). *The global learning crisis: Why every child deserves a quality education*. Paris: UNESCO.

UNESCO (2015a). *Education 2030: Incheon declaration and framework for action for the implementation of Sustainable Development Goal 4*. Paris: UNESCO.

UNESCO (2015b). *EFA global monitoring report 2015: Education for all 2000-2015: Achievement and challenges*. Paris: UNESCO.

UNESCO (2015c). *Pricing the right to education: The cost of reaching new targets by 2030* (Education for All Global Monitoring Report Policy Paper 18). Paris: UNESCO.

UNESCO & UNICEF (2013). *Asia-Pacific end of decade notes on education for all: EFA goal 2: Universal primary education*. Bangkok: UNESCO Bangkok.

UNESCO Institute for Statistics. (2018a). *Data for the Sustainable Development Goals*. Retrieved October 10, 2018, from http://uis.unesco.org/en

UNESCO Institute for Statistics (2018b). *UIS.Stat*. Montreal: UNESCO Institute for Statistics. Retrieved October 10, 2018, from http://data.uis.unesco.org/

UNESCO Institute for Statistics, & UNICEF (2015). *Fixing the broken promise of education for all: Findings from the global initiative on out-of-school children*. Montreal: UNESCO Institute for Statistics.

UNESCO International Institute for Educational Planning, UNESCO Institute for Statistics, & IIEP Pôle de Dakar (2016). *Methodology of national education accounts*. Paris: UNESCO-IIEP.

Weidman, J. C., & DePietro-Jurand, R. (2011). *Equip2 state-of-the-art knowledge in education: Decentralization: A guide to education project design based on a comprehensive literature and project revie*w. Washington, DC: USAID.

Williams, R. (2018). *Missing data part II: Multiple imputation & maximum likelihood*. Revised February 2, 2018. Retrieved June 5, 2018, from https://www3.nd.edu/~rwilliam/

Williams, T. P., Abbott, P., & Mupenzi, A. (2015). 'Education at our school is not free': The hidden costs of free-free schooling in Rwanda. *Compare, 45*(6), 931-952.

Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed.). Mason, OH: South-Western, Cengage Learning.

Ye Tong, P., & Kolen, M. J. (2010). Scaling: An ITEMS module. *Educational Measurement: Issues and Practice, 29*(4), 39-48.

Zimmer, R. W., Krop, C., & Brewer, D. J. (2003). Private resources in public schools: Evidence from a pilot study. *Journal of Education Finance, 28*(4), 485-521.

Chapter 2. Stakeholder Salience in Multi-Stakeholder School Governance: Factors Facilitating and Constraining the Influence of Parents and Private Partners on School Decision-Making

Introduction

Governments and development partners have made significant progress in expanding access to education since 1990 with the global commitments to the Education for All (EFA) goals. International aid and domestic resources were mobilized to increase the supply of schools, while accelerating the demand for education by removing social, cultural, and economic barriers, with an emphasis on the disadvantaged (UNESCO, 2015b). As a result, the global net enrollment rate in primary education increased from 82% to 89% between 1990-2015, while the number of out-of-school children of primary-school age fell by 43% despite the rapid growth of the child population (UNESCO Institute for Statistics, 2018c).

However, schooling does not necessarily mean learning. Governments in many countries have failed to provide quality education to the increasing number of students due to their insufficient technical and financial capacity to, for example, revise school curricula, recruit and train qualified teachers, provide quality learning materials, and use assessment to improve teaching and learning (UNESCO, 2013). The consequence is that an estimated 130 million children who were enrolled in primary school are still not able to read, write, or count well (UNESCO 2014). 200 million children and adolescents leave school without learning basic skills and knowledge they need to thrive in their society (UNESCO, 2013). The learning crisis is a global challenge that is happening in both developed and developing countries (UNESCO Institute for Statistics, 2018b). When put into monetary terms, the cost of the learning crisis is estimated to be 129 billion US dollars per year (UNESCO, 2014).

One of the policy responses to the learning crisis, adopted by many governments, is the decentralization of education governance from a central government to the school and community levels (UNESCO, 2008). By allowing decision-making authority to reside with local stakeholders, who better understand their children's educational needs, education decentralization is assumed to improve the quality of education (Barrera-Osorio et al., 2009; UNESCO, 2015b). In particular, engaging parents in school decision-making is considered an important mechanism for holding schools accountable for the delivery of quality education services since parents have direct incentives to improve education for their children (Barrera-Osorio, et al., 2009). Education decentralization also promotes participation of private partners, such as firms and non-governmental organizations (NGOs), in school management as a means to strengthen the capacity of local school authorities to provide quality education (Macpherson, 2016; Miraftab, 2004; Nambissan & Ball, 2010; UNESCO, 2008). In light of the above background, the discourse on multi-stakeholder partnerships and collaborative governance has become more prominent as of late (Menashy, 2013). Developing partnerships with various external stakeholders including parents, civil societies, and private-sector organizations is recognized as a key strategy for achieving the globally agreed education target in the Sustainable Development Goals (SDGs), inclusive and equitable quality education for all (UNESCO, 2015a, 2019).

However, the global discourse on multi-stakeholder partnerships does not adequately take into account the nature of accountability relationships developed at school. The participation of external stakeholders in school governance creates multiple-accountability relationships in which schools are required to respond to diverse, potentially conflicting interests and demands of various stakeholders. In such multi-stakeholder governance, external stakeholders are considered to be able to influence school decisions when their interests and concerns generate enough attention to outweigh the priorities of government and demands of other parties. This indicates that simply developing partnerships with external stakeholders and promoting collaborative governance does not change school decisions, nor does it affect school policy and practices. This notion raises a question: under what conditions do interests and concerns of external stakeholders receive sufficient attention so that they are able to influence school decisions?

Although there is a rich body of literature on engagement of external stakeholders in school governance, few systematic efforts have been made to identify factors that affect the level of their influence on school decisions. This poses a challenge in understanding the conditions under which stakeholder influence becomes salient and may affect educational outcomes. In cases where school personnel do not adequately respond to demands of a particular stakeholder group, identifying the conditions becomes important so that interventions may be designed to increase the influence of external stakeholders in multi-stakeholder school governance.

In order to address this limitation of the existing literature, I conducted a systematic literature review to identify factors affecting the influence of parents and private partners on school decision-making. I used the stakeholder salience theory as a conceptual framework to organize emergent insights from the literature and assess how identified factors facilitate or constrain their influence. The findings were applied to participatory school governance in Pakistan in order to examine how these factors affect the influence of external stakeholders in a particular country context and to identify areas of interventions that may strengthen their influence. Based on the results of analysis, I present a new framework that addresses multi-dimensional and interrelated nature of stakeholder influence in school governance.

The study contributes to the literature on school governance by providing insights into factors that affect external stakeholders' influence in school governance and ways to leverage their participation for achieving better educational outcomes in decentralized education system.

The findings of this study suggest that multi-stakeholder partnerships and collaborative governance are more likely to generate expected outcomes when a range of multi-dimensional and interrelated factors at the country, organizational, and individual levels are aligned to strengthen the influence of target stakeholders. This suggests the importance of taking a holistic approach to identify factors that affect stakeholder influence in a given context.

Literature Review

In this section, I provide a literature review on 1) education decentralization, 2) participation of parents and private partners in school management, and 3) multiple-accountability relationships in school governance.

Education Decentralization

Decentralization of school education management to local levels, such as local government, schools, and communities, has been a phenomenon seen in both developed and developed countries. In Europe, an increasing number of countries have been transferring decision-making authority to the local school level since the 1980s (Urbanovič & Patapas, 2012). School autonomy was promoted as a means to reach out to local communities and strengthen democratic participation, and, since the 1990s, as a way to address concerns over educational effectiveness and efficiency (Iftene, 2014).

In the United States, school autonomy reform that aims to engage local community members in site-based management has been promoted since the 1980s as a response to the perceived failure of school systems and a lack of accountability (Shatkin & Gershberg, 2007). While the federal and state governments have increased their control over education, (Hess & Meeks, 2013; Malen, 2003), actions at the local level have arisen, in forms such as parental pushback against standardized testing and a core curriculum, and increased parental representation in local school boards (Smrekar & Crowson, 2015).

In developing countries, responsibilities for education management became the purview of sub-national governments in the 1970s with the rapid expansion of education systems (Edwards & DeMatthews, 2014). Since the 1980s, the responsibilities have further shifted to local schools and communities in efforts to establish community-accountability mechanisms to improve educational quality and efficiency (Edwards & DeMatthews, 2014). The decentralization of educational management in developing countries was driven by international organizations through Structural Adjustment Programs (SAPs). During the 1970s-1980s, developing countries suffering from debt crises received loans from international donors with the conditions that they would adopt neoliberal reforms such as privatization and decentralization of government functions. These reforms were designed to reduce the roles of central government as a means to address short-term fiscal imbalances and realize an economic growth. The economic crises and SAPs, which resulted in reduction in public revenue and expenditure, created internal and external pressures to shift responsibilities of social service delivery to sub-national and local levels (Carnoy, 1995; King & Guerra, 2005).

Participation of External Stakeholders in School Management

In the decentralized education system, participation of external stakeholders such as parents and private partners in school management has been promoted as a means to improve educational effectiveness and efficiency.

Participation of parents. Education decentralization is accompanied by specific reforms, which include participation of local community members in school management (Weidman & DePietro-Jurand, 2011). Such a participatory governance is called school-based management

(SBM), referring to the transfer of decision-making authority over school management to stakeholders such as principals, teachers, parents, students, and other community members at the local school level (The World Bank, 2008). Although SBM can take the form of various operational models depending on the locus of primary decision-making authority (Leithwood & Menzies, 1998), most SBM involves parents in school decision-making (Barrera-Osorio et al., 2009). Parents' participation in school management is often facilitated by the establishment of local school governance bodies such as school management committees (SMCs) and school councils (Bruns et al., 2011). These school governing bodies provide parents with a formal channel to participate in school decision-making (Shatkin & Gershberg, 2007).

Parent participation in school management has been promoted as a means to improve the effectiveness and efficiency of school education services since they are assumed to have direct incentives to improve their child's education and to know their child's learning needs more than others (Barrera-Osorio et al, 2009). It is argued that the positive effects of parental participation would be realized through various channels, including: 1) enhancing transparency and accountability through more stringent monitoring of school operation and outcomes, 2) increasing school resource and investment by facilitating contribution from communities and mitigating corruption, 3) facilitating efficient use of resources by achieving a better match between students' learning needs and school offerings, and 4) decreasing administrative cost by reducing intermediary administrative levels and relying on voluntary committees to manage the school (Barrera-Osorio et al., 2009; Bruns et al., 2011; Edwards & DeMatthews, 2014). An increasing number of countries have introduced SBM reforms to leverage these mechanisms for improving the performance of their education system (Bruns et al., 2011; UNESCO, 2008).

Participation of private partners. Educational decentralization has also promoted participation of private partners such as firms and NGOs. Lower tiers of government received new responsibilities under education decentralization without matching technical capacity (Cheema, 1993; Smoke, 1993). The lack of internal capacity, coupled with international pressure, urged local governments and schools to form public-private partnerships (PPPs) to obtain expertise from the private sector in order to fulfill their public missions and mandates (Macpherson, 2016; Miraftab, 2004; Nambissan & Ball, 2010; UNESCO, 2008).

For example, public schools have increasingly outsourced their educational functions to private partners in order to leverage their unique expertise for improving the quality and efficiency of education services (Ball & Youdell, 2008; Murphy et al., 1998). Examples include outsourcing of school inspection services in countries of the Gulf region to a non-profit organization based in the United Kingdom (Churches & McBride, 2013). Outsourcing of whole school management to private partners has also become popular. Examples include charter schools in the United States (Kena, et al., 2015), independent schools in Qatar, (Constant et al., 2010) and concession schools in Bogotá, Colombia (Villa & Duarte, 2005). In addition, it has been increasingly common to invite or appoint representatives from firms, trade unions, universities, and charitable organizations to local school governing bodies in order to utilize their professional and managerial expertise for school management (Balarin et al., 2008; Sliwka & Istance, 2006).

Multiple-Accountability Relationships in School Governance

Education decentralization, with increased parental participation intertwining with PPPs, forms multiple-accountability relationships in school governance. Schools now need to handle tensions between various stakeholders who have unique interests and stakes in the delivery of school education services.

Formation of multiple-accountability relationships. Traditionally, public agencies operate according to top-down hierarchical accountability relationships, in which the agencies are responsible for meeting political, legal, and organizational expectations and mandates set by government authorities (Bovens, 2007). However, as direct accountability relationships with parents are formed through their engagement in school management, the hierarchical (vertical) accountability has been augmented by a new horizontal accountability, which changes how schools perform decision-making (Bovens, 2007; Hooge et al., 2012).

The accountability relationships have become further complicated due to an increasing number of private partners engaging in school education. Playing integral roles in school operation and management, these private partners are seen as important interest groups to whom schools must be accountable (Acar et al., 2012). To satisfy these multiple stakeholders, schools develop a series of principal-agent relationships in which schools as agents are motivated to act on various principals in political, administrative, professional, and public service realms (Adnett, 2004; Ferris, 1992).

Accountability dilemma. Since the priorities of the government and the interests of parents and private partners are not necessarily compatible with one another, achieving democratic consensus on educational issues has grown more difficult (Begley & Zaretsky, 2004). As a result, schools face an accountability dilemma between meeting national objectives and standards as hierarchical mandates and ensuring responsiveness to parents and other partners (Bauch, 2001; Burns & Köster, 2016). For example, there are reported cases where schools face conflicts and pressures in meeting competing expectations of governments and local communities (Begley & Zaretsky, 2004; Wildy & Louden, 2000). In decentralized education systems, schools are required to deal with tensions between various stakeholders who have unique interests and stakes in how education services are delivered to students.

Problem Statement, Research Question and Contribution

The literature suggests that parents and private partners are able to influence school decisions, and possibly educational outcomes, when their interests and concerns receive enough attention to overpower the priorities of the government and demands of other parties. This raises a question: what conditions need to be met so that parents and private partners are able to influence school decisions in the multiple-accountability relationships?

Although there is a rich body of literature on engagement of external stakeholders in school governance, and while there are a fair number of studies that shed light on the potential factors affecting the level of the stakeholder's influence, the evidence is scattered across diverse sub-fields without being synthesized. The challenge then becomes understanding the conditions under which an external stakeholder's influence becomes salient in multi-stakeholder school governance.

This study conducts a systematic review to answer following research question: what are key factors in facilitating or constraining the influence of parents and private partners on school decisions in instances of multi-stakeholder school governance. Understanding the conditions is important for policy makers who seek to leverage the participation of parents and private partners for improving educational outcomes. The study also contributes to the literature on school governance by providing insights into ways to identify and assess attributes of stakeholders' influence in multi-stakeholder school governance.

Conceptual Framework

I use the stakeholder salience theory as a conceptual framework to organize emergent insights from the literature and to analyze the conditions under which parents and private partners exert influence over school decisions in multi-stakeholder school governance.

Stakeholder Theory

The stakeholder theory was first proposed by Freeman (1984) as an approach to organizational management and business ethics in the corporate sector. He defined stakeholders as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (p. 46). Since these groups have a stake, and thus play a critical role in the success and survival of the organization, the organization must understand and address the key issues of each stakeholder group (Freeman, 1984, pp. 25-26). In other words, the organization's success depends on its ability to create value and satisfaction for stakeholders, which means it is accountable for fulfilling responsibilities to the stakeholder groups (Clarkson, 1995).

Difficulties in stakeholder management can arise from conflicts between stakeholders. In a normative sense, each stakeholder has legitimate interests in the organization's activities that are of intrinsic value (Donaldson & Preston, 1995), and therefore no set of interests is assumed to dominate the others (Jones & Wicks, 1999). However, organizations are unlikely to meet all the expectations and demands of each stakeholder equally (Jawahar & McLaughlin, 2001). In reality, organizations decide which stakeholders' interests get more attention and higher priorities (Buchholz & Rosenthal, 2004). In order to understand why organizations choose to deal with some stakeholders over others, we need to examine "who and what really counts" (Freeman, 1994, p. 412).

Stakeholder Salience Theory

In order to address the preferential treatment of some stakeholders over others, Mitchell et al. (1997) proposed the theory of stakeholder salience, which defines “the degree to which managers give priority to competing stakeholder claims” (p. 854). According to the theory, influence of stakeholders is multi-faceted and determined by the relative presence of three attributes: 1) the legitimacy of the stakeholder’s relationship with the organization, 2) the power of the stakeholder to influence the organization, and 3) the urgency of the stakeholder’s claim on the organization (Mitchell et al., 1997). The theory is not free from limitations and criticisms, which include a lack of distinction between moral and pragmatic legitimacy, a reduced importance on the role of urgency, and insufficient methods for capturing and measuring the varying degrees of the attributes (Neville, et al., 2011). However, the theory still provides a useful framework to identify and understand the conditions under which parents and private partners exercise influence over school decisions in multiple-accountability relationships.

Mitchell et al. (1997) proposed a typology of stakeholders based on the presence of three attributes of influence, as shown in Figure 2.1. In multi-stakeholder school governance, the government is considered to be a definitive stakeholder with a constitutional legitimacy and political and financial power to enforce implementation of policy and regulation on school, which are formulated as urgent/critical mandates. However, in a decentralized education system, school personnel pay attention to other stakeholders as well. According to Mitchell et al.’s typology, the influence of these other stakeholders over school decision-making is assumed to increase as they gain legitimacy, power, and urgency. Using the stakeholder salience theory as a conceptual framework, this study aims to identify factors that facilitate or constrain the influence of parents and private partners on school decisions from the perspectives of legitimacy, power, and urgency.

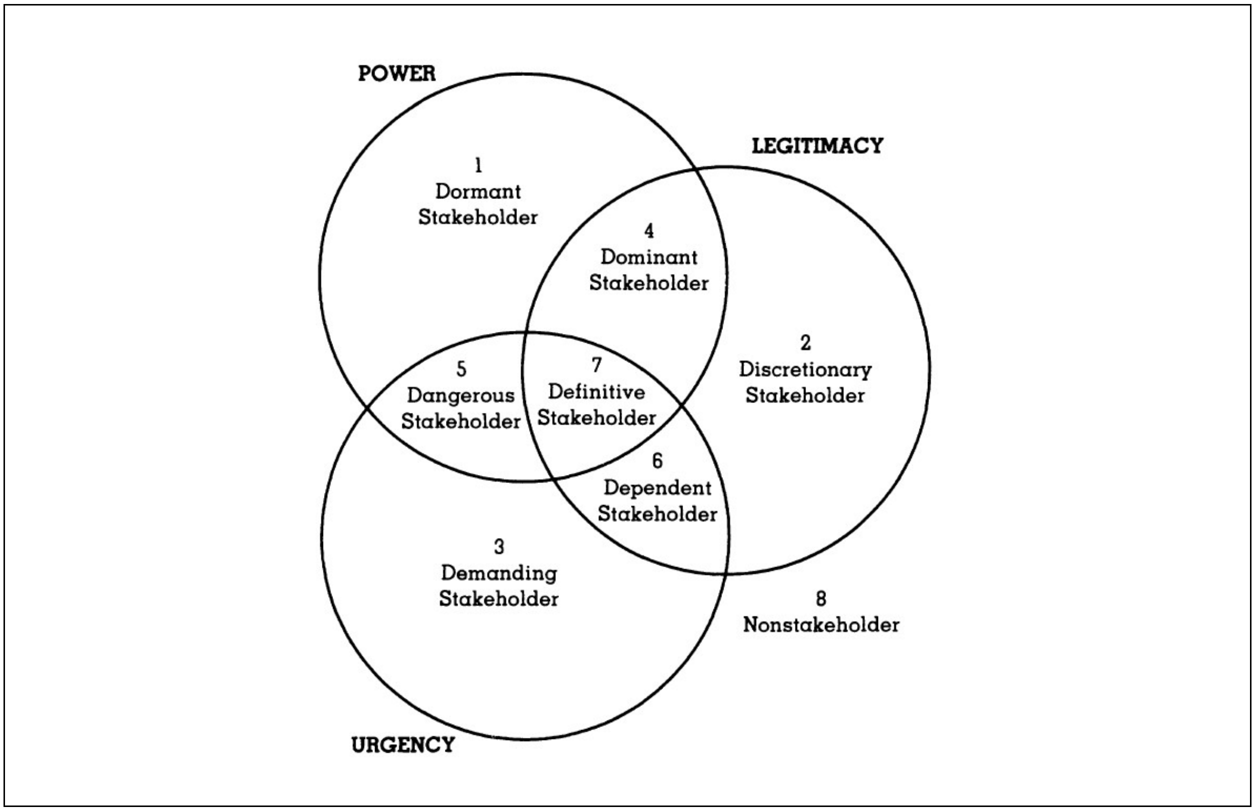


Figure 2.1. Attributes of stakeholder salience and stakeholder typology. Reprinted from "Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts," by R. K. Mitchell, B. R. Agle, and D. J. Wood, 1997, *The Academy of Management Review, 22*(4), p. 874. Copyright 1997 by Academy of Management. Reprinted with permission.

Methodology

This study performs a systematic literature review to identify conditions in which parents and private partners influence school decisions in multi-stakeholder school governance, using the framework of stakeholder salience theory. I then apply the findings to participatory school governance in Pakistan to examine how these factors affect the influence of external stakeholders in a particular country context and identify areas of interventions that may strengthen their influence.

Selection of Studies

I conducted a systematic search of studies that shed light on attributes of stakeholder influence on school decisions, using all 104 databases available through ProQuest at Michigan State University. The databases cover a broad of array of literature in diverse disciplinary fields spanning education (ERIC) to economics (EconLit), sociology (Sociological Abstracts), and psychology (PsycINFO), among others. I did not limit the databases since the stakeholder salience is an inter-disciplinary theory by nature and its application to school education can be analyzed by a variety of research methods. In addition to the ProQuest databases, I used Google Scholar to expand my search to studies and reports published by non-academic institutions.

In order to capture a wide range of sources, I did not restrict search parameters by type of documents (i.e., scholarly articles, books, dissertations, working papers, etc.), by field (i.e., author, publication title, abstract, document text), or by geographic limit. However, I did limit my search to studies in English published between 1997 and 2018. This allowed me to find the most recent research published since the stakeholder salience theory was formalized by Mitchell et al. (1997).

I used adjacent terms in closed quotation marks (e.g., “stakeholder salience”) combined with Boolean operators (e.g., “AND” and “OR”) to enhance the search process. The first search condition was an inclusion of one of the following adjacent terms: “stakeholder salience”; “stakeholder influence”; or “stakeholder theory”. I did not include terms that specify particular stakeholder groups such as “parent” and “private partners” since it could exclude other important external stakeholders such as foundations, charities, philanthropy, and religious organizations. The second search condition was an inclusion of one of the topic-based search terms related to school decision-making (e.g., “school governance,” “school management,” “school decision,” and "school accountability"). These two search conditions helped winnow the body of studies to those related to stakeholder influence on school decisions[11]. This preliminary search process led to the identification of 312 studies through ProQuest and 528 studies through Google Scholar.

These studies were then reviewed to determine their appropriateness for this study. First, I reviewed the abstract of these studies and excluded those targeting at the non-education sectors and fields, such as studies in the corporate sector and environmental management. Second, I reviewed the abstract and/or main text of the education studies to exclude studies in the field of higher education. Third, I carefully reviewed the main text of the education studies at the basic school education level to identify those examining the influence of external stakeholders and providing insights into factors affecting their influence. I excluded materials only concerned with the influence of school personnel (i.e., principals and teachers), as well as those exploring the influence of external stakeholders but not the factors affecting their influence. This resulted in the final selection of 33 studies.

Data

This section provides a summary of publication type, target region, and primary research methods of the 33 studies. Table 2.1 shows that the majority of studies are journal articles. The sample also includes several book chapters and agency reports, many of which provide detailed description of stakeholder influence in school governance. I also included a doctoral dissertation and a conference paper that shed light on unique factors of stakeholder influence.

[11] See Appendix 2A for further detail on search language.

Table 2.1.
Literature Classification by Publication Type

Publication type	Count
Journal articles	22 (67%)
Book chapters	6 (18%)
Agency reports	3 (9%)
Doctoral dissertation	1 (3%)
Conference paper	1 (3%)
Total	33 (100%)

Table 2.2 shows the distribution of geographical foci within the sample. Studies discussing topics within countries in Europe and North America each represent 33% of the sample. Five studies focus on African countries, followed by three studies in Asia and the Pacific. Studies concentrated in the Middle East and the Latin America and Caribbean regions were not selected, reflecting scarcity in the overall topic and a total lack of studies exploring factors that moderate a stakeholder's influence. Although the sample is not geographically balanced, it covers studies from both developed and developing countries.

Table 2.2.
Literature Classification by Region

Region	Count
Africa	5 (15%)
Asia and the Pacific	3 (9%)
Europe	11 (33%)
Latin America and the Caribbean	0 (0%)
Middle East	0 (0%)
North America	11 (33%)
Multiple regions	3 (9%)
Total	33 (100%)

Table 2.3 shows that qualitative research methods are used in the majority of studies, accounting for 70% of the sample. About half of the qualitative studies used a case-study approach that examined stakeholder influence in particular analytical units such as districts and schools. The other half used narrative/descriptive synthesis where researchers review and synthesize findings from multiple studies. On the other hand, quantitative research accounts for

21% of the sample; data analysis is conducted through inferential statistics such as statistical testing, regression analysis, and path analysis. Three studies used mixed methods, combining both qualitative and quantitative methods.

Table 2.3.
Literature Classification by Primary Research Method

Primary research method	Count
Qualitative	**23 (70%)**
Case study	11 (34%)
Narrative/Descriptive synthesis	12 (36%)
Quantitative	**7 (21%)**
Descriptive	0 (0%)
Inference (e.g., regression, statistical testing)	7 (21%)
Mixed method	**3 (9%)**
Total	33 (100%)

It is important to note that, although the majority of the studies are found in academic journals, their quality is not uniform. Some studies have less rigor in terms of internal and external validity as well as reliability. Nonetheless, I kept these studies since they still provide unique insights into this study that explores various attributes of stakeholder salience.

Analysis

Using stakeholder salience theory as a conceptual framework to organize emergent insights from the literature, I identified and assessed factors affecting the influence of external stakeholders on school decisions. First, I carefully reviewed the selected studies to find evidence of and/or insights into factors that either facilitate or constrain the influence of parents and private partners in multi-stakeholder school governance. The identified factors were then categorized into the three attributes (legitimacy, power, and urgency) of stakeholder influence. It is important to note that, although these factors were identified in a systematic manner based on the theoretical framework presented above, they were drawn from the selected literature and therefore not comprehensive. In addition, these factors were identified from research conducted in diverse fields from multiple countries and therefore do not speak to any particular context.

Second, the findings were applied to participatory school governance in Pakistan in order to examine how these factors affect the influence of external stakeholders within a particular context and to identify areas of interventions that may strengthen their influence. Based on the results of analysis, I presented a new framework for addressing the multi-dimensional and interrelated nature of stakeholder influence in school governance, one which is not adequately captured by the stakeholder salience theory.

The remainder of this paper presents and discusses the findings. In the subsequent section, I refer to parents and private partners as external stakeholders since they are actors who are traditionally not engaged in school governance but can affect or be affected by school education.

Results

The systematic review of literature identified a number of factors contributing to increased influence of external stakeholders in school governance. The identified factors are categorized and presented according to the three attributes of stakeholder influence: legitimacy, power, and urgency.

Legitimacy

In the stakeholder salience theory, legitimacy is defined as, "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, as cited in Michelle et al., 1997). In this context, legitimacy of external stakeholders to influence school decisions is determined by the extent to which their actions on school are perceived appropriate and desirable. The literature further suggests that the stakeholders' influence becomes salient when their role in school governance is legitimized by: 1) education law and policy that support participation in school decision-making, 2) representation in school governing bodies, and 3) devolution of decision-making authorities to school and local levels.

1) Law and policy that support participation in school governance. External stakeholders have greater chances to influence school decisions when their role in school governance is legitimized through legal rights and obligations or policy priorities. Laws and policies help designate targeted groups as legitimate stakeholders allowed to engage in school decision-making.

Involvement of parents and other community members in school governance is codified as a set of legal rights and obligation in many countries. In the United States, parental engagement in school affairs was strengthened by the No Child Left Behind (NCLB) Act, which required Title I schools serving low-income and at-risk students to develop a parental involvement policy as a condition to receive financial aid (Rapp & Duncan, 2012). In the United Kingdom, involvement of parents in school decision-making was formally introduced and strengthened with the enactment of the Education Act in 1986 and Education Reform Act in 1988 (Farrell & Jones, 2000). Finland passed the Basic Education Act in 1999, which requires schools to be developed in close cooperation with parents (Silwka & Istance, 2006). In Sweden, education laws confer rights to parents, allowing them to take part in school management (Holmgren et al., 2012). National legislation requires the engagement of external stakeholders in less developed countries as well. In South Africa, participation of parents and community members in school decision-making was formalized by the South African School Act of 1996 (Botha, 2007). In Mozambique, parental engagement in school management is supported by national law (Taela et al., 2018).

Education policy also contributes to legitimizing the participation of external stakeholders in school decision-making. For instance, studies in the United States found that district education policy plays an important role in promoting participation of community members in school governance and decision-making (Gordon, 2012; Gordon & Louis, 2013). Overall, the literature suggests the importance of education law and policy as institutional mechanisms to establish and strengthen the legitimacy of external stakeholders to influence school decisions in both developed and developing countries.

2) Representation in school governing bodies. The influence of external stakeholders is further strengthened when their role in school governance is legitimized by their representation in school governing bodies such as SMCs and school councils. These school governing bodies are established upon approval of school authorities as a function of school management. Therefore, their membership of school governing bodies helps external stakeholders secure and strengthen their legitimacy to participate in school governance and decision-making.

In fact, the literature suggests that representation of external stakeholders in school governing bodies facilitates their influence over school decisions. Using a path analysis, a study in the United States found that school council enabled the influence of its members over school decisions (Bauer & Bogotch, 2001). The finding is also supported by other studies in the United States, which found that parental representation in school governing bodies facilitates their participation in school decision-making (Gordon, 2012; Gordon & Louis, 2013). In Denmark, where parents have long played a role in supporting school operation, their influence on school decisions has been further strengthened since the boards of school governors consisting of parents were created (Sliwka & Istance, 2006).

It is important to note that the representation of external stakeholders in school governing bodies is often supported by education law. For example, parental representation in school governing bodies is secured by legislations during the 1980s in the United Kingdom (Connolly et al., 2017; Farrell & Jones, 2000), the Framework Law in Bosnia and Herzegovina (Komatsu, 2012), education laws in Sweden (Holmgren et al., 2012), and the School Act 1996 in South Africa (Hlongoane, 2016; Quan-Baffour & Arko-Achemfuor, 2014).

3) Devolution of decision-making authorities to school/local level. Representation in school governing bodies under the auspice of education law and policy does not mean that external stakeholders can influence all aspects of school education. They are allowed and expected to participate in decision-makings in those items that have been delegated to school and local levels. Therefore, whether external stakeholders can influence school decisions also depends on the degree and area of decision-making authorities that have been devolved to the school and local levels and which codify the legitimacy of their roles in school governance. For instance, a case study of schools in Hong Kong found that the scope of decision-making authority delegated to parents affected the degree of parental influence over the schools (Ho, 2012). A case study in the United Kingdom suggests that a devolution of decision-making authority to local school governing bodies enabled parents to play major roles in school decision-making (Farrell & Jones, 2000). In the United Sates, researchers found that stakeholders' influence in SBM increases when greater decision-making authority is delegated to school councils (Bauer & Bogotch, 2001). These studies suggest that a devolution of decision-making authorities is an important mechanism for local-level external stakeholders allowing them to exert influence over school decisions legitimately.

Power

Although the importance of legitimacy is addressed, the influence of external stakeholders on school decisions is conditional on not only their legitimacy but also their power to get their interests and concerns to be prioritized in school decisions. The literature suggests that participation of external stakeholders in school decision-making is not necessarily realized at the local administration level even when education law and policy support it in a decentralized education system (Botha, 2007; Evans & Radina, 2014; Gordon & Louis, 2009). For instance, even if external stakeholders participate in school governance as a legitimate member of a school governing body, school personnel such as principals, teachers, and other school staff tend to dominate decision-making processes, leaving little room for external stakeholders to exert meaningful influence (Farrell, 2005; Kofod et al., 2016; Komatsu, 2012). Comparative case studies of school boards in Nordic countries indicate that school professionals use their ability to control information and agenda-setting so that influence of other members are limited (Nihlfors et al., 2014). The evidence suggests that, in the presence of multiple stakeholders who have the legitimacy to participate in school governance, the most powerful are those who are able to get their interests and concerns prioritized over others.

In school governance, unequal positions of power enable more powerful stakeholders to dominate weaker ones in decision-making on school-related issues (Anderson, 1988; Cornwall, 2002; Hooge et al., 2012). In an effort to understand the basis for power, Mitchell et al. (1997) argue that power to impose one's will in a relationship designates the extent the party has access to coercive, utilitarian, or normative means. The question here is what factors help external stakeholders gain coercive, utilitarian, or normative means as a source of power to influence school decision-making. The literature suggests that the power of external stakeholders is facilitated by: 1) factors that strengthen their capacity to influence school decisions, and 2) factors that promote a school's openness to shared decision-making.

1) Factors strengthening the capacity to influence school decisions. The literature suggests that external stakeholders are able to exert greater influence when they are equipped with sufficient capacity to participate in school governance and decision-making. Their capacity is enhanced by: 1) social and cultural norms that facilitate participation, 2) their interest in school education, 3) their ability to participate in school governance in terms of time and distance, 4) skills and knowledge that allow them to take an active role in school governance, 5) decision-making mechanisms in favor of external stakeholders, and 6) an alignment of interests for forming a coalition.

1-1) Social and cultural norm that facilitate participation. The capacity of external stakeholders to participate in school governance can be facilitated or constrained by social and cultural norms in a given country. Social and cultural norms mean informally shared expectations that govern individual behaviors within social group. In this sense, such country-specific norms would affect stakeholders' ability and willingness to participate in school governance. For instance, it is suggested that the long history of and experience with supply-dominated administrative systems in central and eastern Europe formed social and cultural norms that leave school-related decisions to education professionals (Silwka & Istance, 2006). This indicates that social and cultural norms play a role in facilitating or limiting the capacity of external stakeholders to influence school decisions.

1-2) Interest in school education. The power of external stakeholders to influence school decisions is also subject to a degree on their interests in school education. For example, a study in Australia found that one of the common barriers to parental participation in school affairs is a lack of interests in school education of their children (Povey et al., 2016). A study in the United States also suggests that parents who have low expectations regarding school education are less likely to participate (Rapp & Duncan, 2012). These examples indicate that those who have a higher level of interest in school education will have greater power to influence school decisions. The literature also suggests that parents' interests in school education are affected by various factors, including parents' racial and socioeconomic status, age of their child, and school level enrolled (Rapp & Duncan, 2012; Sliwka & Istance, 2006).

1-3) Ability to participate in school governance (time / distance). Power of external stakeholders to influence school decisions is also subject to their ability to physically participate in school governing bodies. The literature suggests that their ability can be constrained by availability of time and distance to school.

The literature provides the evidence that participation of parents and community members in school governance and decisions are limited due to time constraints in the United States (Bauer & Bogotch, 2001, 2006), Australia (Povey et al., 2016), and Sweden (Holmgren et al., 2012). The issue of time availability is related to family wealth in some countries. For example, studies in the United States found that parents from poor households are less likely to participate in school since they face greater needs to work in the daytime (Gordon, 2012; Rapp & Duncan, 2012). Time constraints are also applicable to participation of private partners. A mixed-methods study in the United Kingdom found that, although business partners are invited to join school management, their participation is hampered by time constraints (Balarin et al., 2008).

The distance to school also limits the ability of external stakeholders to participate in school governance. A case study of school councils in Mozambique found that parental participation in school council is constrained by a long distance from their home to school (Taela et al., 2018). The issue of distance is also related to family wealth. In South Africa, many parents in rural communities, especially those from poor households, do not have a means to travel to school to participate in school management (Botha, 2007). A lack of financial resources to travel to schools among poor parents is also recognized as a barrier to participate in school governance in Australia (Povey et al., 2016) and the United States (Rapp & Duncan, 2012).

The literature however indicates that an ability of stakeholders to participate in school governance could be facilitated by use of technology. Case studies of schools in the United Kingdom and Indonesia suggests that participation of external stakeholders and their interaction with school was enhanced by using various technologies such as e-mail, websites, electronic newsletters, e-forums, e-learning, and social media (Yusuf et al., 2016). This implies that technology use has a potential to empower external stakeholders to take part in school governance.

1-4) Skills and knowledge necessary for taking an active role in school governance. The power of external stakeholders to influence school decisions is also affected by the possession of the skills and knowledge necessary for taking an active role in school governance, which suggest the importance of capacity development.

First, the literature suggests that external stakeholders need certain skills in order to participate in school governance and decision-making (e.g., Bauer & Bogotch, 2001, 2006; Farrell & Jones, 2000). These skills include basic literacy skills as well as technical expertise in school planning and management. For example, parents who have language barriers are less likely to participate in school affairs in the United States (Rapp & Duncan, 2012). Studies in South Africa also found that external stakeholders have limited power to take an active role in school decision-making due to illiteracy and a lack of skills for handling issues related to school policies and budgeting (Botha, 2007; Quan-Baffour & Arko-Achemfuor, 2014).

Second, the power of external stakeholder to influence school decisions is also limited by a lack of professional and technical knowledge about education and school, which gives school personnel advantage to control decision-making process (Balarin et al., 2008; Quan-Baffour & Arko-Achemfuor, 2014). In fact, a study in the United States found that parent associations have a limited influence on areas where professional knowledge and judgement are needed, such as teacher professional development and staff hiring (Ni et al., 2018). It is suggested that external stakeholders are more likely to exert meaningful influence when they have knowledge about education policy, school operation, curriculum, and the rules of participation (Auerbach, 2012).

Given the recognition of a lack of skills and knowledge among external stakeholders, several studies raised the importance of training and of capacity development programs as a means of empowering stakeholders so they may take an active role in school governance and decision-making processes (e.g., Bauer & Bogotch, 2006; Quan-Baffour & Arko-Achemfuor, 2014).

1-5) Decision-making mechanisms in favor of external stakeholders. External stakeholders gain greater power to influence school decisions when decision-making mechanisms in school governance are designed to empower them. For instance, a study in the United States showed that electoral mechanisms for school council membership, rather than appointed mechanisms, contribute to extending its membership to external stakeholders, which facilitates their influence in school governance (Gordon & Louis, 2009). In South Africa, parents hold a majority of votes in school governing bodies under the country law, which contributes to strengthening their relative power to reflect their interests and concerns in school decisions

(Levy & Shumane, 2017). The South African School Act of 1996 also granted parents the right to take a position of treasurer in school governing bodies and the authority to approve annual school reports (Hlongoane, 2016). These examples suggest that the influence of external stakeholders will increase when decision-making mechanisms in school governance are designed to give them greater decision-making power relative to school personnel.

1-6) Alignment of interests for forming a coalition. The power of external stakeholders to influence school decisions is also strengthened when they are partnered with other influential stakeholders who have similar interests. For instance, a study in the United States found that members of a local school committee were able to gain greater bargaining power by banding together for shared goals (Gordon, 2012). A study of Nordic countries found that school board members increased their power to influence school decisions when they had connection with municipal councils, which possess strong political power (Paulsen et al., 2016). The literature suggests that alignment of interests opens up opportunities to form a coalition that helps external stakeholders gain greater power to influence school decisions.

2) Factors promoting a school's openness to shared decision-making. The power of external stakeholders to influence school decisions is determined by not only their capacity but also the school's openness to shared decision-making. In other words, external stakeholders gain greater power when school personnel value participatory school governance, provides a cooperative climate for their participation, and listens to their voice (Auerbach, 2012; Gordon, 2012; Gordon & Louis, 2013; Ho, 2012). The literature suggests that a school's openness and willingness to cooperate is facilitated by 1) social and cultural norms supporting participatory governance, 2) the school's organizational experience with participatory governance, 3) a sharing of school goals and objectives, 4) offerings of expertise and resources of value to the school by external stakeholders, and 5) accountability pressure.

2-1) Social and cultural norms that support participatory governance. Country-specific social and cultural norms affect not only the capacity of external stakeholders to participate in school governance but also the school's openness and attitude to shared decision-making. For instance, case studies of education governance in Nordic countries suggest that the country's history and tradition of education administration impact practices of stakeholder engagement (Kofod et al., 2016). In central and eastern Europe, it is suggested that the long history of supply-dominated education systems have contributed to creating a culture of discouraging parental involvement in school governance (Sliwka & Istance, 2006). These examples indicate that sharing of decision-making power with external stakeholders at school is a reflection of social and cultural norms, derived from the country's history and tradition.

2-2) School's organizational experience with participatory governance. A school's organizational experience with participatory governance also facilitates the school's openness to shared decision-making. A study in South Africa found that schools possessing experience with a mutually-supportive participatory governance during an earlier period are more likely to engage external stakeholders in school management at a later date (Levy & Shumane, 2017). On the other hand, a study in the United States found that stakeholder engagement is relatively weak in schools with a history and culture of keeping parents and community members on the periphery (Gordon & Louis, 2013). These examples suggest that a school's prior experience with stakeholder engagement helps facilitate the school's openness to shared decision-making.

2-3) Sharing of school goals and objectives. The power of external stakeholders is strengthened when goals and objectives of the school are shared among stakeholders. This also fosters an atmosphere of openness to shared decision-making. For instance, a study in the United States found that school-based management is more likely to realize greater influence of external stakeholders when school council members share school goals and objectives (Bauer & Bogotch, 2001). This implies that school personnel can view participation of external stakeholders as a means to achieve their goals when these goals are common interests among stakeholders. This suggests the importance of building a consensus on school goals and objectives as a means to promote a school's openness to and cooperation with participatory decision-making.

2-4) Offering of expertise and resources of external stakeholders that school values. External stakeholders can gain power to influence school decisions if they possess and offer expertise and resources valued by principals and teachers, thereby incentivizing the school personnel to respond to the demands of external stakeholders. The relationship between expertise/resource and power is formalized by the resource dependency theory developed by Pfeffer & Salancik (1978). The theory provides the principle that organizations need to prioritize interests of stakeholders who, in return, provide critical resources for the organization' survival and development. Therefore, external stakeholders who provide expertise and resources critical for school operation will obtain greater power and the ability to make the school accountable for their demands.

In fact, the literature suggests that external stakeholders who possess and offer useful expertise, that which is valued by school, have greater chances to influence school decisions. In the United Kingdom, for example, external stakeholders from universities and businesses are appointed to school board members in order to mobilize expertise that is not available in the public school sector (Balarin et al., 2008; Connolly et al., 2017).

Examples of expertise valued by schools include skills and knowledge in the areas of curriculum development, religious specialization, and community outreach. For instance, a study targeting member countries of the Organization for Economic Co-operation and Development (OECD) found that external stakeholders, such as members of universities, trade unions, and charitable foundations, are often invited to employ their expertise in the development of school curriculum (Sliwka & Istance, 2006). In Bosnia and Herzegovina, although school directors tend to dominate decision-making processes, they turn to school board members for decision-making in areas where board members' knowledge and expertise are required, like the development of vocational education (Komatsu, 2012). Religious expertise also matters in some cases. For instance, a study of school boards in England and Wales notes that, in schools with religious characteristics, some faith-based foundations have been appointed to school boards in order to ensure their religious interests (Connolly et al., 2017). Community outreach is another area of expertise in which external stakeholders can provide to school. A study of school councils in Mozambique found that schools consult with and involve local community members in school management when the school needs to organize awareness-raising activities on community-related issues such as HIV/AIDS prevention and early marriage (Taela et al., 2018).

The literature also suggests that external stakeholders who own and offer financial and material resources to school gain power to influence school decisions. According to a study in England and Wales, stakeholders who gave financial assistance to school are more likely to be appointed for school boards (Connolly et al., 2017). A study in the United States found that parents' influence on school decision-making increases when the parent-teacher organization raises funds for school operation (Gordon, 2012). A study of education providers in an early New Zealand settlement found that a school made efforts to be accountable to local communities who were the major funders of the school (Fowler & Cordery, 2015). In Mozambique, schools reach out to and consult with local communities when the schools need to mobilize additional financial and material resources for school improvement (Taela et al., 2018). These findings provide evidence that the possession and offering of unique expertise and resources valued by school personnel help external stakeholders increase their power to influence school decision-making.

2-5) Accountability pressure. There is suggestive evidence that the power of external stakeholders increases when school is under pressure to be accountable, and is thus incentivized to respond to the demands of parents and local communities. For instance in Holland, a publication ranking schools by their level of quality created sufficient pressure that the schools were driven to improve school management and to address concerns raised by the local communities in order to salvage the school's reputation (Meijer, 2007). However, the evidence is not conclusive. A study in England indicates that, in socially deprived areas, schools facing greater accountability pressure tend to limit the involvement of external stakeholders in school governance in order to perform accountability under professional leadership of school (Currie et al., 2009). These studies indicate that whether accountability pressures enhance the openness of schools depends on community and organizational contexts.

Urgency

The final attribute to stakeholder salience is urgency, which is defined as the degree to which stakeholder's claims call for immediate attention by the organization in terms of both time-sensitivity and criticality (Mitchell et al. 1997). The literature suggests that external stakeholders make more efforts to intervene in school decision-making when they have pressing and serious concerns about the provision, quality, and cost of schooling.

1) Critical/pressing concern for provision of and access to schooling. First, external stakeholders attempt to influence school decisions when the provision of and access to schooling are threatened. For example, in Sweden, parents took initiatives to establish school boards as a response to looming threats of school shut-down, while parents were less likely to get involved in school affairs if they were already satisfied with school operation (Holmgren et al., 2012). A study in the United States found that parent associations exert greater influence on disciplinary policy in schools where parents of racial minority students are pressed to address a zero tolerance and racially inequitable disciplinary policy that threatens their child's enrollment (Curran, 2017). The examples suggest that the influence of external stakeholders will be enhanced when their concerns over school provisions and access reach a critical level.

2) Critical/pressing concern about quality of school service. Second, critical and pressing concerns regarding the quality of school services drive external stakeholders to influence school decision-making. In Poland, growing parental concerns over the quality of schooling during the 1990s encouraged parents to take the initiative to create school councils and associations, thereby increasing their influence over school decisions and operation (Sliwka & Istance, 2006). A study in the United States found that a parent group pressured their school to improve education quality after recognizing that the school's poor reputation was due to academic and disciplinary problems (Gordon, 2012). Another study in the United States found that school council members tend to have greater influence over decision-making in districts where standardized testing is linked to budget allocation (Snow & Williamson, 2015). A case study in South Africa found that parent groups organized protests against poor performance of teachers and the absenteeism of a principal, which resulted in redeployment of these school personnel (Levy & Shumane, 2017). These studies suggest that the influence of external stakeholders becomes salient when the issue of school quality is perceived as critical.

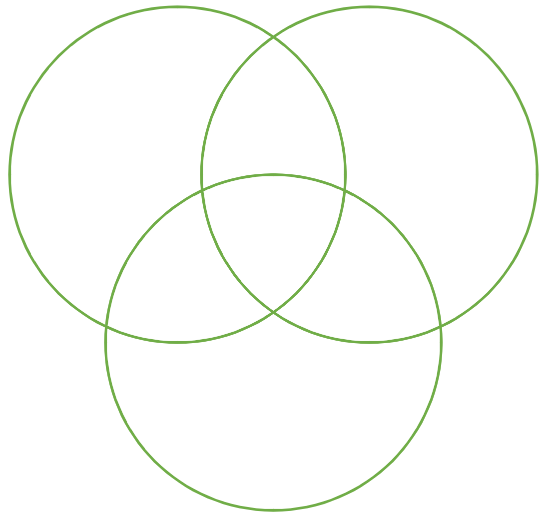
3) Critical/pressing concern for cost of schooling. Third, an increase in the cost of school could mobilize parent groups to intervene in school decision-making. A study of stakeholder influence on the sale of food items in high schools in the United States found that, although parents were not powerful stakeholders in the food-related decisions in general, their influence became salient when the price of food increased (Probart et al., 2006). This indicates that parents will magnify their influence when rising costs associated with their child's school increases their financial burden.

Summary of Factors Composing Legitimacy, Power and Urgency

The systematic review of literature suggests a number of factors lend legitimacy, power, and urgency to external stakeholders in their efforts to influence school decisions. Figure 2.2 summarizes the findings.

Legitimacy

1) Law and policy that support participation in school governance
2) Representation in school governing bodies
3) Devolution of decision-making authorities to school/local level



Urgency

1) Critical/pressing concern for a provision of and access to schooling
2) Critical/pressing concern about quality of school service
3) Critical/pressing concern for cost of schooling

Power

I. Strengthening the capacity of external stakeholders

1) Social and cultural norms that facilitate participation
2) Interest in school education
3) Ability to participate in school governance (time, distance)
4) Skills/knowledge necessary for taking an active role in school governance
5) Decision-making mechanisms in favor of external stakeholders
6) Alignment of interests for forming a coalition

II. Promoting a school's openness to shared decision-making

1) Social and cultural norms that support participatory governance
2) School's organizational experience with participatory governance
3) Sharing of school goals and objectives
4) Offering of valuable expertise and resources by external stakeholders
5) Accountability pressure

Figure 2.2. Factors contributing to influence of external stakeholders on school decisions.

As stated above, these factors have been identified from the systematically selected literature and are based on the three attributes of stakeholder salience yet they do not represent a comprehensive list. Furthermore, the research from which the data has been gathered was scattered across diverse fields and multiple countries and therefore do not speak to any particular context or country. Therefore, in the next section, I apply the findings to the participatory school governance in Pakistan to examine how these factors affect the influence of external stakeholders in a given context, and identify areas of intervention that strengthen their influence

Assessment of Attributes of Parental Influence in Pakistan

In this section, I apply the stakeholder salience framework to assess how the identified factors facilitate or constrain parental influence in school decisions in Pakistan. Prior research suggests that parental participation in school decision-making has been well established and strengthened within the country. However, the parents' power to influence school decisions is limited by a range of factors that constrain both the parents' capacity and the school's openness to shared decision-making. The analysis highlights a need of targeted interventions that address the constraints at both parents' side and school side.

Country Background

Pakistan is a predominantly Islamic country located in South Asia. It possesses the world's sixth largest population with approximately 200 million people in 2017 (Central Intelligence Agency, 2019). Over the half of the population is under 25 years old, and 63% of the population reside in rural areas (Central Intelligence Agency, 2019). The gross domestic product (GDP) per capita in purchasing power parity as of 2017 was $5,400, ranked 171st in the world (Central Intelligence Agency, 2019).

The country consists of four provinces (Balochistan, Khyber Pakhtunkhwa, Punjab, and Sindh), two autonomous territories (Azad Jammu and Kashmir, and Gilgit-Baltistan), and one federal territory (Islamabad Capital Territory). Education in Pakistan is overseen by the Federal Ministry of Education and the provincial governments. While the Federal Ministry formulates education policies and plans at the national level, the provincial governments possess the authority to develop and implement their own education plans in accordance with the national education policies.

Despite policy efforts to ensure access to a quality basic school education, many children still do not attend school, as indicated by the net enrollment ratio of 76% at the primary level and 53% at the secondary level in 2017 (UNESCO Institute for Statistics, 2018c). Over 10 million Pakistani children and adolescents are not attending school (UNESCO Institute for Statistics, 2018a). In addition, education quality and outcome have been a major challenge. According to the household surveys in 154 rural districts, about half of children of Grade 5 age have not reached Grade 2 levels of learning in both reading and math (ASER Pakistan, 2018). Students in the province of Punjab performed significantly below curricular standards and their grade level (Andrabi et al., 2008).

Given the limited capacity of the government to provide access to quality education, decentralization of school education, characterized by community participation in school governance, has been promoted as a means to address the educational challenges. In the following sections, I use the stakeholder salience framework to assess what factors facilitated or constrained parents' influence over school decisions and identify potential areas where interventions might be used strengthen parents' participation in school governance and decision-making.

Legitimacy of Parents to Influence School Decisions

In Pakistan, parental influence has been legitimized by education policy that supports their participation in school governance, their representation in school governing bodies, and the increasing scope of decision-making authorities devolved to local level.

1) Law and policy that support participation in school governance. In Pakistan, education policy has played an important role in establishing and strengthening the legitimacy of parental and community participation in school governance and decision-making since the early

1970s. The government called for the decentralization of educational administration in the national education policy in 1970 (Shah, 2003) and community participation in school management and resource mobilization in the national education policy in 1979 (Bengali, 1999). In order to realize the policy goal, the federal government issued a notification on the formation and re-establishment of local school governing bodies such as SMCs and parent-teacher associations (PTAs) in all provinces in 1994 (Khan, 2003). The establishment and strengthening of participatory school governing bodies were also prioritized in the national education policy in 1998 (Ahsan, 2003). Local management of school education was further emphasized in the local government ordinance in 2001 (Rahim, 2017; Shah, 2003). These policies have contributed to legitimizing parental participation in school governance and decision-making as policy mandate.

2) Representation in school governing bodies. The legitimacy of parents as part of the school decision-making process is further strengthened by ensuring parent representation in school governing bodies. The provincial government in particular has taken a leading role in establishing a local school governing body represented by parents in each school since the 1990s (Mirza, 2003). For instance, in 1995 the government of Punjab issued an ordinance requiring each school to establish an SMC represented by parents (Government of the Punjab School Education Department, 2000; Punjab Education Sector Reform Programme, 2018). Parent-represented SMCs were also introduced as a mandatory component of public school education in the Khyber Pakhtunkhwa province (Ahmad & Ullah, 2014). Parental representation in these governing bodies is secured by membership requirements stipulated in policies and manuals; the school council policy in Punjab requires school councils to include parents and other local community members (Government of Punjab, 2008). By representing school governing bodies, parents are legitimized as participants in school decision-making processes.

3) Devolution of decision-making authorities to school/local level. Parental influence has been further legitimized by expanding the scope of decision-making authority delegated to local levels. School governing bodies were initially limited to such duties as management of locally raised revenue and facility maintenance (Ahmad & Ullah, 2014; Shah, 2003). Such restricted autonomy was seen as a major obstacle to achieving efficient local school management by school stakeholders (Hussain et al., 2016). However, the scope of decision-making authority granted to local school governing bodies has been expanding. For instance, the provincial government of Khyber Pakhtunkhwa granted greater autonomy to local levels in 2006/2007, which includes giving the school governing bodies the authority to use their own budget to hire contract teachers to improve the quality of school (Rahim, 2017). In the school council policy in 2007, the government of the Punjab province granted to school councils the authority to develop and execute a school development plan and request a district education office to discharge a poorly-performing principal from the position of chairperson of school council (Government of Punjab, 2008). These examples indicate that the legitimacy to influence school decisions increases as the scope of decision-making authorities devolved to the local level are expanded.

Power of Parents to Influence School Decisions

While the participation of parents in school governance and decision-making has been legitimized in Pakistan, parents often do not possess the power to get their interests and concerns to be prioritized due to their weak capacity and school's attitude to shared decision-making.

1) Factors strengthening the capacity of parents. The literature suggests that, although parents' capacity to influence school decisions is strengthened by decision-making mechanisms that favor parents, it is constrained by a range of other factors. These include gender norms, a low level of interest in school education, and the availability of time (Ahmad & Ullah, 2014;

Khan, 2003). Parents are also constrained due to a lack of skills and knowledge that inhibit their ability to become active in school governance (e.g., Khan, 2003). However, some of the constraints could be mitigated by raising the parents' awareness of the importance of education, introducing technology that facilitates their participation, and providing information and training to help them play an active role in school governance.

1-1) Social and cultural norms that facilitate participation. It is suggested that the capacity of female parents to influence school governance and decision-making is constrained by gender norms in Pakistan. In fact, female parents are limited in their ability to participate in school and communicate their voice due to a conservative culture that restricts women's interaction and communication outside the home (Ahmad & Ullah, 2014). Even though the policy recommends female representation in school governing bodies in girls' schools, mothers are severely underrepresented in the Punjab province (Khan, 2003). This suggests an importance of mitigating gender-related barriers, especially for female parents.

1-2) Interest in school education. The power to influence school decisions is also limited due to a low level of interests in and expectations of school education among some parents. For instance, one study found that parental representation in school governing bodies was minimal in areas where parents had little interests in schools (Khan, 2003). Many of these parents were not even aware of the existence of school governing body (Khan, 2003). A study in the Khyber Pakhtunkhwa province suggests that parents, especially those who are working-class and less educated, were uninterested in school affairs and therefore do not recognize the importance of participating in school governance (Ahmad & Ullah, 2014). These studies indicate a need of targeted intervention that raises awareness of the importance of education and the value of involvement in school management among poor and less-educated parents.

1-3) Ability to participate in school governance (time, distance). The power of parents is also weakened by a lack of time to physically participate in school governance, particularly among poor parents in Pakistan. For instance, a lack of time was recognized as a major obstacle to parental participation in school affairs in the Khyber Pakhtunkhwa province (Ahmad & Ullah, 2014). Impoverished parents were often unable to spare time to participate in school governance since they were preoccupied with making a living (Khan, 2003). In fact, parents in poverty were seriously underrepresented in school governing bodies in Punjab, even though its membership is determined by appointment (Khan, 2007). However, there is suggestive evidence that the time constraint could be partly mitigated by using technology. An experimental study in Sindh found the introduction of a cell phone based communication platform facilitated the sharing of interests and concerns of local community members with the school (Asim et al., 2015).

1-4) Skills and knowledge necessary for taking an active role in school governance. A lack of skills and knowledge necessary for taking an active role in school governance also constrains parental influence on school decisions (Nayyar-Stone et al., 2006). For instance, a study of school governing bodies found that the majority of parents were illiterate and thus not be able to perform their expected roles (Khan, 2003). School council members in the Khyber Pakhtunkhwa province lacked administrative skills and knowledge needed to take informed actions on use of council funds (Ahmad & Ullah, 2014). These studies suggest that a lack of pertinent skills and knowledge weaken parents' capacity to influence school decisions in Pakistan.

This underscores the importance of providing information and training as a means to empower parents in school decision-making (Hussain et al., 2016; Shah, 2003). For example, dissemination of information on how to access and spend school council's funds improved the council members' engagement in school management and budget execution in the Punjab province (Asim, 2019). There is also suggestive evidence that training on the function of school governing bodies and the development of school improvement plans had a positive impact on parental participation in school decision-making process in Sindh (Asim et al., 2015). These suggest that providing information and training helps strengthen the capacity of parents to influence school decisions.

1-5) Decision-making mechanisms in favor of external stakeholders. On the other hand, the parents are more able to take actions that will influence school decisions when decision-making mechanisms are designed to empower them. Principals were initially mandated to be chairpersons in school councils and thus owned extensive power to set the agenda and priorities in Punjab and Sindh (Khan, 2003; Khan, 2007). However, efforts have been made to assign parents to the position of chairperson as a means of empowerment. For instance, the government of Punjab required one of the parent members to serve as a co-chairman of school council in its school council policy in 2007 (Government of Punjab, 2008). In Sindh, a parent representative is assigned to chair the executive committee, which governs PTAs (Mirza, 2003). Another decision-making mechanism put in place in favor of parents is granting greater voting power to parents. For example, the school council policy in Punjab requires parents to constitute more than 50% of its membership, and for important decisions to be made with two-third of members' votes (Government of Punjab, 2008).

1-6) Alignment of interests for forming a coalition. The power of parents to influence school decisions can be also strengthened by gaining support from other influential stakeholders whose interests are aligned with those of the parents. A field survey in Punjab found that non-governmental organization members in school councils used their local network to solve school problems such as staff shortages and budgetary constraints (Khan, 2007). This implies that parents' capacity to influence school decisions would increase if they are able to cooperate with other influential stakeholders. However, the feasibility of forming such cooperation depends on the existence of influential stakeholders who are willing to cooperate with parents.

2) Factors promoting a school's openness to shared decision-making. In Pakistan, principals and teachers often do not share decision-making power with parents even though policy requires parental participation in school governance (e.g., Khan, 2007; Shah, 2003). The literature suggests that school leadership is not developed and oriented toward sharing decision-making with parents due to various factors. These include gender norms, the school's lack of organizational experience with participatory governance, an inadequate sharing of the school's goals and objectives, and weak accountability pressure (Ahmad & Ullah, 2014; Fancy & Razzaq, 2017; Khan, 2003; Shah, 2003). On the other hand, the parents' financial contributions may strengthen their ability to hold the school accountable if their financial resource are critical to the school.

2-1) Social and cultural norms that facilitate participatory governance. The power of parents to influence school decisions can be constrained by gender norms within a given country, factors which also impact the school's openness to parental participation. For instance, restrictive gender norms permeating school organizations provide little space for female parents to participate in school governing bodies (Ahmad & Ullah, 2014). However, gender norms play a complex role in bounding and facilitating school's attitude to shared-decision making. A survey in Punjab found that female principals who run a girls' schools are more flexible and open to local and community demands than male principals in boys' school (Khan, 2007). This implies that a school's openness to shared decision-making may depend on the interplay between the gender of the principals and the gender of the students in single-sex schools.

2-2) School's organizational experience with participatory governance. A schools' organizational experience with participatory governance may also affect the relationship between the school and parents regarding decision making. A study of school councils found that the establishment of school governing bodies strengthened the level of parent participation particularly in schools that already had experience of engaging local communities (Khan, 2003). This implies that schools with limited prior experience and without a culture of community engagement may not have organizational readiness to support participatory decision-making.

2-3) Sharing of school goals and objectives. The power parents possess to influence school decisions may also be restricted due to inefficient sharing of the school's goals and objectives between stakeholders. Under such circumstances, school personnel are less likely to share their decision-making power with parents. In fact, teachers tend to have negative attitudes toward parental engagement because the majority of teachers are concerned about the protection of their professional status (Ahmad & Ullah, 2014). In turn, parents who feel discouraged by the teachers, and thus do not trust schools, do not participate in school governance (Khan, 2003; Shah, 2003). These examples suggest that the power to influence school decisions is restricted when stakeholders do not share the school's goals and objectives, including the purpose of participatory school governance. However, efforts have been made to establish shared goals and objectives and achieve them in combination with parents and local community members. For instance, the school council policy in 2007 in Punjab requires school councils to prepare and approve school action plan together with all members (Government of Punjab, 2008).

2-4) Offering of valuable expertise and resources by parents. It is possible that parents will gain power through their financial contributions to a school, as they may thereby hold the school accountable for those funds. In Pakistan, many parents pay fees to their child's public school even though free education is a right under the constitution of Pakistan (Centre for Peace and Development Initiatives; 2014). Since a delay in the disbursement of government funds is a critical issue for school operation (Centre for Peace and Development Initiatives; 2014), financial contributions from parents are likely to be relied upon. The power of parents may therefore be enhanced if their financial contributions incentivize the schools to respond to parents' interests and concerns.

2-5) Accountability pressure. Parental power will likely be diminished if there is minimal pressure for the schools to be accountable to parents. In Pakistan, school accountability is not adequately prioritized in education policy and system (Fancy & Razzaq, 2017). A weak system of accountability provides school leaders little incentive to listen and respond to parents' concerns and demands. Yet research suggests the importance and impact of accountability mechanisms on school leadership. An experimental study found that sharing school performance with both the school and parents at a school meeting, thereby pressuring the school to be accountable for education quality and outcomes, changed school investment patterns so as to increase the qualification of teachers (Andrabi et al., 2017). This indicates that parents' power to influence school decisions could be strengthened by introducing mechanisms that encourage schools to perform accountability to parents.

Urgency of Parents' Claim

With regards to urgency, parental influence could become salient when their concerns for educational access and quality reach a critical level. The sense of urgency among parents may not be high in general given the aforementioned low level of interests in school education, particularly among poor parents. However, there is evidence that parents have taken a proactive role in making their voice heard when dropout rates were high and classes were overcrowded (Khan, 2003). These findings suggest that pressing concerns over education access and quality has potential to make parental influence more salient.

Ways to Realize Greater Parental Influence

As detailed, parents in Pakistan are recognized as legitimate stakeholders allowed to engage in school decision-making. Their status is well established and is being strengthened by education policies that supports their participation in school governance, their representation in school governing bodies, and the increasing scope of decision-making authorities devolved to local level. Parental influence, however, has not been necessarily realized since, while legitimate, it has not been fully translated into actual power to influence school decisions.

Parents' power is restricted by factors that affect the parents' capacity to engage in school governance in addition to the school's openness to shared decision-making. First, the parents' capacity to influence school decisions is constrained by the country's gender norms as well as the parents' characteristics, such as a low level of interests in school education, availability of time to participate in school governance, and a lack of skills and knowledge necessary to take active roles in decision-making. The individual-level constraints are particularly evident among poor and less-educated parents. These findings highlight the importance of targeted interventions that could empower female and poor parents. For instance, the individual-level constraints could be mitigated by targeted interventions that raise awareness of the importance of education, introduce technology that facilitates parental participation in school governance, and provide information and training to help them actively participate in decision-making.

However, the power of parents to influence school decisions is conditional on not only their capacity but also the school's willingness to share decision-making responsibility. Schools in Pakistan are not fully oriented to share decision-making with parents due to the country's gender norms, the school's lack of organizational experience with participatory governance, inadequate sharing of the school's goals and objectives between invested parties, and weak accountability pressure. It would be difficult to address the issue of gender norms and the school's lack of organizational experience in the short term. However, the literature suggests that policies requiring the development of shared school goals and the introduction of accountability mechanisms have the potential to promote a school's openness to participatory decision-making. Therefore, policy efforts must be made to create an environment and incentives that encourage school leaders to promote participatory decision-making.

Finally, the literature suggests that parental influence will be salient when their concerns over school access and quality reach a critical level. However, the sense of urgency among parents might be weak due to a low level of interest in school education, particularly among working-class and less-educated parents. This also suggests a need for targeted interventions that raise the awareness of the importance and benefits of school education among these parents.

Reflection and Conclusion

The systematic review of literature, based in the framework of stakeholder salience theory, identified a set of factors affecting the influence of external stakeholders in multi-stakeholder school governance. The application of this framework to school governance in Pakistan also exemplified the usefulness of the framework for assessing how each factor facilitates or constraints the influence of external stakeholders within a given context and for identifying areas where targeted interventions could be used to make the stakeholder's influence more salient. The study also identified several limitations with the stakeholder salience theory as a practical tool for understanding the conditions under which a given external stakeholder group exerts influence over school decisions.

Multi-Dimensional and Interrelated Nature of Stakeholder Influence

The findings of this study demonstrate that factors affecting external stakeholders' influence in school governance are multi-dimensional and interrelated to one another. First, I found that legitimacy, power, and urgency are attributed to diverse, multi-dimensional factors. These include country-specific factors ranging from social and cultural norms to legal provisions, policy mandates, and education system design (e.g., accountability system). They also include organizational factors such as school culture and operational rules (e.g., decision-making mechanisms) and individual-level factors such as characteristics of the external stakeholders (e.g., interests and capacity of given stakeholders). In addition, stakeholder influence is derived from the relationship between stakeholder groups. For instance, the influence of parents depends on the degree to which school personnel value parents' expertise and resources. Parents' influence is also magnified when their interests are aligned with the priorities of other external stakeholders.

Second, these factors are closely interrelated to one another beyond the boundaries of legitimacy, power, and urgency. For instance, education law and policy legitimizes while also strengthening the power of parents by informing decision-making mechanisms and generating accountability pressure to school personnel. Whether parents perceive the quality of education as an urgent issue (urgency) depends on their level of interest in school education.

Unfortunately, the stakeholder salience theory is limited as a practical tool for examining the underlying relationships between various factors impacting the influence of stakeholders.

Therefore, I present a new framework addressing the multi-dimensional and interrelated nature of stakeholder influence in school governance based on the findings in this study. This new framework is not comprehensive but provides one way to identify and understand factors impacting external stakeholders’ influence in multi-stakeholder school governance.

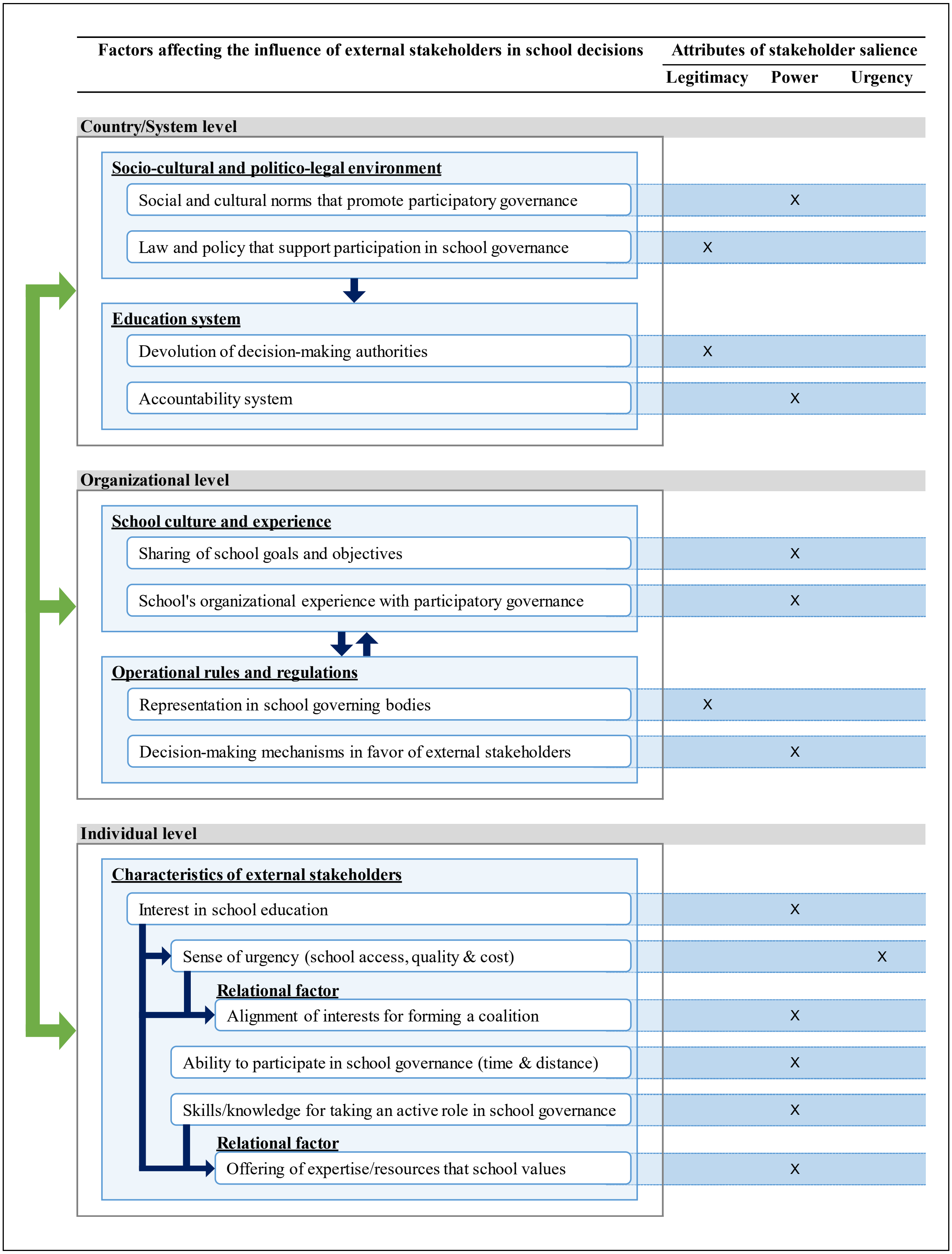


Figure 2.3. A framework of factors affecting the influence of external stakeholders on school decisions.

Figure 2.3 shows the factors affecting the influence of external stakeholders on school decision-making and the relationships between them. In the new framework, the identified factors are re-organized by country and system level, organizational level, and individual level. At the country level, socio-cultural norms and politico-legal structures affect the legitimacy and power of external stakeholders to influence school decision-making. These country-level factors further inform the design of the national education system, which includes the degree of school autonomy and the existence of an accountability system. These education system factors serve as institutional mechanisms that facilitate and/or constrain the participation of external stakeholders in school governance and their influence over school decision-making.

At the organizational level, school culture and experience play an important role in determining the likelihood of external stakeholders to influence school decision-making. These include whether schools established shared school goals and objectives with external stakeholders and whether they have prior experience of participatory governance. In addition, the influence of external stakeholders can be strengthened or constrained by operational rules and regulations, which determine who should be represented in a school governing body and how decisions are made in the governing body. It is important to note that the school's culture and experience and its operational rules and regulations have a reciprocal relationship. Schools that have culture and experience of participatory governance are more likely to develop organizational rules and regulations that empower external stakeholders to exert their influence on school decision-making. On the other hand, such rules and regulations help schools develop organizational culture and the experience of shared decision-making.

At the individual level, people who have a higher level of interest in and expectations of school education are more likely to participate in school governance and influence school decisions. The interest in and expectations of schools also affects their sense of urgency to intervene in school and the likelihood that they will form a coalition with other interest groups, both of which would help external stakeholders to influence school decisions further. The influence of external stakeholders also depends on their ability to physically participate in a school governing body and the possession of skills and knowledge that will allow them to play an active role in decision-making process. The chance of influencing school decisions may increase if external stakeholders can offer expertise and resources that the school values. However, the stakeholders' willingness and ability to offer such critical expertise and resources also depends on whether they have strong interests in school education.

Importantly, the factors at the country/system, organizational, and individual levels are interrelated not only within each level but also across the levels. First, the socio-cultural and politico-legal environment and the country's education system affect a school's organizational culture and operational rules. The country/system level factors also influence an individual's valuation of school education and their ability to participate in school decision-making. Second, the school-level factors such as organizational experience and practices inform national-level education law/policy and system in the long run, while school culture and regulatory practices facilitate and constrain the willingness and ability of external stakeholders to participate in school decision-making. Third, the characteristics of external stakeholders at the individual level, such as their interests in and capacity for influencing school decisions, inform the national policy and the schools' organizational practices that may promote participatory school governance.

The multi-dimensional and interrelated factors of stakeholder influence suggest the importance of taking a holistic approach. In other words, we need to identify the diverse factors that affect stakeholder influence in context, at different levels, and in relation to one another. Understanding how stakeholder influence is formed within complex systems would help us identify bottlenecks that constrain the influence of a target stakeholder group and design targeted and feasible interventions to strengthen their influence.

Other Limitations of Stakeholder Salience Theory

There are a couple of other limitations of the stakeholder salience theory that are not addressed by the presented framework. These are 1) accounting for within-stakeholder diversity and 2) assessing attributes of stakeholder influence in measurable and comparable manners.

First, the framework is not suitable for identifying and accounting for the diversity that exists within a particular stakeholder group. For instance, although parents can be defined as a distinct stakeholder group, the study suggests that socioeconomically disadvantaged parents could have weaker power and a sense of urgency compared to other parents. Ignoring such within-stakeholder diversity could pose challenges in addressing constraints that limit the influence of target stakeholder groups. Such within-stakeholder diversity could be explored more easily in a single-school case study for instance, rather than a country-wide study. In this sense, the application of stakeholder salience theory would be more suitable for case studies.

Second, the strengths of the attributes of stakeholder influence are not always assessed in measurable and comparable manners. For instance, in order to assess whether parents have greater power than a school principal, the power between the two groups needs to be compared. However, this is often not feasible due to a lack of measurements that can be used to assess and compare the strengths of particular attributes in a fair manner. In the absence of such measurements, assessment and comparison of legitimacy, power, and urgency between different stakeholders can only be made in subjective manners.

These limitations imply a need to combining the stakeholder salience theory with other theoretical framework and/or analytical tools in order to further unpack the mechanisms of stakeholder salience.

Conclusion

Multi-stakeholder partnerships and collaborative governance have been recognized and advocated as a key strategy for improving the quality of education and learning outcomes. However, the global discourse on partnerships pays insufficient attention to multiple-accountability relationships within schools—situations in which external stakeholders can influence school decisions only when their interests and concerns get enough attention over the priorities and demands of others. It is therefore important to understand conditions under which they are able to influence school decisions in the instances of multi-stakeholder school governance.

This study performed a systematic literature review to identify conditions under which parents and private partners can influence school decisions in multi-stakeholder school governance, using the framework of stakeholder salience theory. I found that the chance of a given stakeholder group exerting influence over school decisions depends of a range of multi-dimensional and relational factors at the country, organizational, and individual levels, which are also interrelated with one another. This indicates that partnerships are not necessarily a promising strategy to improve education quality and learning outcomes. The purported effects of partnerships would not be realized just by engaging external stakeholders in school without attending various enabling and constraining factors. Multi-stakeholder partnerships need to be carefully designed and coordinated in consideration of the diverse and interrelated factors in order to generate expected school accountability and improve the quality of school education.

In order to achieve this, we need to take a holistic approach so as to identify diverse factors that affect stakeholder influence in context and in relation to one another, and understand how these factors alone and together facilitate or constrain stakeholder influence. Then, we need to provide institutional and organizational mechanisms and/or targeted interventions to provide enabling environments that help the voices of targeted stakeholders be heard, prioritized, and reflected in school decision-making. The new framework I presented in this study provides one way to identify and understand these factors and hopefully help policy makers and school authorities to develop effective partnerships that improve the quality of education and learning outcomes.

APPENDICES

Appendix 2A: Search Syntax

Proquest

"stakeholder salience" OR "stakeholder influence" OR "stakeholder theory" AND "school governance" OR "school management" OR "school-based management" OR "site-based management" OR "school decision" OR "school decisions" OR "school accountability"

Google Scholar

"stakeholder salience" OR "stakeholder influence" OR "stakeholder theory" AND "school governance" OR "school management" OR "school-based management" OR "site-based management" OR "school decision" OR "school decisions" OR "school accountability"

Appendix 2B: Final Sample of Articles (N=33)

Auerbach, S. (2012). Conceptualizing leadership for authentic partnerships. In S. Auerbach (Ed.), *School leadership for authentic family and community partnerships* (pp. 29-51). New York: Routledge.

Balarin, M., Brammer, S., James, C., & McCormack, M. (2008). *The school governance study*. London, UK: Business in the Community.

Bauer, S. C., & Bogotch, I. E. (2001). Analysis of the relationships among site council resources, council practices, and outcomes. *Journal of School Leadership, 11*, 98-119.

Bauer, S. C., & Bogotch, I. E. (2006). Modeling site-based decision making: School practices in the age of accountability. *Journal of Educational Administration, 44*(5), 446-470.

Botha, R. (2007). School-based management: Stakeholder participation and the impact of stakeholder values. *Africa Education Review, 4*(1), 28-41.

Connolly, M., Farrell, C., & James, C. (2017). An analysis of the stakeholder model of public boards and the case of school governing bodies in England and Wales. *Educational Management Administration & leadership, 45*(1), 5-19.

Curran, F. C. (2017). Influence over school discipline policy: Variation across levels of governance, school contexts, and time. *Education Policy Analysis Archives, 25*(119), 1-27.

Currie, G., Lockett, A., & Suhomlinova, O. (2009). The institutionalization of distributed leadership: A 'Catch-22' in English public services. *Human Relations, 62*(11), 1735-1761.

Evans, M. P., & Radina, R. (2014). Great expectations? Critical discourse analysis of Title I school – Family compacts. *School Community Journal, 24*(2), 107-126.

Farrell, C. M. (2005). Governance in the UK public sector: The involvement of the governing board. *Public Administration, 83*(1), 89-110.

Farrell, C. M., & Jones, J. (2000). Evaluating stakeholder participation in public services: Parents and schools. *Policy & Politics, 28*(2), 251-262.

Fowler, C. J., & Cordery, C. J. (2015). From community to public ownership: A tale of changing accountabilities. *Accounting, Auditing & Accountability Journal, 28*(1), 128-153.

Gordon, M. F. (2012). Creating organizational cultures of family and community engagement: The impact of district policies and practices on school leaders. In S. Auerbach (Ed.), *School leadership for authentic family and community partnerships* (pp. 133-150). New York: Routledge.

Gordon, M. F., & Louis, K. S. (2009). Linking parent and community involvement with student achievement: Comparing principal and teacher perceptions of stakeholder influence. *American Journal of Education, 116*, 1-31.

Gordon, M. F., & Louis, K. S. (2013). How to harness family and community energy: The district's role. In K. Leithwood, and K. S. Louis (Eds.), *Linking leadership to student learning* (pp. 89-106). San Francisco, CA: John Wiley & Sons, Inc.

Hlongoane, M. T. (2016). *Possible financial reporting challenges faced by governing bodies of public schools in South Africa*. Proceedings of the 5th International Conference on Accounting, Auditing, and Taxation (ICAAT 2016).

Ho, D. (2012). The paradox of power in leadership in early childhood education. *Peabody Journal of Education, 87*(2), 253-266.

Holmgren, M., Johansson, O., Nihlfors, E., & Skott, P. (2012). Local school governance in Sweden: Boards, parents, and democracy. *Journal of School Public Relations, 33*, 8-28.

Kofod, K. K., Johansson, O., Paulsen, J. M., & Risku, M. (2016) Political cultures. In L. Moos, E. Nihlfors, & J. Paulsen (Eds.), *Nordic superintendents: Agents in a broken chain* (pp. 207-231). Cham, Switzerland: Springer.

Komatsu, T. (2012). *Decentralized school governance and social cohesion in a post-conflict society: School leaders' participatory democratic accountability in Bosnia and Herzegovina* (Doctoral dissertation). Retrieved from https://conservancy.umn.edu/handle/11299/126262

Levy, B., & Shumane, L. (2017). *School governance in a fragmented political and bureaucratic environment: Case studies from South Africa's Eastern Cape Province* (ESID working paper no. 84). Manchester, UK: Effective State and Inclusive Development Research Centre.

Meijer, A. J. (2007). Publishing public performance results on the internet: Do stakeholders use the internet to hold Dutch public service organizations to account? *Government Information Quarterly, 24*, 165-185.

Ni, Y., Yan, R., & Pounder, D. (2018). Collective leadership: Principals' decision influence and the supportive or inhibiting decision influence of other stakeholders. *Educational Administration Quarterly, 54*(2), 216-248.

Nihlfors, E., Paulsen, J. M., Skedsmo, G., Moos, L., Pulkkinen, S., & Kanervio, P. (2014). Role and influence of school boards on improving educational quality. In L. Moos, & J. Paulsen (Eds.), *School boards in the governance process*. Cham, Switzerland: Springer.

Paulsen, J. M., Nihlfors, E., Brinkkjær, U., & Risku, M. (2016). Superintendent leadership in hierarchy and network. In L. Moos, E. Nihlfors, & J. Paulsen (Eds.), *Nordic superintendents: Agents in a broken chain* (pp. 207-231). Cham, Switzerland: Springer.

Povey, J., Campbell, A. K., Willis, L., Haynes, M., Western, M., Bennett, S., Antrobus, E., & Pedde, C. (2016). Engaging parents in schools and building parent-school partnerships: The role of school and parent organisation leadership. *International Journal of Educational Research, 79*, 128-141.

Probart, C., Snow-Telfer, H., & McDonnell, E. (2006). Use of stakeholder theory to examine groups salient in decisions related to a la carte offerings. *The Journal of Child Nutrition and Management, 30*(2).

Quan-Baffour, K. P., & Arko-Achemfuor, A. (2014). Training school governing body members in three rural schools in Taung: Empowerment for good governance. *Studies of Tribes and Tribals, 12*(1), 171-178.

Rapp, N., & Duncan, H. (2012). Multi-dimensional parental involvement in schools: A principal's guide. *International Journal of Educational Leadership Preparation, 7*(1), 1-14.

Sliwka, A., & Istance, D. (2006). Parental and stakeholder 'voice' in schools and systems. *European Journal of Education, 41*(1), 29-43.

Snow, D., & Williamson, A. (2015). Accountability and micromanagement: Decentralized budgeting in Massachusetts school districts. *Public Administration Quarterly, 39*(2), 220-258.

Taela, K., Franco, E. L., Shankland, A., Maivasse, C., Chilengue, N., & Goodyfry, C. (2018). *Representation and inclusion in school councils in Mozambique* (Research report vol. 2018, no. 84). Brighton, UK: Institute of Development Studies.

Yusuf, M., Adams, C., & Dingley, K. (2016). Digital citizen participation within schools in the United Kingdom and Indonesia: An actor-network theory (ANT) perspective. *Information, 7*(69), 1-27.

REFERENCES

REFERENCES

Acar, M., Guo, C., & Yang, K. (2012). Accountability in voluntary partnerships: To whom and for what? *Public Organization Review, 12*(2), 157-174.

Adnett, N. (2004). Private-sector provision of schooling: An economic assessment. *Comparative Education, 40*(3), 385-399.

Ahmad, S. M., & Ullah, O. (2014). Parent-teacher councils in public secondary schools in Northern Pakistan: A qualitative case study. *Journal of Applied Environmental and Biological Sciences, 4*(7S), 121-134.

Ahsan, M. (2003). An analytical review of Pakistan's educational policies and plans. *Research papers in Education, 18(*3), 259-280.

Anderson, G. L. (1998). Toward authentic participation: Deconstructing the discourses of participatory reforms in education. *American Educational Research Journal, 35*(4), 571-603.

Andrabi, T., Das, J., & Khwaja, A. I. (2017). Report cards: The impact of providing school and child test scores on educational markets. *American Economic Review, 107*(6), 1535-1563.

Andrabi, T., Das, J., Khwaja, A. I., Vishwanath, T., Zajonc, T. & LEAPS team. (2008). *Pakistan Learning and Educational Achievements in Punjab Schools (LEAPS): Insights to inform the education policy debate* (World Bank Working Paper No. 43750). Washington, DC: The World Bank.

ASER Pakistan (2018). *Annual status of education report: ASER-Pakistan 2018*. Lahore: ASER Pakistan.

Asim, M. (2019). *Can information strengthen local governance of schools? Evidence from Pakistan*. Paper presented at RISE annual conference 2019, Washington, DC.

Asim, S., Abbas, A., & Adil, M. (2015). *Community engagement mechanisms: Field experiment in Pakistan*. Washington DC: The World Bank.

Auerbach, S. (2012). Conceptualizing leadership for authentic partnerships. In S. Auerbach (Ed.), *School leadership for authentic family and community partnerships* (pp. 29-51). New York: Routledge.

Balarin, M., Brammer, S., James, C., & McCormack, M. (2008). *The school governance study*. London, UK: Business in the Community.

Ball, S. J. & Youdell, D. (2008). *Hidden privatization in public education*. Brussels: Education International.

Barrera-Osorio, F., Fasih, T., Patrinos, H. A. (2009). *Decentralized decision-making in schools: The theory and evidence on school-based management*. Washington, DC: The World Bank.

Bauch, P. A. (2001). School-community partnerships in rural schools: Leadership, renewal, and a sense of place. *Peabody Journal of Education, 76*(2), 204-221.

Bauer, S. C., & Bogotch, I. E. (2001). Analysis of the relationships among site council resources, council practices, and outcomes. *Journal of School Leadership, 11*, 98-119.

Bauer, S. C., & Bogotch, I. E. (2006). Modeling site-based decision making: School practices in the age of accountability. *Journal of Educational Administration, 44*(5), 446-470.

Begley, P. T., & Zaretsky, L. (2004). Democratic school leadership in Canada's public school systems: Professional value and social ethic. *Journal of Educational Administration, 42*(6), 640-655.

Bengali, K. (1999). *History of educational policy making and planning in Pakistan* (SDPI Working Paper Series #40). Islamabad: Sustainable Development Policy Institute.

Botha, R. (2007). School-based management: Stakeholder participation and the impact of stakeholder values. *Africa Education Review, 4*(1), 28-41.

Bovens, M. (2007). Public accountability. In E. Ferlie, L. E. Lynn Jr., & C, Pollitt (Eds.), *The Oxford Handbook of Public Management* (pp. 182-208), Oxford: Oxford University Press.

Bruns, B., Filmer, D., & Patrinos, H. A. (2011). *Making schools work: New evidence on accountability reforms*. Washington, DC: The World Bank.

Buchholz, R. A., & Rosenthal, S. B. (2004). Stakeholder theory and public policy: How governments matter. *Journal of Business Ethics, 51*, 143-153.

Burns, T., & Köster, F. (2016). Modern governance challenges in education. In T. Burns, & F. Köster (Eds.), *Governing education in a complex world* (pp. 17-39). OECD Publishing, Paris.

Carnoy, M. (1995). Structural adjustment and the changing face of education. *International Labour Review, 134*(6), 653-674.

Central Intelligence Agency (2019). *The World Factbook*. Langley, VA. Retrieved from https://www.cia.gov/library/publications/the-world-factbook.

Centre for Peace and Development Initiatives (2014). *Following the school paisa! Report II – District Toba Tek Singh*. Islamabad: CPDI.

Cheema, G. S. (1993). The challenge of urban management: Some issues. In G. S. Cheema & E. Wards (Eds.), *Urban management: Policies and innovations in developing countries.* London: Praeger.

Churches, R., & McBride, C. (2013). *Making external school review effective: Findings from the 2012 Windsor international conference on school improvement through inspection and eternal review*. Reading: CfBT Education Trust.

Clarkson, M. B. E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review, 20*(1), 92-117.

Constant, L., Goldman, C. A., Zellman, G. L., Augustine, C. H., Galama, T., Gonzalez, G., Guarino, C. A., Karam, R., Ryan, G. W., & Salem, H. (2010). Promoting quality and variety through the public financing of privately operated schools in Qatar. *Journal of School Choice, 4*(4), 450-473.

Connolly, M., Farrell, C., & James, C. (2017). An analysis of the stakeholder model of public boards and the case of school governing bodies in England and Wales. *Educational Management Administration & leadership, 45*(1), 5-19.

Cornwall, A. (2002). *Making spaces, changing places: Situating participation in development* (IDS Working Paper No. 170). Falmer: Institute of Development Studies, University of Sussex.

Curran, F. C. (2017). Influence over school discipline policy: Variation across levels of governance, school contexts, and time. *Education Policy Analysis Archives, 25*(119), 1-27.

Currie, G., Lockett, A., & Suhomlinova, O. (2009). The institutionalization of distributed leadership: A 'Catch-22' in English public services. *Human Relations, 62*(11), 1735-1761.

Donaldson, T., & Preston, L. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of Management Review, 20*, 65-91.

Edwards, D. B., Jr., & DeMatthews, D. E. (2014). Historical trends in educational decentralization in the United States and developing countries: A periodization and comparison in the post-WWII context. *Education Policy Analysis Archives, 22*(40).

Evans, M. P., & Radina, R. (2014). Great expectations? Critical discourse analysis of Title I school – Family compacts. *School Community Journal, 24*(2), 107-126.

Fancy, H., & Razzaq, J. (2017). *Accountability in education in Pakistan*. Country case study prepared for the 2018/8 Global Education Monitoring Report. Paris: UNESCO.

Farrell, C. M. (2005). Governance in the UK public sector: The involvement of the governing board. *Public Administration, 83*(1), 89-110.

Farrell, C. M., & Jones, J. (2000). Evaluating stakeholder participation in public services: Parents and schools. *Policy & Politics, 28*(2), 251-262.

Ferris, J. M. (1992). School-based decision making: A principal-agent perspective. *Educational Evaluation and Policy Analysis, 14*(4), 333-346.

Fowler, C. J., & Cordery, C. J. (2015). From community to public ownership: A tale of changing accountabilities. *Accounting, Auditing & Accountability Journal, 28*(1), 128-153.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

Freeman, R. E. (1994). The politics of stakeholder theory: Some future directions. *Business Ethics Quarterly, 4*(4), 409-421.

Gordon, M. F. (2012). Creating organizational cultures of family and community engagement: The impact of district policies and practices on school leaders. In S. Auerbach (Ed.), *School leadership for authentic family and community partnerships* (pp. 133-150). New York: Routledge.

Gordon, M. F., & Louis, K. S. (2009). Linking parent and community involvement with student achievement: Comparing principal and teacher perceptions of stakeholder influence. *American Journal of Education, 116*, 1-31.

Gordon, M. F., & Louis, K. S. (2013). How to harness family and community energy: The district's role. In K. Leithwood, and K. S. Louis (Eds.), *Linking leadership to student learning* (pp. 89-106). San Francisco, CA: John Wiley & Sons, Inc.

Government of Punjab (2008). *School council policy 2007 amended 2008*. Retrieved from http://www.pesrp.edu.pk/downloads/library/SCHOOL_COUNCIL_POLICY_2007-Final.pdf

Government of the Punjab School Education Department (2000). *No, US(F-aid)24-I/99: Constitution of School Councils*. Retrieved from https://schools.punjab.gov.pk/system/files/unit%2010_0.pdf.

Hess, F. M., & Meeks, O. M. (2013). Rethinking district governance. In P. Manna, & P. McGuinn (Eds.), *Education governance for the twenty-first century: Overcoming the structural barriers to school reform*. Washington, DC: Brookings Institution Press.

Hlongoane, M. T. (2016). *Possible financial reporting challenges faced by governing bodies of public schools in South Africa*. Proceedings of the 5th International Conference on Accounting, Auditing, and Taxation (ICAAT 2016).

Ho, D. (2012). The paradox of power in leadership in early childhood education. *Peabody Journal of Education, 87*(2), 253-266.

Holmgren, M., Johansson, O., Nihlfors, E., & Skott, P. (2012). Local school governance in Sweden: Boards, parents, and democracy. *Journal of School Public Relations, 33*, 8-28.

Hooge, E., Burns, T., & Wilkoszewski, H. (2012). *Looking beyond the numbers: Stakeholders and multiple school accountability* (OECD Education Working Papers No. 85). Paris: OECD Publishing.

Hussain, S. N., Hameed, A., & Zulfqar, A. (2016). *School-based management: Voices from government schools of Punjab*.

Iftene, C. (2014). Educational systems' autonomy: Facts and analysis. *Procedia - Social and Behavioral Sciences, 142*, 47-53.

Jawahar, I. M., & McLaughlin, G. L. (2001). Toward a descriptive stakeholder theory: An organizational life cycle approach. *Academy of Management Review, 26*(3), 397-414.

Jones, T. M., & Wicks, A. C. (1999). Convergent stakeholder theory. *Academy of Management Review, 24*(2), 206-221.

Kena, G., Musu-Gillette, L., Robinson, J., Wang, X., Rathbun, A., Zhang, J., Wilkinson-Flicker, S., Barmer, A., & Velez, E. D. (2015). *The Condition of Education 2015* (NCES 2015-144). U.S. Department of Education, National Center for Education Statistics. Washington, DC.

Khan, S. R. (2003). Participation via collective action in government and NGO schools in Pakistan. *Development in Practice, 13*(4), 361-376.

Khan, F. (2007). School management councils: A lever for mobilizing social capital in rural Punjab, Pakistan? *Prospects, XXXVII (1)*, 57-79.

King, E. M., & Guerra, S. C. (2005). Education reforms in East Asia: Policy, process, and impact. In The International Bank for Reconstruction and Development / The World Bank, *East Asia decentralizes: Making local government work* (pp. 179-207). Washington, DC: The World Bank.

Kofod, K. K., Johansson, O., Paulsen, J. M., & Risku, M. (2016) Political cultures. In L. Moos, E. Nihlfors, & J. Paulsen (Eds.), *Nordic superintendents: Agents in a broken chain* (pp. 207-231). Cham, Switzerland: Springer.

Komatsu, T. (2012). *Decentralized school governance and social cohesion in a post-conflict society: School leaders' participatory democratic accountability in Bosnia and Herzegovina* (Doctoral dissertation). Retrieved from https://conservancy.umn.edu/handle/11299/126262

Leithwood, K., & Menzies, T. (1998). Forms and effects of school-based management: A review. *Educational Policy, 12*(3), 325-346.

Levy, B., & Shumane, L. (2017). *School governance in a fragmented political and bureaucratic environment: Case studies from South Africa's Eastern Cape Province* (ESID working paper no. 84). Manchester, UK: Effective State and Inclusive Development Research Centre.

Macpherson, I. (2016). An analysis of power in transnational advocacy networks in education. In K. Mundy, A. Green, B. Lingard, & A. Verger (Eds.), *The handbook of global education policy* (pp. 313–317). Malden, MA: Wiley-Blackwell.

Malen, B. (2003). Tightening the grip? The impact of state activism on local school systems. *Educational Policy*, *17*(2), 195-216.

Meijer, A. J. (2007). Publishing public performance results on the internet: Do stakeholders use the internet to hold Dutch public service organizations to account? *Government Information Quarterly, 24*, 165-185.

Menashy, F. (2013). Private sector engagement in education worldwide: Conceptual and critical challenges. In A. W. Wiseman & E. Anderson (Eds), *International perspectives on education and society: Vol. 20. Annual review of comparative and international education 2013* (pp. 137-165). Bingley, UK: Emerald Publishing.

Miraftab, F. (2004). Public-private partnerships: The Trojan horse of neoliberal development? *Journal of Planning Education and Research, 24*, 89-101.

Mirza, M. S. (2003). *Quality of primary education in Pakistan*. Preparatory document for the Ministerial meeting of South Asia EFA Forum 21-23 may, 2003. Ministry of Education, Government of Pakistan.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *The Academy of Management Review, 22*(4), 853-886.

Murphy, J., Gilmer, S. W., Weise, R., & Page, A. (1998). *Pathways to privatization in education*. Greenwich, CT: Ablex Publishing.

Nambissan, G. B., & Ball, S. J. (2010). Advocacy networks, choice and private schooling of the poor in India. *Global Networks, 10*(3), 324–343.

Nayyar-Stone, R., Ebel, R., Ignatova, S., & Rashid, K. (2006). *Assessing the impact of devolution on healthcare and education in Pakistan*. Washington DC: The Urban Institute.

Neville, B. A., Bell, S. J., & Whitwell, G. J. (2011). Stakeholder salience revisited: Refining, redefining, and refueling an underdeveloped conceptual tool. *Journal of Business Ethics, 102*(3), 357-378.

Ni, Y., Yan, R., & Pounder, D. (2018). Collective leadership: Principals' decision influence and the supportive or inhibiting decision influence of other stakeholders. *Educational Administration Quarterly, 54*(2), 216-248.

Nihlfors, E., Paulsen, J. M., Skedsmo, G., Moos, L., Pulkkinen, S., & Kanervio, P. (2014). Role and influence of school boards on improving educational quality. In L. Moos, & J. Paulsen (Eds.), *School boards in the governance process*. Cham, Switzerland: Springer.

Paulsen, J. M., Nihlfors, E., Brinkkjær, U., & Risku, M. (2016). Superintendent leadership in hierarchy and network. In L. Moos, E. Nihlfors, & J. Paulsen (Eds.), *Nordic superintendents: Agents in a broken chain* (pp. 207-231). Cham, Switzerland: Springer.

Pfeffer, J., & Salancik, G. R. (1978). T*he external control of organizations: A resource dependence perspective*. New York: Harper & Row.

Povey, J., Campbell, A. K., Willis, L., Haynes, M., Western, M., Bennett, S., Antrobus, E., & Pedde, C. (2016). Engaging parents in schools and building parent-school partnerships: The role of school and parent organisation leadership. *International Journal of Educational Research, 79*, 128-141.

Probart, C., Snow-Telfer, H., & McDonnell, E. (2006). Use of stakeholder theory to examine groups salient in decisions related to a la carte offerings. *The Journal of Child Nutrition and Management, 30*(2).

Punjab Education Sector Reform Programme (2018). *School councils*. Retrieved from http://www.pesrp.edu.pk/pages/School-Councils.

Quan-Baffour, K. P., & Arko-Achemfuor, A. (2014). Training school governing body members in three rural schools in Taung: Empowerment for good governance. *Studies of Tribes and Tribals, 12*(1), 171-178.

Rahim, B. (2017). Improving primary education in Pakistan: An examination of the association between school autonomy and children's learning outcomes. *FIRE: Forum for International Research in Education, 4*(1), 94-112.

Rapp, N., & Duncan, H. (2012). Multi-dimensional parental involvement in schools: A principal's guide. *International Journal of Educational Leadership Preparation, 7*(1), 1-14.

Shah, D. (2003). *Country report on decentralization in the education system of Pakistan: Policies and strategies*. Islamabad: Academy of Educational Planning and Management, Ministry of Education, Government of Pakistan.

Shatkin, G., & Gershberg, A. I. (2007). Empowering parents and building communities: The role of school-based councils in educational governance and accountability. *Urban Education, 42*(6), 582-615.

Sliwka, A., & Istance, D. (2006). Parental and stakeholder 'voice' in schools and systems. *European Journal of Education, 41*(1), 29-43.

Smoke, P. (1993). Local government fiscal reform in developing countries: Lessons from Kenya. *World Development, 21*(6), 901-923.

Smrekar, C., & Crowson, R. L. (2015). Localism rediscovered: Toward new political understandings in school district governance. *Peabody Journal of Education, 90*(1), 1-8.

Snow, D., & Williamson, A. (2015). Accountability and micromanagement: Decentralized budgeting in Massachusetts school districts. *Public Administration Quarterly, 39*(2), 220-258.

Taela, K., Franco, E. L., Shankland, A., Maivasse, C., Chilengue, N., & Goodyfry, C. (2018). *Representation and inclusion in school councils in Mozambique* (Research report vol. 2018, no. 84). Brighton, UK: Institute of Development Studies.

The World Bank (2008). *What is school-based management?* Washington, DC: The World Bank.

UNESCO (2008). *EFA Global Monitoring Report 2009. Overcoming inequality: Why governance matters*. Paris: UNESCO Publishing.

UNESCO (2013). *The global learning crisis: Why every child deserves a quality education*. Paris: UNESCO.

UNESCO (2014). *EFA Global Monitoring Report 2013/4. Teaching and learning: Achieving quality for all*. Paris: UNESCO Publishing.

UNESCO (2015a). *Education 2030: Incheon declaration and framework for action for the implementation of Sustainable Development Goal 4*. Paris: UNESCO.

UNESCO (2015b). *EFA Global Monitoring Report 2015. Education for all 2000-2015: Achievements and challenges*. Paris: UNESCO Publishing.

UNESCO (2019). *Concept note for the 2020 Global Education Monitoring report on inclusion*. Paris: UNESCO Publishing.

UNESCO Institute for Statistics. (2018a). *Data for the Sustainable Development Goals*. Montreal: UNESCO Institute for Statistics. Retrieved from http://uis.unesco.org/en.

UNESCO Institute for Statistics (2018b). *Sills and innovation in G20 countries*. Montreal: UNESCO Institute for Statistics.

UNESCO Institute for Statistics (2018c). *UIS.Stat*. Montreal: UNESCO Institute for Statistics. Retrieved from http://data.uis.unesco.org.

Urbanovič, J., & Patapas, A. (2012). Decentralisation reforms of education management: Theoretical and practical issues. *Viesoji Politika ir Administravimas, 11*(4), 659-671.

Villa, L., & Duarte, J. (2005). Concessionary public schools in Bogotá: An innovation in school management in Colombia. In L. Wolff, J. C. Navarro & P. González (Eds.), *Private education and public policy in Latin America* (pp. 95-130). Washington, DC: Partnership for Educational Revitalization in the Americas.

Weidman, J. C., & DePietro-Jurand, R. (2011). *Equip2 state-of-the-art knowledge in education: Decentralization: A guide to education project design based on a comprehensive literature and project review*. Washington, DC: USAID.

Wildy, H., & Louden, W. (2000). School restructuring and the dilemmas of principals' work. *Educational Management and Administration, 28*(2), 173-184.

Yusuf, M., Adams, C., & Dingley, K. (2016). Digital citizen participation within schools in the United Kingdom and Indonesia: An actor-network theory (ANT) perspective. *Information, 7*(69), 1-27.

Chapter 3. The Association Between Parent Participation in School Management and Student Achievement in Eight Countries and Economies

Introduction

Governments and development partners have made significant progress in expanding access to education since 1990 with the global commitments into the Education for All (EFA) goals. International aid and domestic resources were mobilized to increase the supply of schools, while accelerating the demand for education by removing social, cultural, and economic barriers, with an emphasis on the disadvantaged (UNESCO, 2015b). As a result, the global net enrollment rate in primary education increased from 82% to 89% between 1990-2015, while the number of out-of-school children of primary-school age fell by 43% despite the rapid growth of the child population (UNESCO Institute for Statistics, 2018b).

However, schooling does not necessarily mean learning. Governments in many countries have failed to provide quality education to the increasing number of students due to their insufficient technical and financial capacity to, for example, revise school curricula, recruit and train qualified teachers, provide quality learning materials, and use assessment to improve teaching and learning (UNESCO, 2013). The consequence is that an estimated 130 million children who enroll in primary school cannot read, write, or count well (UNESCO 2014). 200 million children and adolescents leave school without learning basic skills and knowledge they need to thrive in the society (UNESCO, 2013). The learning crisis is a global challenge that is happening in both developed and developing countries across the continents (UNESCO Institute for Statistics, 2018a). When put into monetary terms, the cost of the learning crisis is estimated to be 129 billion US dollars per year (UNESCO, 2014).

One of the policy responses to the learning crisis, taken by many governments, is the decentralization of education governance from central to local levels (UNESCO, 2008). By giving decision-making authority to local stakeholders, who are assumed to know their children's educational needs and their local education system better than the central government, education decentralization is expected to strengthen accountability mechanisms and enhance the effectiveness of school education (Barrera-Osorio et al., 2009; UNESCO, 2015b). In fact, responsibility for education management has been decentralized to the local community level in both developed and developing countries as a means to improve the quality of education and hold schools accountable for educational outcomes (Bruns et al., 2011; Edwards & DeMatthews, 2014; Iftene, 2014; Shatkin & Gershberg, 2007).

In particular, engaging parents in school management is viewed as an important mechanism for improving student achievement since they have direct incentives to improve their child's education and are assumed to know their child's learning needs better than others (Barrera-Osorio et al, 2009). For example, parental participation in school management is expected to improve education quality and learning outcomes by enhancing transparency of school operation, strengthening accountability for learning outcomes, increasing school resources through local contributions, and promoting efficient use of resources by achieving a better match between students' learning needs and school offerings (Barrera-Osorio et al., 2009; Bruns et al., 2011; Edwards & DeMatthews, 2014). Strengthening school-parent partnerships has been advocated as a strategy for addressing the learning crisis and achieve the globally agreed education target in the Sustainable Development Goals (SDGs), inclusive and equitable quality education for all (UNESCO, 2008, 2015a).

Despite this discourse on the importance of parental engagement and its theoretical underpinnings, the evidence on the association between parent participation in school management and student achievement is inconclusive. In addition, the available evidence does not adequately explain mechanisms by which parent participation in school management influences student achievement, if any. The lack of firm evidence raises questions about the effectiveness of engaging parents in school management and poses a challenge to designing effective participatory school governance that hold schools accountable for educational outcomes.

In order to understand whether and how parent participation in school management is associated with student achievement, this study pays attention to two mechanisms through which parent participation in school management affects student achievement. First, by participating in school management, individual parents may obtain information about the school and build networks with school personnel and other parents. These resources may enable parents who participate in school management to provide optimal level of learning support for their own child at home (home input). Second, it provides a group of parents with opportunities to influence school decisions and thus affect the learning environment at school (school input). In order to understand how parent participation in school management contributes to students' learning, the participation-achievement association derived from the two mechanisms need to be isolated from each other. In addition, the magnitude of associations derived from each mechanism may differ by parents' socioeconomic status (SES) if it facilitates or limits the ability of parents to benefit from their participation.

I address these issues by examining two questions: to what extent participation of a student's own parents and a group of parents in school management is associated with student achievement; and how parents' SES moderates these associations. This study uses public school student data derived from the Program for International Student Assessment (PISA) survey in 2015 for eight countries and economies (Croatia, Georgia, Portugal, Dominican Republic, Mexico, Korea, Hong Kong, and Macao). Using cross-national data from a sample of nationally representative 15-year-old students and their parents, I performed Ordinary Least Squares (OLS) regression analysis to estimate the participation-achievement associations for the public school student population in these geographically diverse countries and economies.

I found no evidence that parent participation in school management contributed to improving student achievement in any of the countries or economies. The association between parent participation in school management and student achievement varied by country and economy but any statistically significant associations lay in a negative direction. However, depending on the country or economy, the negative association was derived from either participation of a student's own parents or participation of a group of parents. The former (individual-level participation) is more likely to impact home input, while the latter (school-level participation) is assumed to affect school input. This suggests the importance of identifying which mechanism accounts for positive/negative associations in order to design effective participatory school governance model.

I also found that the associations were not moderated by parents' SES. However, the exploration of other moderating factors suggests that the parents' perception of school's openness to parental engagement (whether the parents felt involved by school) moderated the participation-achievement association in some countries and economies. This implies that what matters may not be participation per se but rather the degree of engagement.

The findings of this cross-national study call into question the recommendations to increase parental participation in school management without attending to various moderating and mediating contextual factors. The results underscore the importance of carefully examining how parental participation positively and negatively affects student learning within the context of each country and identifying factors that moderate the associations. Establishing a better understanding of how parent participation works in a given context helps policy makers and public school authorities in removing bottlenecks and/or providing enabling environments to leverage the school-parent partnership for improving students' learning outcomes.

Literature Review

This section provides a review of literature on the association between participation of parents in school management and student achievement. It presents a summary of empirical evidence in the United States and other countries and potential reasons for the mixed evidence.

Association Between Parent Participation in School Management and Student Achievement

There is a fair amount of empirical studies that examine the association between parent participation in school management and student achievement. The studies use parent engagement in participatory local school governing bodies, such as school management committees (SMC), parent-teacher associations (PTA), and parent-teacher organizations (PTO), as a measure of parent participation in school management and decision-making. The evidence was found mostly in the United States but also in low- and middle-income countries. The results of this evidence, however, are mixed.

United States. Most empirical studies in the United States exploited rich student-level data, which include their parents' information, to estimate the association between participation of a student's own parents in school management and student achievement. The evidence derived from the studies in the United States is mixed.

A positive association was found by several studies. For example, analyzing cross-sectional data on eighth-grade students derived from the National Education Longitudinal Study of 1988 (NELS), one study used OLS regression to find that a composite measure of a PTO membership and participation is positively associated with math and reading achievement (Desimone, 1999). Some studies used longitudinal data to control for students' prior performance. These include a study that analyzed data on low-income children from kindergarten to 5th grade derived from the Comprehensive Child Development Program and the School Transition Study in the United States (Dearing et al., 2006). Estimating individual growth models, this study found that within-family changes in a composite measure of parent participation, which included participation in PTA, were positively associated with changes in literacy performance (Dearing et al., 2006). Another used data sourced from the Early Childhood Longitudinal Survey in the United States of representative sample of students across the nation who entered kindergarten in 1998/1999 (Park & Holloway, 2017). Estimating growth curve models, the study found that a composite measure, derived from parent participation in PTA meetings, volunteering, and fundraising, was positively associated with student reading scores but not with math scores (Park & Holloway, 2017).

However, other studies found negative or no associations between participation of a student's own parents in school management and student achievement. Using the NELS panel data for public school students initially in the eighth grade in 1988, and in the tenth in 1990, a study estimating OLS regression models found that a composite measure of parent participation, including PTO membership, PTO meeting attendance, PTO activity participation, and volunteering in school, was negatively associated with student science achievement (McNeal, 1999). Another study using three waves of NELS data to estimate latent growth curve models found that a composite measure including the four participation variables had no statistically significant association with a growth of student achievement in math, reading, science, or social studies (Fan, 2001). Using national data from the Longitudinal Study of American Youth (LSAY), additional research found that a composite measure of parent participation derived from PTA membership, school visits, and a degree of attentiveness to school issues was not associated with student math-science composite scores (Shumow & Miller, 2001). Estimating time-lagged growth models with longitudinal data sourced from the National Longitudinal Survey of Youth 1979, another study found that parental participation in PTA was not associated with math and reading scores after controlling for prior achievement (Domina, 2005).

Low- and middle-income countries. Research exploring the association between parent participation in school management and student achievement was also found for low- and middle-income countries where school-based management (SBM) programs have been implemented. These programs transfer the responsibility for school management to local school governing bodies represented by parents. By comparing student achievement between treatment schools and control schools, researchers examined whether participation of a group of parents in school management was associated with student achievement. The evidence derived from the evaluation of SBM programs in low- and middle-income countries is also inconclusive.

For instance, a review of 83 empirical studies of SBM from 1985 to 1995 found that community-control SBM, in which decision-making authority is mainly devolved to parents and local community members, was associated with both positive and negative, as well as neutral, student learning outcomes (Leithwood & Menzies, 1998). The evidence from recent studies was also inconclusive.

A positive association between parental engagement and student achievement was found in some countries. In Argentina, the government has promoted education decentralization in which school associations represented by parents make decisions on school management. Using both difference-in-differences and school fixed-effects approaches, one study found that students in decentralized public secondary schools increased test scores in math and language greater than their counterparts in traditional province schools (Galiani et al., 2008). In Ecuador, the government launched decentralization reform in 1999; a group of schools formed autonomous school networks called *Redes Amigas*, which are managed by directive councils consisting of teachers, parents, and community members. Using a propensity score matching method to create a matched sample of schools that applied to the program, one study found a positive association between program participation and math and language test scores of second and fourth graders (Ponce, 2006). In an evaluation of a community school project sponsored by Save the Children in Mali, third and fourth graders in community schools scored higher in math and language on average compared to their counterparts in traditional schools (Muskin, 1999).

Other studies, however, have found that school-level parent participation in school management was not associated with student achievement. In Mexico, the government launched PEC-FIDE (Program of Strengthening and Direct Investment in Schools) in 2008, in which federal and state matching grants were provided to selected schools in exchange for the implementation of school-based collaborative planning and shared decision-making through school councils comprised of parents. A study using difference-in-differences analysis provided suggestive evidence that positive effects of the program, if any, is driven by increased cash benefits rather than school-based decision-making (Santibañez et al., 2014). In Nepal, the government transformed government schools to community schools in which school management committees consisting of parents and community members made a number of key decisions. Using difference-in-differences and instrumental variables approaches, a study found no community-school impact on achievement in math and language for students in grade three, or achievement in math and science for those in grade five, in comparison to traditional government schools (Chaudhury & Parajuli, 2010). An experimental study in the Philippines, in which public secondary schools were randomly assigned to organize monthly meetings of an advisory school council represented by parents, found that the treatment had no impact on student academic achievement (San Antonio, 2008).

Possible Explanation for the Mixed Results

Research conducted on situations within the United States and other low- and middle-income countries suggests that empirical evidence on the association between parent participation in school management and student achievement is inconclusive. However, the literature also suggests that several conceptual and methodological issues may have contributed to the mixed evidence. These include: 1) a distinction of parent participation in school management, 2) the isolation of individual- and school-level parent participation, 3) heterogeneity in parents' SES, and 4) reverse causality.

1) Distinction of parent participation in school management. Parent participation in school management should be distinguished from other types of parent participation because mechanisms to influence student achievement differ by type of parent participation. Parent participation in school is viewed as a source of social capital, providing beneficial, interpersonal relationships between school personnel and other parents, as well as the parent's own child (Coleman, 1988; Hill & Taylor, 2004; Putnam, 1995). Yet the ways in which this social capital influences student learning varies by how parents are engaged in their child's school (Bassani, 2008; McNeal, 1999).

Parent participation in school management is unique in that it influences student learning through two channels. On the one hand, participation in school management provides parents with a means to improve their own child's learning at home. By participating in school governing bodies, parents obtain information about their school and build networks with school personnel and other parents, which may help the parents to provide optimal level of learning support at home (Hill & Taylor, 2004; McNeal, 1999). Through this mechanism, students may benefit from the participation of their own parents (Bassani, 2008).

On the other hand, parent participation in school management has potential to influence achievement of a broader set of students in school. According to the typology of parents' participation proposed by Epstein (1995), parent participation in school management is unique in that parents are engaged in school decision-making. This enables a group of parents to influence school policy and practices that would change ways in which education services are delivered to children in school. Due to its school-wide influence, students would benefit from a school-level parent participation regardless of whether their own parents participate in school management. Because of the unique mechanisms, parent participation in school management needs to be distinguished from other types of participation.

The importance of differentiating types of parent participation in school has been addressed within the literature (e.g., Hill & Taylor, 2004). Despite this, participation in school management is often used in combination with other types of parent participation. For example, Park & Holloway (2017) used a composite measure deriving from PTA participation, volunteering, and fundraising. Other studies used factor analysis or principal component analysis to generate linearly-uncorrelated dimensions of parent participation from a set of different types of parent participation (e.g., Fan, 2001; McNeal, 1999; Sui-Chu & Willms, 1996). Even though these statistical procedures provide methodologically sound and useful approach, they pose a practical constraint in understanding which specific form of parent participation affects student achievement (Shumow & Miller, 2001). Therefore, parent participation in school management should be examined as a distinct type of participation.

2) Isolation of individual- and school-level parent participation. The association between parent participation in school management and student achievement needs to be examined with respect to both individual- and school-level parent participation. As noted above, parent participation in school management can affect student achievement through two mechanisms. However, the majority of empirical studies examined the association with respect to either participation of a student's own parents or participation of a group of parents at the school level. With such an approach, we may not be able to fully capture the participation-achievement association uniquely derived from the two mechanisms. This poses a challenge in our efforts to understand how parent participation influences student learning. In order to assess the extent of achievement effects derived from each mechanism, the association derived from individual-level participation and school-level participation need to be isolated from each other.

Unfortunately, studies addressing this issue are scarce. One of the few studies is a hierarchical linear analysis using cross sectional data of eighth-grade students derived from NELS data in the United States (Sui-Chu & Willms, 1996). By including both individual- and school-level participation measures in the same model, the study found that student achievement in reading was positively associated with school-mean parent participation to a greater magnitude than individual-level parent participation, suggesting that student achievement depends on the average level of participation of all parents rather than participation of a student's own parents (Sui-Chu & Willms, 1996). However, the evidence from this study may not adequately inform how individual- and school-level parent participation in school management is associated with student achievement since the study used a composite measure of parent participation derived from PTO participation and volunteering at school.

Another study is a growth curve analysis that estimated the association between parent participation and student achievement by using individual-level data and school-level data, respectively (Park & Holloway, 2017). The study found a positive association between school-level parent participation and student achievement, indicating that students whose parents do not actively participate in school still benefit academically from the participation of other parents (Park & Holloway, 2017). This study, however, also does not provide a clear picture of the associations derived from the two mechanisms since the study used a composite measure of parent participation and did not isolate the two associations from each other.

3) Heterogeneity in parent socioeconomic status (SES). The literature on parent participation has given attention to parents' SES as a potential factor that may moderate the association between parent participation in school and student achievement. Theoretical and empirical studies suggest that parents' SES may play differential roles depending on whether the association is derived from an individual's parents' efforts to improve their learning support at home or the parent group's efforts to influence school decisions to improve the learning environment at school. In this context, the role of the parents' SES in moderating the participation-achievement association needs to be examined for each of the two mechanisms, respectively.

3-1) The level of parents' SES. There is evidence that socioeconomically advantaged families are more likely to participate in school (e.g. Child Trends, 2013; Park & Holloway, 2017; Shumow & Miller, 2001; Sui-Chu & Willms, 1996) due to various reasons such as the parents' valuation of schooling, the schools' ability to engage parents and cultural capitals (Lareau, 1987), as well as practical issues such as transportation, availability of child care, and work schedule (Carr, 1996). In addition, socioeconomically advantaged parents can benefit more than socioeconomically disadvantaged parents from the same level of participation because of the differential availability of resources and the capacity to capitalize their participation (McNeal, 1999). However, parents' SES may play differential roles for individual- and school-level parent participation.

With regards to participation of a student's own parents, socioeconomically advantaged parents may obtain greater resources and knowledge that enable them to provide optimal level of support to their child at home such as homework help and private tutoring. Regardless of the notion of an SES-advantage, however, existing studies show inconclusive evidence. The literature in the United States shows that a positive association between participation of a student's own parents and student achievement is higher for both high-SES students (McNeal, 1999; Park & Holloway, 2017) and low-SES students (e.g., Dearing et al., 2006), while other studies found that the level of SES has no moderating effects (e.g., Domina, 2005). Since most of the research was based in the United States, new evidence from other countries would help clarify whether the level of SES moderates the association between participation of a student's own parents and student achievement.

With respect to school-level parent participation, parent groups whose members are socioeconomically advantaged may have greater power to influence school decisions and the learning environment. It has been reported that, even if parents participate in school management, principals and teachers dominate decision-making processes (Briggs & Wohlstetter, 2003; Khan, 2003; Marshall & Bunly, 2017; Santibañez et al., 2014). This indicates that more powerful stakeholders dominate weaker ones in school decision-making (Anderson, 1988; Cornwall, 2002; Hooge et al., 2012). In other words, parents are better able to exert influence over school decisions when their voice is amplified due to increased power. In fact, a case study of an urban school district in Kentucky in the United States suggests that parent-represented school management councils implement effective decision-making when adequate power is distributed to parents (Talley & Keedy, 2006).

The literature indicates that power is partly attributed to SES. According to the theories of intersectionality, people are located in social structures that capture power relationships informed by multiple, mutually-interwoven social constructs such as class and race (Stewart & McDermott, 2004). This indicates that inequality in social status generates dominance that allows one party to prosper at expense of others (American Psychological Association, 2006). In fact, it is reported that parents are more effective in their roles in school decision-making process when they are more educated and knowledgeable (Chikoko, 2008; Gershberg et al., 2009; Khan, 2003; Swift-Morgan, 2006). Yet, there is also evidence that parents' SES does not necessarily serve as a source of parents' bargaining power to influence school decisions and hold schools accountable for student learning outcomes. One study conducted in the United States shows that at the school-level, SES does not moderate the association between parent participation and student achievement (Park & Holloway, 2017). Another study in the United States demonstrates that positive effects of parent participation on reading score is higher in school where parents' SES is low on average (Sui-Chu & Willms, 1996). Whether a level of parents' SES serves as a source of their bargaining power in school decision-making is not clear.

3-2) Within-school SES variation. While the literature on parent participation focuses on the overall level of SES, a within-school variation in SES may play an important role in determining the ability of parent groups to influence school decisions and generate school-wide effects on the learning environment. In socioeconomically diverse schools, participation creates conflicts not only between parents and other stakeholders but also within the parent groups (Anderson, 1998). Conflicts among parents has important implications for parent participation in school management and decision-making. It is possible that, in socioeconomically diverse schools, engaging a large number of parents in school management will make it difficult for parents to reach a democratic consensus on their preferences and thus fail to form a collective power to influence school decisions. On the other hand, in socioeconomically homogeneous schools where parents have similar interests and preferences, it can be relatively easy for parents to generate collective bargaining power that allows them to get their demands reflected in school decisions. In this context, the role of SES in moderating the association between school-level parent participation and student achievement needs to be examined with respect to both the level of SES and the within-school SES variation.

4) Reverse causality. Another possibility for the mixed evidence discussed above is that of reverse causality. While parent participation is expected to affect student achievement in theory, poor academic results may incentivize parents to increase their involvement in school (McNeal, 2012). In empirical studies, a failure to account for the reverse causality could create downward biases concerning the association between parent participation and student achievement. Therefore, controlling for reverse causality is a critical methodological issue. Recent empirical studies address this issue by using longitudinal data, which enable researchers to control for past achievement (e.g., Domina, 2005) and estimate latent growth models to examine the causal directions (Dearing et al., 2006).

Problem Statement, Research Questions and Contribution

Parents are engaged in school management in decentralized education systems in many countries, with the expectations that they will be able to hold the school accountable for learning outcomes. However, the association between parent participation in school management and student achievement is inconclusive and limited in its ability to explain mechanisms of affecting student achievement. The lack of firm evidence raises questions about the effectiveness of engaging parents in school management and poses a challenge to designing effective participatory school governance.

This study pays attention to the two unique mechanisms through which parent participation in school management can affect student achievement: 1) participation of a student's own parents that would affect their learning support at home and 2) participation of a group of parents that would affect the learning environment at school. Parents' SES may also play differential roles in moderating the associations derived from the two mechanisms.

Using the international assessment data derived from the PISA 2015 in eight countries and economies (Croatia, Georgia, Portugal, Dominican Republic, Mexico, Korea, Hong Kong, and Macao), this study answers two questions: to what extent participation of a student's own parents and that of a group of parents in school management are associated with student achievement; and how parents' SES moderate these associations.

The study contributes to the literature on school governance and parent participation by generating the new evidence on how parent participation in school management is associated with student achievement through consideration of the two different mechanisms in different contexts. The findings also provide policy makers and public school authorities with insights into ways to leverage participatory school governance for improving students' learning outcomes.

Conceptual Framework

Figure 3.1 shows mechanisms through which parent participation in school management affects student achievement. Students increase their learning by receiving home input from parents and school input from teachers and peers. Parent participation in school management has potential to change the amount of both home input and school input.

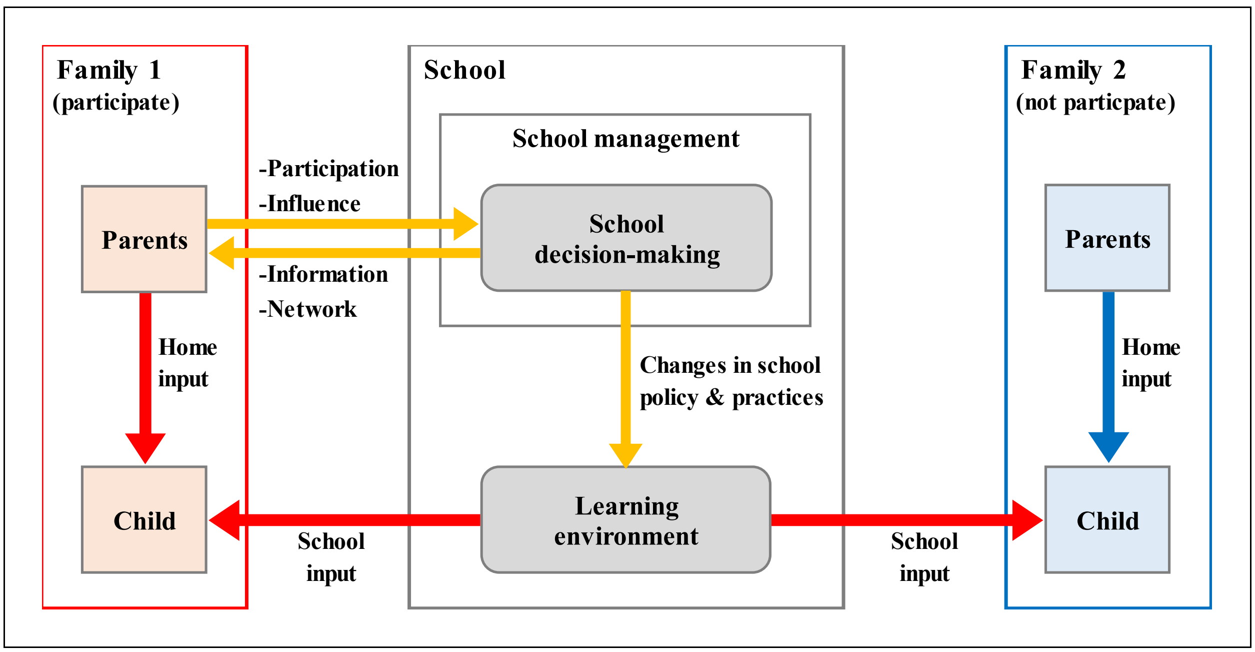


Figure 3.1. Conceptual framework for achievement effects of parent participation in school management.

First, parents who participate in school management (Family 1, Figure 3.1) could obtain insider information, including information on school curriculum and instructional policy, and develop networks with school personnel and other parents. These parents may use these resources to provide optimal level of learning support for their child at home, for example by providing more effective homework help and/or private tutoring that meet their child's learning needs. Parents who do not participate in school management (Family 2, Figure 3.1) miss the opportunity to strengthen their home input. However, participation in school management may not actually result in increase in home input and could even reduce parents' support for learning at home. For instance, parents may not get information and networks useful for strengthening home input through their participation in school management. In addition, if participation in school management is labor-intensive and time-consuming, participating parents may need to give up their commitment to and time for supporting their child's learning at home. When the cost of participating in school management exceeds the benefit, the students would receive less home input, which may result in a decline in learning gain.

Second, a group of parents participating in school management could influence school decisions and change school policy and practices to improve learning environment at school, which would benefit all students in the school. Because of the school-wide influence, this benefit accrues to even students whose parents do not participate in school management as spill-over effects (see Figure 3.1). However, since parents are not educational professionals, engaging parents in school management may hamper effective and efficient school leadership and professional practices. This may become detrimental to the learning environment at school, which could result in a decline in school input and student learning gain.

The conceptual framework indicates that the effects of parental participation in school management on student achievement are derived from two mechanisms: participation of a student's own parents that would affect home input, and school-level participation that would affect school input. In addition, these mechanisms could create both positive and negative impacts on student achievement. In order to understand how parent participation in school management influence student achievement, the associations derived from individual- and school-level parent participation need to be isolated from each other.

It is however important to note that parent participation in school management is not the only factor that affects the level of home and school input. These inputs are also influenced by other factors such as a country's education system, community environment, school conditions, and household and student characteristics. No causal relationship can be claimed between parent participation in school management and home/school inputs unless these factors are properly controlled for.

Data

Data and Sample

This study performs regression analysis on student-level cross-sectional data on public schools derived from the PISA 2015 round surveys to examine the association between parent participation in school management and student achievement in and across countries and economies. The Organization for Economic Co-operation and Development (OECD) has administered PISA, an international survey assessing the competencies of 15-year-old students, every three years since 2000. A sample of nationally representative 15-year-old students were selected through a two-stage stratified random sampling with schools defined as primary sampling units and students as secondary sampling units in most participating countries and economies. In addition to tests in math, science, and reading administered to the students, a questionnaire survey was provided to the schools and students. Some countries and economies administered an optional questionnaire survey to parents of the sampled schools as well.

Use of the 2015 PISA data provides several advantages. First, using the latest round of PISA surveys as of 2018, this study is able to examine the participation-achievement associations in the most up-to-date educational environment. Second, since the number of countries and economies participating in the PISA surveys has increased over the years, this study can provide findings and evidence from a broader set of countries and economies, including countries where studies on parental engagement are scarce. By using a cross-country analysis, I can exploit between-country variation in parent participation in school management in order to identify the participation-achievement association that may not be identified by targeting a single country. In addition, a country analysis enables me to explore country-specific contextual factors that could explain why the association between parent participation and student achievement exists in some countries and economies and does not exists in others.

For this study, I used only a public school sample since public and private schools have different mandates and functions in society. They are, therefore, likely to develop different accountability relationships with governments and parents. For instance, parents in public and private schools may participate in school management and decision-making process with different roles, motivations, and expectations (Anderson, 1992). In order to mitigate potential noise derived from the difference in school sector, only a public school sample was used.

Out of 73 countries and economies that participated in the PISA 2015, 19 countries and economies administered a questionnaire survey to parents. The initial sample of public school students in the 19 countries and economies consisted of 87,000 students in 2,803 public schools. Parents of these students were asked to report whether they “participated in local school government, e.g. parent council or school management committee.” In addition, school administrators provided information on the proportion of parents who “participated in local school government (e.g. parent council or school management committee).” The two measures of parent participation have missing values. The parent-reported participation has missing values accounting for 38.27% of the sample as some parents did not turn in a questionnaire or answer the particular question[12]. The school-reported parent participation has missing values accounting for 4.79% of the sample. Table 3.1 shows an average student achievement, parent-reported participation and school-reported participation, and a proportion of missing data for each of the countries and economies.

[12] In Belgium and Spain (regional), no parents reported their participation in school government. If these two countries and economies are dropped, the missing data on parent-reported participation reduces to 17.91% of the sample.

Table 3.1.
Student Achievement and Parent Participation in School Management in Public Schools in Countries that Administered a Parent Survey Module

Country/ Economy	Observations	Math score (PV1)	Science score (PV1)	Reading score (PV1)	Parent-reported parent participation (% missing)	School-reported parent participation (%) (% missing)
Belgium	1,439	467.70 (0.00%)	462.74 (0.00%)	459.97 (0.00%)	- (100.00%)	6.07 (24.81%)
Chile	1,924	398.78 (0.00%)	421.77 (0.00%)	431.99 (0.00%)	0.29 (12.27%)	40.57 (0.05%)
Croatia	5,675	463.57 (0.00%)	476.03 (0.00%)	487.38 (0.00%)	0.19 (7.86%)	33.12 (0.70%)
Dominican Republic	3,401	322.42 (0.00%)	323.88 (0.00%)	349.84 (0.00%)	0.61 (6.26%)	69.27 (2.35%)
France	4,428	492.82 (0.00%)	496.08 (0.00%)	499.37 (0.00%)	0.07 (14.14%)	14.95 (5.89%)
Georgia	4,734	401.59 (0.00%)	407.16 (0.00%)	398.57 (0.00%)	0.24 (5.47%)	26.05 (4.20%)
Germany	4,606	503.42 (0.00%)	507.73 (0.00%)	507.37 (0.00%)	0.17 (49.46%)	10.58 (6.36%)
Hong Kong	403	572.16 (0.00%)	544.23 (0.00%)	541.70 (0.00%)	0.10 (1.49%)	24.96 (8.93%)
Ireland	2,428	489.52 (0.00%)	487.10 (0.00%)	506.21 (0.00%)	0.09 (14.29%)	8.88 (13.10%)
Italy	7,559	501.63 (0.00%)	496.21 (0.00%)	499.05 (0.00%)	0.17 (19.53%)	32.32 (5.87%)
Korea	3,703	518.97 (0.00%)	509.10 (0.00%)	506.75 (0.00%)	0.14 (1.97%)	30.53 (0.97%)
Luxembourg	4,485	487.91 (0.00%)	484.28 (0.00%)	480.43 (0.00%)	0.08 (38.57%)	5.15 (8.65%)
Macao	121	490.02 (0.00%)	477.64 (0.00%)	460.13 (0.00%)	0.26 (3.31%)	17.60 (0.00%)
Malta	1,931	450.17 (0.00%)	436.37 (0.00%)	419.23 (0.00%)	0.05 (17.14%)	2.44 (10.93%)
Mexico	6,635	409.91 (0.00%)	418.01 (0.00%)	425.45 (0.00%)	0.46 (8.89%)	42.12 (1.01%)
Portugal	6,897	478.47 (0.00%)	485.88 (0.00%)	484.81 (0.00%)	0.12 (7.29%)	21.56 (4.60%)
Spain	4,344	480.76 (0.00%)	486.85 (0.00%)	488.88 (0.00%)	0.17 (34.39%)	21.36 (4.01%)
Spain (Regions)	20,141	484.83 (0.00%)	490.04 (0.00%)	491.89 (0.00%)	- (100.00%)	22.27 (3.63%)
United Kingdom	2,146	487.46 (0.00%)	492.92 (0.00%)	490.88 (0.00%)	0.07 (51.54%)	7.15 (9.74%)
Observations	87,000					

Note. In the PISA 2015 surveys, student achievement scores are presented in 10 plausible values (PV). The scores in this table shows the plausible value 1. Parent-reported participation and school-reported participation are derived from parent surveys and school surveys respectively. No sampling weights and replicate weights are used.

Given the relatively large number of missing values in parent-reported participation, I examined whether characteristics of students and schools differ between parents who reported and did not report their participation in school management in Table 3.2.

Table 3.2.
Test of Differences in Student/School Characteristics Between Parents Who Reported and Did Not Report Their Participation in School Management

Variable	Mean		Test of difference	
	Participation reported	Participation not reported	Coefficient	Standard error
Student achievement				
Math score (PV1)	458.77	459.67	-0.90	2.11
Science score (PV1)	463.09	461.55	1.54	2.12
Reading score (PV1)	467.66	461.81	5.85**	2.28
Parent participation				
Parent-reported participation	-	-	-	-
School-reported participation (%)	31.92	21.05	10.86***	1.12
Student characteristics				
Socioeconomic status	-0.66	-0.59	-0.07***	0.03
Age	15.81	15.84	-0.03***	0.00
Female	0.50	0.45	0.06***	0.01
Native immigration status	0.95	0.84	0.11***	0.01
Home/test language match	0.94	0.82	0.12***	0.01
Relative school grade	-0.25	-0.25	0.00	0.02
School program				
General	0.80	0.86	-0.06***	0.01
Pre-vocational	0.01	0.02	-0.01***	0.00
Vocational	0.19	0.13	0.06***	0.01
Modular (combined)	0.00	0.00	0.00***	0.00
School characteristics				
School location				
Population: <3,000	0.10	0.06	0.04***	0.01
Population: 3,000-15,000	0.19	0.24	-0.05***	0.02
Population: 15,000-100,000	0.31	0.37	-0.07***	0.02
Population: 100,000-1,000,000	0.23	0.21	0.01	0.02
Population: >1,000,000	0.17	0.11	0.06***	0.02
School size	930.50	790.84	139.67***	19.53
Observations	53,702	33,298		

Note. Student achievement and characteristics are derived from student testing and surveys. Parent-reported participation is derived from parent surveys. School-reported parent participation and school characteristics are derived from school surveys. Sampling and replicate weights are used for the estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.2 shows that students whose parents reported/did not report their participation in school management differ in student and school characteristics. Students whose parents reported their participation status scored higher in reading test on average. They were slightly younger, more likely to be female, and have lower SES. These students were more likely to have native immigration status (i.e., at least one parent was born in the country) and thus tend to have taken a test that was given in their native language. They were also more likely to have enrolled in a vocational track in school. Students whose parents reported their participation status tended to attend school located in a small community with a population less than 3,000 or a large city with a population greater than 1,000,000. Their school tended to have larger enrollment. Overall, the tests of differences suggests that the missing data were not completely at random.

In order to address the issue of missing data in parent-reported participation, I used a multiple imputation technique to replace missing values with a set of plausible values predicted by other variables in the dataset. Multiple imputation does not give biased results when the data is missing at random (MAR), which means that the probability of a particular value being missing depends only on the observed data (Social Science Computing Cooperative, 2013). Simulation studies also demonstrated that multiple imputation produces unbiased estimates even with a high amount of missing data under MAR (Johson & Young, 2011; Lee & Huber, 2011). However, if the probability of having missing values depends on the unobserved data, which is called missing not at random (MNAR), multiple imputation generates bias that increases as the proportion of missing data increases between 10% and 80% (Lee & Huber, 2011).

Since I could not eliminate a possibility that the missing mechanism is MNAR with the observed data, I first dropped 11 countries and economies with more than 10% missing data on parent-reported participation (Belgium, Chile, France, Germany, Italy, Ireland, Luxembourg, Malta, Spain, Spain (regions), and United Kingdom). This reduced sample size to 31,569 public school students across eight countries and economies (Croatia, Dominican Republic, Georgia, Hong Kong, Korea, Macao, Mexico, and Portugal). Although this restricted sample still has some missing data, there is no more than 10% missing data in any variables to be used in the analysis, including parent participation measures. Then, I used the multiple imputation approach to create imputed data sets for the remaining eight countries and economies. A detailed explanation of imputation procedures is found in Appendix 3A. Although the reduction in sample countries and economies limited the generalizability of findings to a broader set of countries and economies, the presented approach helps mitigate potential bias resulting from relatively large missing data on the key variable of interest.

Descriptive Statistics

Student and school characteristics. Table 3.3 presents a descriptive summary of public school students in the eight countries and economies. The sample size in Hong Kong and Macao is small due to the relatively small student population in the two economies in China. The detailed description of each variable is provided in Appendix 3B.

Table 3.3.
Descriptive Summary of the Public School Student Sample, Non-Imputed Data

Variable	Full sample	Country/Economy							
		Croatia	Georgia	Portugal	Dom. Republic	Mexico	Korea	Hong Kong	Macao
Achievement									
Math score	428.67	463.74	398.15	487.80	317.31	405.23	518.17	568.19	485.34
Science score	432.22	474.98	405.94	497.66	320.60	411.99	508.84	539.31	479.80
Reading score	437.90	486.29	396.08	495.37	344.05	418.76	509.13	537.98	462.77
Parent participation									
Parent-reported participation	0.39	0.19	0.25	0.12	0.61	0.48	0.14	0.10	0.26
School-reported participation (%)	40.55	32.93	27.23	20.29	66.75	43.46	31.14	24.61	17.70
Student characteristics									
Socioeconomic status	-1.04	-0.24	-0.40	-0.44	-1.12	-1.37	-0.24	-0.53	-0.88
Age	15.78	15.71	15.87	15.78	15.74	15.81	15.70	15.75	15.85
Female	0.49	0.51	0.47	0.50	0.51	0.49	0.46	0.51	0.46
Native immigration status	0.98	0.89	0.98	0.92	0.98	0.99	1.00	0.59	0.36
Home/test language match	0.97	0.97	0.95	0.97	0.97	0.96	1.00	0.98	0.90
Relative school grade	-0.41	0.20	-0.24	-0.51	-0.62	-0.50	-0.10	-0.41	-0.79
School program									
General	0.76	0.32	0.98	0.88	0.95	0.72	0.84	1.00	0.82
Pre-vocational	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.18
Vocational	0.24	0.68	0.02	0.07	0.05	0.28	0.16	0.00	0.00
Module (combined)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School characteristics									
School location (population)									
<3,000	0.15	0.01	0.34	0.03	0.17	0.19	0.01	0.00	0.00
3,000-15,000	0.16	0.20	0.13	0.30	0.35	0.18	0.00	0.00	0.00
15,000-100,000	0.21	0.41	0.16	0.50	0.29	0.20	0.12	0.00	0.00
100,000-1,000,000	0.24	0.35	0.16	0.14	0.11	0.21	0.38	0.00	1.00
>1,000,000	0.25	0.03	0.21	0.03	0.07	0.21	0.48	1.00	0.00
School size	992.69	605.04	636.55	1,796.13	650.27	1,000.90	947.70	797.47	522.06
School-mean SES	-1.04	-0.24	-0.40	-0.42	-1.12	-1.37	-0.24	-0.52	-0.88
Variation in SES	0.86	0.72	0.74	0.99	0.89	0.93	0.60	0.90	0.75
Observations	31,569	5,675	4,734	6,897	3,401	6,635	3,703	403	121

Note. The table shows the mean values estimated based on non-imputed data using sampling and replicate weights. All 10 plausible values are used to compute test scores. Student achievement and characteristics are derived from student testing and surveys. Parent-reported participation is derived from parent surveys. School-reported parent participation and other school characteristics are derived from school surveys. School-mean SES and variation in SES, which is the standard deviation of SES within school, are computed by aggregating parent SES to school level.

The average student achievement varies by country and economy with the highest scores found in Hong Kong and the lowest in Dominican Republic for math, science, and reading. With respect to parent participation, the cross-country average of parent-reported participation (an indicator variable taking the value 1 if parent participates) is 0.39 and school-reported participation (% parents participate) is 40.55, suggesting that on average about 40% of parents participated in school management. However, parent participation varies by country and economy as well. Parent-reported participation ranges from 0.10 in Hong Kong to 0.61 in Dominican Republic. In school-reported parent participation, which potentially captures the participation of parents who were not sampled for the survey, a proportion of parents who participated in school management is the lowest in Macao at 17.70% and the highest in Dominican Republic at 66.75%. The average test scores and parent participation at country level imply that, without controlling for other factors, the association between parent participation in school management and student achievement could be a negative one.

Parent socioeconomic status also varies by country and economy. Parents in Mexico had the lowest SES index while those in Croatia and Korea had the highest SES index on average. Within-school variation (standard deviation) in parents' SES indicates that public schools in Portugal were the most socioeconomically diverse while those in Korea were the most socioeconomically homogeneous.

Differences between participating and non-participating parents. I also examined whether there were any significant differences between parents who did and did not participate in school management for each country and economy. The results of test of differences are presented in Table 3.4. The detailed description of each variable is provided in Appendix 3B.

Table 3.4.

Test of Differences in Student and Parent Characteristics According to Parental Participation in School Management, Non-Imputed Data

Variable	Test of differences (participating parents – non-participating parents)							
	Croatia	Georgia	Portugal	Dom. Republic	Mexico	Korea	Hong Kong	Macao
<u>Student characteristics</u>								
Age	-0.06***	0.00	-0.01	0.01	0.00	0.04***	-0.09***	0.04
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.05)
Female	-0.03*	-0.02	-0.02	0.00	-0.03*	-0.01	-0.03	0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.05)	(0.11)
Native immigration status	-0.01	-0.01	0.02	0.00	-0.01	0.00*	-0.06	-0.07
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.08)	(0.11)
Home/test language match	-0.01	0.01	0.01*	0.00	-0.02**	0.00	-0.03	0.04
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.03)	(0.06)
Relative school grade	-0.10***	0.02	-0.03	0.04	-0.12***	0.02	-0.25***	-0.04
	(0.01)	(0.03)	(0.04)	(0.06)	(0.04)	(0.01)	(0.06)	(0.18)
School program								
General	-0.03	0.00	-0.05***	0.00	0.05***	-0.01	-	0.01
	(0.02)	(0.00)	(0.02)	(0.01)	(0.02)	(0.02)		(0.08)
Pre-vocational	-	-	0.03**	-	-	-	-	-0.01
			(0.01)					(0.08)
Vocational	0.03	0.00	0.01	0.00	-0.05***	0.01	-	-
	(0.02)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)		
<u>Parent characteristics</u>								
Socioeconomic status	0.04	-0.06	0.04	-0.01	-0.42***	0.12***	0.17	-0.22
	(0.03)	(0.04)	(0.05)	(0.05)	(0.05)	(0.03)	(0.14)	(0.20)
Education level index	0.07**	-0.06	0.10	0.02	-0.58***	0.14***	0.08	-0.24
	(0.03)	(0.05)	(0.07)	(0.07)	(0.07)	(0.05)	(0.26)	(0.39)
Occupation status index	0.68	-0.12	-0.21	-0.34	-5.36***	0.88	2.72	-6.58*
	(0.85)	(1.20)	(1.04)	(0.97)	(0.90)	(0.95)	(5.11)	(3.85)
Household possession index	0.00	-0.14***	0.02	-0.06	-0.39***	0.16***	0.18	0.01
	(0.03)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.12)	(0.17)
Reason for school choice: Good reputation	0.08***	0.11***	0.01	0.01	0.03	0.03	0.15***	0.09
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.04)	(0.18)
Reason for school choice: Courses offered	0.05*	0.10*	0.06**	-0.02	0.06***	0.21***	0.34**	0.40**
	(0.03)	(0.05)	(0.03)	(0.04)	(0.02)	(0.04)	(0.13)	(0.18)
Reason for school choice: High achievement	0.08**	0.10***	-0.02	0.06**	0.01	0.10**	-0.02	0.34**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.09)	(0.15)
Satisfaction with school quality	0.15***	0.42***	0.16***	0.12**	0.20***	0.25***	0.59***	0.18
	(0.04)	(0.04)	(0.04)	(0.05)	(0.03)	(0.05)	(0.07)	(0.25)
Observations	5,229	4,475	6,394	3,188	6,045	3,630	397	117

Note. The table shows coefficients and standard errors in parentheses for the test of differences between parents who did and did not participate in school management based on non-imputed data. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

First, I found that two groups of parents were different in some characteristics but these differences are not necessarily systematic across the countries and economies. With regards to student characteristics, I found no evidence that a child's gender affected parent participation in any of the countries and economies at the 5% significance level. However, students having participating parents were slightly older in Korea but younger in Croatia and Hong Kong. Although there was no statistically significant difference in immigration status at the 5% significance level, students of participating parents were less likely to have a home language that was used for the test in Mexico. Concerning schooling, parents whose child was enrolled in lower grades were more likely to participate in school management in Croatia, Mexico, and Hong Kong. Students of participating parents were also more likely to enroll in a pre-vocational program in Portugal but less likely to be in a vocational program in Mexico.

With respect to parent characteristics, parents who participated in school management had lower SES in Mexico but higher SES in Korea. Looking at the sub-indices of SES, I found that parents who had less education, lower occupational status, and fewer household possessions were more likely to participate in school management in Mexico. In Korea, participating parents were socioeconomically advantaged in education level and household possessions, but not in occupational status, at the 5% significance level. In addition, educated parents were more likely to participate in school management in Croatia, while parents with a higher level of material wealth were less likely to participate in school management in Georgia. These results show that there were differences in the types of parents who were more likely to participate in school management. However, these differences vary by country and economy.

Second, more consistent differences across countries and economies are identified in parents' academic orientation and their satisfaction with school. In the PISA survey, parents were asked to rate the importance of 1) school reputation, 2) offering of particular courses, and 3) school academic achievement, for choosing their child's school on a four-point scale. These questions indicate a degree that parents care about the quality of school education and their child's academic success. The results show that parents who participated in school management were more likely to value at least one of the three academic orientation measures in all the countries and economies. In addition, a more evident and consistent difference was found in the degree of parents' satisfaction with school quality. Parents who had a higher level of satisfaction with the quality of their child's school were more likely to participate in school management at the 5% significance level in all the countries and economies except for Macao. These results suggest that parents who were concerned about their child's education and academic success and those who were satisfied with their child's school quality were more likely to participate in school management in these countries and economies, although no causality can be inferred.

Methodology

I used an education production function in which student achievement is estimated as a function of student/family and school inputs, whose production efficiency is determined by family and school environment factors. OLS regression models were estimated to examine the relationship between parent participation in school management and student achievement, controlling for characteristics of students, families, and schools. All models were estimated by using sampling weights and balanced repeated replication (BRR) weights in order to obtain estimates that account for the complex survey/sampling design of PISA surveys as guided by OECD (OECD, 2017a; 2017b)[13].

[13] See appendix 3C for the details of replicate weights.

Cross-Country Regression Model

Individual-level parent participation. First, I examined how student achievement is associated with participation of a student's own parents in school management across countries and economies, controlling for characteristics of students and schools.

$$\mathrm{Score}_{isc} = \beta_0 + \beta_1 \mathrm{Participation}_{isc} + \beta_2 \mathrm{SES}_{isc} + \mathbf{STUcharacter}_{isc}\boldsymbol{\beta}_3 + \mathbf{SCHcharacter}_{sc}\boldsymbol{\beta}_4 + \delta_c + \varepsilon_{isc} \quad (1)$$

Model 1 estimates the relationship between individual-level parent participation in school management and student achievement. The outcome (*Score*) is a PISA test score in math, science, or reading of student *i* in school *s* and country *c*. In the PISA surveys, the student performance is scaled to have an OECD mean of 500 and standard deviation of 100. The PISA 2015 round has 10 plausible values for math, science, and reading scores respectively to improve the accuracy of estimation[14].

The outcome was estimated as a function of participation in school management by parents (*Participation*) of student *i*. Parents reported their participation in "local school government, e.g., parent council or school management committee" from three answers: 1) yes, 2) no, and 3) not supported by school. I created a dummy variable that inputs one if parents participated in school government and zero if they did not participate in school government, regardless of the reasons. The original variable indicates that parent participation in school government was subject to whether schools supported the parent participation. The importance of accounting for whether schools support parent participation in school government is discussed in the later section.

The model accounted for parents' SES, which is the PISA index of economic, social, cultural status derived from sub-indices of home possessions, parents' occupation, and parents'

[14] See appendix 3D for the procedures to estimate regression slope coefficients and standard errors using the 10 plausible values.

education. The model also controlled for other student characteristics (*STUcharacter*), including age, gender, native immigration status (whether at least one parent was born in the country), home-school language match, a difference from the modal grade[15], and school program enrolled (general, pre-vocational, or vocational). School characteristics (*SCHcharacter*) included school location (population of community) and school size (enrollment). The cross-country model also included country dummies (*d*) to account for systematic differences among the countries and economies.

Individual- and school-level parent participation. Second, I examined the relationship between student achievement and participation of a student's own parents in school management, which would affect learning support at home, and school-level parent participation in school management, which would affect the learning environment at school, across countries and economies.

$$\mathrm{Score}_{isc} = \beta_0 + \beta_1 \mathrm{Participation}_{isc} + \gamma_1 \%\mathrm{Participation}_{sc} + \beta_2 \mathrm{SES}_{isc} + \mathbf{STUcharacter_{isc}}\boldsymbol{\beta_3} + \mathbf{SCHcharacter_{sc}}\boldsymbol{\beta_4} + \delta_c + \varepsilon_{isc} \quad (2)$$

In model 2, I added school-level parent participation in school management (*%Participation*), which is measured by the school-reported proportion of parents who participated in "local school government (i.e., school council or school management committee)." I used the school-reported measure, rather than aggregating parent-reported participation to school level, due to the relatively large proportion of missing data in the latter variable. The school-reported parent participation measure would also capture the participation of parents who were not sampled for the survey. Therefore, the measure may reflect the power of parents to influence school decision-making more precisely.

[15] Each country sets a modal grade at which the majority of 15-year old students were enrolled at the time of survey. The variable shows how many grades above/below the modal grade a given student was enrolled in.

The parameter of interest (β_1) tells whether participation of a student's own parents in school management is associated with student achievement, controlling for school-level parent participation and other student and school characteristics. Since the model controls for school-level parent participation that affects the learning environment at school, the coefficient indicates how participation of a student's own parents is associated with their learning support at home. The parameter of interest (γ_1) tells whether school-level parent participation in school management is associated with student achievement, controlling for participation of student's own parents and student and school characteristics. Since the model controls for participation of a student's own parents, which affects the level of home input, the coefficient indicates how school-level parent participation is associated with the level of school input, i.e., school effectiveness.

Addressing endogeneity. These regression models will be subject to bias if parent participation in school management is endogenous to other factors that are correlated with both parent participation and student achievement. Recent research has increasingly used longitudinal data to address the issue of endogeneity (e.g., Dearing et al., 2006; Domina, 2005). However, longitudinal data on parental participation and student achievement is not readily available in many of the countries and economies examined in this study. An instrumental variable approach would be an option to address the endogeneity in cross-sectional data, yet no valid instruments are found in the PISA data. The use of instruments that do not meet required assumptions results in biased estimates. Recognizing the limitations in the data, I decided to include several additional variables to control for potential sources of endogeneity for both individual-level and school-level parent participation.

First, I controlled for parents' academic orientation, which could be positively related to both student achievement and participation in school management. The association between parent participation and student achievement may be biased if students of participating parents are systematically different from those of non-participating parents. For instance, parents who participate in school management may have higher expectations for their child's academic success, which may affect the child's aspirations, learning behavior, and achievement. This may result in an upward bias in the association between parent participation and student achievement. In order to address the issue, I used factor analysis to generate a latent variable that measured a degree of the parents' academic orientation from a set of questions asking parents the importance of various factors for choosing their child's school on a four-point scale. I used three question items in particular: 1) school reputation; 2) the offering of particular courses and subjects; and 3) student academic achievement in school. The factor analysis generated one factor with an eigenvalue equal to or greater than one which accounted for 58% of the variation in the three variables[16]. This factor score was used as a control for an individual's parents' academic orientation. I also aggregated this measure to the school level as a school-mean parents' academic orientation that may affect both school-level parent participation and student achievement. Since an individual's parents' academic orientation is already controlled for in the same model, the academic orientation of the student's own parents is excluded from the computation of school-level parents' academic orientation.

Second, I added variables that address the aforementioned reverse causality. The reverse causality happens when parents of poorly performed child decide to participate in school management to improve school learning environment for their child. Similarly, school-level

[16] The Kaiser criterion suggests to retain factors that have eigenvalues equal to or higher than 1 (Kaiser, 1960). See appendix 3E for factor loadings.

parent participation may be high in low performing schools if parents in such schools try to participate in school management to improve the learning environment in their school. These behavioral patterns would create a downward bias in the association between parent participation and student achievement and therefore need to be controlled for. It would be reasonable to assume that such parents would talk to teachers of their child first, before thinking of participating in school management, if they have concern over their child's performance. In the PISA survey, parents reported on whether they took the initiative in discussing their child's progress with a teacher. Schools also reported the proportion of parents who discussed their child's progress with a teacher on their own initiative. I used the two measures as a control for parents' motivation and behavior to participate in school for the purpose of improving academic achievement of their low-performing child.

Third, I controlled for whether school involved parents in school decision-making. The participation-achievement association may be biased if schools that engage parents in decision-making are systematically different from those not engaging parents. For instance, schools that involve parents in decision-making may not only facilitate parent participation in school management but also have academically oriented programs to perform accountability to parents and/or attract higher achieving students to enroll. This could result in upward bias. In order to address this issue, I included schools' self-reported information on whether they involved parents in decision-making in the regression models.

With these additional variables controlling for potential sources of endogeneity, the modified model 2 (individual- and school-level participation) is presented below.

$$\begin{aligned}\mathrm{Score}_{isc} = {} & \beta_0 + \beta_1\mathrm{Participation}_{isc} + \gamma_1\%\mathrm{Participation}_{sc} + \beta_2\mathrm{SES}_{isc} + \mathbf{STUcharacter}_{\mathbf{isc}}\boldsymbol{\beta}_{\mathbf{3}} + \\ & \mathbf{SCHcharacter}_{\mathbf{sc}}\boldsymbol{\beta}_{\mathbf{4}} + \beta_5\mathrm{PTorient}_{isc} + \beta_6\mathrm{PTorient}_{sc} + \beta_7\mathrm{PTdiscuss}_{isc} + \\ & \beta_8\%\mathrm{PTdiscuss}_{sc} + \beta_9\mathrm{SCHsharedecision}_{sc} + \delta_c + \varepsilon_{isc} \qquad (3)\end{aligned}$$

In model 3, additional controls addressing potential sources of endogeneity for both individual- and school-level parent participation are included. These are: 1) individual-level parent's academic orientation (*PTorient*$_{isc}$), 2) school-level parents' academic orientation (*PTorient*$_{sc}$), 3) whether parents discussed their child's progress with a teacher on their own initiative (*PTdiscuss*), 4) the school-level proportion of parents who discussed their child's progress with a teacher on their initiative (*%PTdiscuss*), and 5) whether school involves parents in decision-making (*SCHsharedecision*). A detailed description of these additional variables is provided in Appendix 3B.

Cross-Country Interaction Model

Next, I examined whether the parents' SES moderates the association between parent participation in school management and student achievement.

Interaction with individual-level SES. First, I examined whether SES of an individual's parents moderates the association between participation of the student's own parents and that student's achievement.

$$\begin{aligned}\mathrm{Score_{isc}} = {} & \beta_0 + \beta_1\mathrm{Participation_{isc}} + \gamma_1\%\mathrm{Participation_{sc}} + \beta_2\mathrm{SES_{isc}} + \mathbf{STUcharacter_{isc}}\boldsymbol{\beta_3} + \\ & \mathbf{SCHcharacter_{sc}}\boldsymbol{\beta_4} + \beta_5\mathrm{PTorient_{isc}} + \beta_6\mathrm{PTorient_{sc}} + \beta_7\mathrm{PTdiscuss_{isc}} + \\ & \beta_8\%\mathrm{PTdiscuss_{sc}} + \beta_9\mathrm{SCHsharedecision_{sc}} + \beta_{10}(\mathrm{Participation_{isc}} \times \mathrm{SES_{isc}}) + \\ & \delta_c + \varepsilon_{isc} \end{aligned} \tag{4}$$

In model 4, individual-level parent participation is interacted with parent's SES. The parameter estimate (β_{10}) indicates whether the association between participation of a student's own parents and their child's achievement differs according to the parent's SES, controlling for school-level parent participation and student and school characteristics. The analysis using the SES index in PISA provides findings that are comparable to the results of other studies, which also use an SES measure derived from parents' wealth, occupation, and education level (e.g., Domina, 2005; McNeal, 1999; Park & Holloway, 2017; Sui-Chu & Willms, 1996).

Interaction with school-mean SES. Next, I examined whether school-mean parents' SES as a source of bargaining power moderates the association between school-level parent participation in school management and student achievement. The focus of this model is whether the school-mean SES, not the SES of a particular family, empowers parent groups to influence school decisions in a way so as to affect learning environment at school and student achievement, regardless of participation of a student's own parents.

The use of SES index in PISA as a measure of parents' bargaining power is conceptually justified given that the index is derived from three social constructs that are linked to the concept of power. Wealth, which provides access to goods and services, creates differences in power and privileges (American Psychological Association, 2006). Occupational status and work roles serve as sources of social identity and provide opportunities to take advantage of expanded networks (American Psychological Association, 2006). Education level serves as social and psychological resources that provide a greater sense of control (Ross & Wu, 1995). In this sense, a parent group in socioeconomically advantaged schools may have greater power to influence school decisions and change the learning environment in their school.

$$\begin{aligned}\mathrm{Score}_{isc} = {} & \beta_0 + \beta_1 \mathrm{Participation}_{isc} + \gamma_1 \%\mathrm{Participation}_{sc} + \beta_2 \mathrm{SES}_{isc} + \mathbf{STUcharacter_{isc}\beta_3} + \\ & \mathbf{SCHcharacter_{sc}\beta_4} + \beta_5 \mathrm{PTorient}_{isc} + \beta_6 \mathrm{PTorient}_{sc} + \beta_7 \mathrm{PTdiscuss}_{isc} + \\ & \beta_8 \%\mathrm{PTdiscuss}_{sc} + \beta_9 \mathrm{SCHsharedecision}_{sc} + \gamma_2 \mathrm{SCHSES}_{sc} + \\ & \gamma_3 (\%\mathrm{Participation}_{sc} \times \mathrm{SCHSES}_{sc}) + \delta_c + \varepsilon_{isc} \qquad (5)\end{aligned}$$

In model 5, school-level parent participation *(%Participation*) is interacted with a school-average SES (*SCHSES*). Since individual-level SES is already controlled for in the model, SES of a student's own parents is excluded from the computation of the school-level SES. The average school-level SES is included in the model as a main effect as well as interaction effect. The parameter estimate (γ_3) indicates whether the association between school-level parent participation and student achievement differs by the school-mean parents' SES, controlling for participation of a student's own parents and other student and school characteristics.

Interaction with a within-school variation in SES. Next, I examined whether a within-school variation in SES (*SDSES*) moderates the association between school-level parent participation and student achievement.

$$\begin{aligned}\mathrm{Score}_{isc} = {} & \beta_0 + \beta_1 \mathrm{Participation}_{isc} + \gamma_1 \%\mathrm{Participation}_{sc} + \beta_2 \mathrm{SES}_{isc} + \mathbf{STUcharacter_{isc}\beta_3} + \\ & \mathbf{SCHcharacter_{sc}\beta_4} + \beta_5 \mathrm{PTorient}_{isc} + \beta_6 \mathrm{PTorient}_{sc} + \beta_7 \mathrm{PTdiscuss}_{isc} + \\ & \beta_8 \%\mathrm{PTdiscuss}_{sc} + \beta_9 \mathrm{SCHsharedecision}_{sc} + \gamma_2 \mathrm{SDSES}_{sc} + \\ & \gamma_3 (\%\mathrm{Participation}_{sc} \times \mathrm{SDSES}_{sc}) + \delta_c + \varepsilon_{isc} \end{aligned} \qquad (6)$$

In model 6, within-school variation in SES (*SDSES*) is measured by the standard deviation in parents' SES in school *s*. The within-school SES variation is included in the model as a main effect as well as interaction effect. The parameter estimate (γ_3) indicates whether the association between school-level parent participation in school management and student achievement varies by a degree of within-school variation in parents' SES, controlling for participation of a student's own parents and other student and school characteristics.

Analysis by Country

In addition to the cross-country analysis, I also performed regression analysis for each of the countries and economies in consideration of the importance of examining the participation-achievement associations in context and the cultural differences that may generate bias in the dataset.

First, country analyses may provide important insights into how and why parent participation affects or does not affect student learning within a specific context. In the previous section, I examined the differences in student and parent characteristics between parents who did and did not participate in school management for each country and economy. The results presented in Table 3.4 show that two groups of parents were different in many characteristics but these differences are not systematic across the countries and economies. This implies that the likelihood of a parent participating in school management may also differ according to other observed and unobserved characteristics depending on context. Therefore, examining the participation-achievement associations and their moderating factors for each of the countries and economies would be important for understanding why parent participation does and does not contribute to student achievement in context.

Second, the importance of ensuring cultural equivalence in cross-country studies has been addressed by a number of studies (He & van de Vijver, 2012; McQueen & Mendelovits, 2003). Although international assessment surveys have improved their survey designs to mitigate bias resulting from cross-country cultural differences and improve the compatibility of measurements (e.g., Bonnet, 2002; OECD, 2017b), there remain a number of technical issues that could threaten the validity of cross-cultural analyses (Goldstein & Thomas, 2008). With regards to measurements, for example, the home possessions index in PISA that is used to develop the SES index shows a varying reliability by country in addition to poor cultural comparability (Rutkowski & Rutkowski, 2013). It is also reported that cultural factors affect student behavior in surveys. For instance, students in different countries demonstrated a systematic difference in response styles in PISA surveys (Buckley, 2009). Cultural background is also closely related to language. Besides the quality of translation of test and questionnaire items, people speaking a same language but in different countries interpret the same items differently (Goldstein &

Thomas, 2008). Recognizing these potential threats to the validity of cross-country analysis, I performed the analysis for each country as well.

Results

Cross-Country Analysis

Association between parent participation and student achievement. Tables 3.5, 3.6, and 3.7 present the results of cross-country regression models for math, science, and reading achievement, respectively. I found no evidence that parent participation in school management contributed to improving student achievement in cross-country analysis. The results show that participation of a student's own parents in school management is not associated with math scores but negatively associated with science and reading scores. School-level parent participation has no statistically significant association with either math, science, or reading achievement.

Table 3.5.
Results of Cross-Country Regression Analysis, Math Score

Variable	Math score		
	(1)	(2)	(3)
Parent participation			
Parent-reported participation	-1.68 (1.97)	-1.69 (1.97)	-1.49 (2.03)
School-reported participation (%)		0.01 (0.05)	0.03 (0.06)
Student characteristics			
Socioeconomic status	13.41*** (1.03)	13.42*** (1.03)	11.66*** (0.98)
Age	-2.24 (3.45)	-2.21 (3.44)	-1.55 (3.42)
Female	-6.00*** (2.09)	-5.98*** (2.08)	-6.62*** (2.00)
Native immigration status	30.32*** (6.24)	30.33*** (6.22)	29.16*** (6.15)
Home/test language match	26.05*** (7.17)	26.07*** (7.20)	18.42** (7.04)
Relative school grade	29.88*** (2.20)	29.91*** (2.21)	26.19*** (2.31)
School program			
Pre-vocational	-95.51*** (11.37)	-95.46*** (11.36)	-97.05*** (10.47)
Vocational	-17.65*** (4.74)	-17.63*** (4.74)	-18.87*** (4.33)
School characteristics			
School location			
Population: 3,000-15,000	7.84 (5.96)	7.94 (5.90)	7.86 (6.44)
Population: 15,000-100,000	9.43* (5.58)	9.56* (5.58)	5.96 (5.88)
Population: 100,000-1,000,000	9.25* (5.26)	9.38* (5.31)	5.69 (5.85)
Population: >1,000,000	13.42** (6.14)	13.65** (6.08)	10.37* (5.99)
School size	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Additional controls addressing endogeneity			
Parents' academic orientation (individual-level)			3.88*** (0.97)
Parents' academic orientation (school-level)			36.66*** (5.17)
Parents discussing progress with a teacher on one's own initiative (individual-level)			-5.84*** (2.12)
% parents discussing progress with a teacher on their own initiative (school-level)			0.02 (0.06)
Whether school involves parents in decision-making			-1.26 (4.89)
Country dummies	Yes	Yes	Yes
Observations	31,569	31,569	31,569

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.6.

Results of Cross-Country Regression Analysis, Science Score

Variable	Science score		
	(1)	(2)	(3)
Parent participation			
Parent-reported participation	-4.35** (1.74)	-4.34** (1.74)	-4.10** (1.74)
School-reported participation (%)		0.00 (0.05)	0.03 (0.04)
Student characteristics			
Socioeconomic status	13.01*** (0.87)	13.00*** (0.86)	11.14*** (0.80)
Age	-1.80 (2.95)	-1.80 (2.95)	-1.07 (2.94)
Female	-6.02*** (2.00)	-6.03*** (2.00)	-6.51*** (1.93)
Native immigration status	26.32*** (6.07)	26.32*** (6.07)	25.43*** (5.92)
Home/test language match	22.00*** (5.92)	21.99*** (5.93)	15.30*** (5.72)
Relative school grade	28.14*** (1.71)	28.13*** (1.71)	24.54*** (1.77)
School program			
Pre-vocational	-90.14*** (9.82)	-90.15*** (9.81)	-91.90*** (8.76)
Vocational	-15.6*** (4.04)	-15.60*** (4.05)	-16.62*** (3.53)
School characteristics			
School location			
Population: 3,000-15,000	9.53** (4.54)	9.51** (4.54)	8.94* (5.13)
Population: 15,000-100,000	13.88*** (4.78)	13.85*** (4.68)	10.34** (4.85)
Population: 100,000-1,000,000	12.40** (4.71)	12.36** (4.75)	8.99* (5.25)
Population: >1,000,000	16.86*** (5.65)	16.80*** (5.52)	13.84** (5.45)
School size	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Additional controls addressing endogeneity			
Parents' academic orientation (individual-level)			4.88*** (0.88)
Parents' academic orientation (school-level)			30.91*** (4.25)
Parents discussing progress with a teacher on one's own initiative (individual-level)			-4.41** (1.72)
% parents discussing progress with a teacher on their own initiative (school-level)			0.03 (0.05)
Whether school involves parents in decision-making			-8.13* (4.32)
Country dummies	Yes	Yes	Yes
Observations	31,569	31,569	31,569

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.7.

Results of Cross-Country Regression Analysis, Reading Score

Variable	Reading score		
	(1)	(2)	(3)
Parent participation			
Parent-reported participation	-4.51**	-4.51**	-4.60**
	(2.04)	(2.03)	(1.97)
School-reported participation (%)		0.00	0.02
		(0.05)	(0.05)
Student characteristics			
Socioeconomic status	13.75***	13.74***	11.79***
	(0.97)	(0.96)	(0.90)
Age	-0.77	-0.78	-0.05
	(3.51)	(3.51)	(3.50)
Female	19.25***	19.25***	18.77***
	(1.92)	(1.92)	(1.84)
Native immigration status	25.77***	25.77***	24.85***
	(6.94)	(6.95)	(6.84)
Home/test language match	23.55***	23.54***	16.46**
	(7.07)	(7.06)	(6.82)
Relative school grade	32.15***	32.14***	28.55***
	(1.92)	(1.93)	(2.02)
School program			
Pre-vocational	-85.71***	-85.73***	-87.60***
	(11.31)	(11.30)	(10.23)
Vocational	-16.74***	-16.74***	-17.74***
	(4.02)	(4.03)	(3.58)
School characteristics			
School location			
Population: 3,000-15,000	12.67**	12.64**	12.38**
	(5.41)	(5.45)	(6.00)
Population: 15,000-100,000	21.44***	21.40***	18.04***
	(5.70)	(5.71)	(5.83)
Population: 100,000-1,000,000	21.80***	21.76***	18.52***
	(5.38)	(5.46)	(5.92)
Population: >1,000,000	25.10***	25.03***	22.18***
	(6.69)	(6.72)	(6.84)
School size	0.01***	0.01***	0.00**
	(0.00)	(0.00)	(0.00)
Additional controls addressing endogeneity			
Parents' academic orientation (individual-level)			5.51***
			(0.94)
Parents' academic orientation (school-level)			31.05***
			(4.87)
Parents discussing progress with a teacher on one's own initiative (individual-level)			-3.07*
			(1.84)
% parents discussing progress with a teacher on their own initiative (school-level)			0.05
			(0.06)
Whether school involves parents in decision-making			-7.22
			(5.40)
Country dummies	Yes	Yes	Yes
Observations	31,569	31,569	31,569

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.5 shows the results of cross-country regression models for math achievement. The specification 1 includes only individual-level parent participation without additional controls that address potential sources of endogeneity. The model shows a negative but statistically non-significant association between participation of a student's own parents in school management and math achievement, holding student and school characteristics constant. The specification 2 includes school-level parent participation. No significant association is found between school-level parent participation in school management and math achievement. The association between individual parent participation and math achievement also remains non-significant with a similar magnitude even after including school-level parent participation in the model.

Specification 3 includes additional variables that control for potential sources of endogeneity. Once additional controls are included, the magnitude of the association between individual-level parent participation and math achievement decreases although the change is small. This implies the importance of addressing endogeneity including those derived from the reverse causality. The results of the full specification model show that, on average, student math achievement is associated with neither participation of a student's own parents nor school-level parent participation in school management.

Table 3.6 shows the results for science achievement. According to the full specification model 3, which includes both individual-level and school-level parent participation and additional controls for potential sources of endogeneity, students' science achievement is negatively associated with participation of a student's own parents in school management at the 5% significance level. On average, participation of a student's own parents in school management is associated with decrease in science score by 4.10 points. With respect to school-level participation, no statistically significant association was found.

Table 3.7 shows the results for reading achievement. Similar to the results on science achievement, the full specification model 3 suggests that students' reading achievement is negatively associated with participation of a student's own parents in school management at the 5% significance level. On average, participation of a student's own parents in school management is associated with decrease in their reading score by 4.60 points. On the other hand, no statistically significant association was found between school-level parent participation and student reading achievement.

Overall, the cross-country analyses found no evidence that parent participation in school management contributed to an improvement in student achievement. The results show that participation of a student's own parents in school management is not associated with math scores, and is even negatively associated with science and reading scores. This suggests that participation in school management may not necessarily help parents strengthen their learning support at home. The negative associations even imply that parents who participated in school management may have ended up providing a lower level of home input for science and reading. The results also show that school-level parent participation is not associated with either math, science, or reading achievement. This implies that engaging a larger number of parents in school management may not necessarily help parents to influence school decisions to improve learning environment at school.

Roles of socioeconomic status as a moderating factor. Table 3.8 summarizes the results of cross-county interaction models that examine interaction effects between parent participation in school management and parents' SES. For all the three subjects, the analysis found negative interaction effects between participation of a student's own parents and their SES at the 5% significance level.

Table 3.8.
Participation-SES Interaction Effects Across Countries/Economies

Main effect (parent participation) and interaction term	Score		
	Math	Science	Reading
(1) Individual level: Participation × SES			
Parent-reported participation	-7.14**	-9.19***	-10.15***
	(2.89)	(2.59)	(2.47)
Parent-reported participation × Parent SES	-4.83***	-4.36***	-4.75***
	(1.81)	(1.45)	(1.45)
(2) School level: Participation × SES			
School-reported participation (%)	-0.05	0.01	0.01
	(0.08)	(0.06)	(0.07)
School-reported participation (%) × School-mean SES	-0.07	-0.02	-0.01
	(0.05)	(0.04)	(0.05)
(3) School-level: Participation × SES variation			
School-reported participation (%)	0.04	0.15	0.11
	(0.19)	(0.17)	(0.18)
School-reported participation (%) × Within-school SES variation	-0.01	-0.14	-0.11
	(0.22)	(0.19)	(0.20)
(4) School level: Participation × SES of participating parents			
School-reported participation (%)	-0.88	0.04	0.04
	(2.05)	(0.06)	(0.07)
School-reported participation (%) × School-mean SES of participating parents	-0.01	0.02	0.03
	(0.05)	(0.04)	(0.05)
(5) School level: Participation × SES variation of participating parents			
School-reported participation (%)	0.06	0.10	0.08
	(0.13)	(0.12)	(0.12)
School-reported participation (%) × Within-school SES variation of participating parents	-0.04	-0.09	-0.07
	(0.15)	(0.13)	(0.14)

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Specification 1 suggests that, for students whose socioeconomic status index is zero, participation of the student's own parents in school management is associated with an average decrease in their math score by 7.14 points, science achievement by 9.19 points, and reading score by 10.15 points. However, with every one-unit increase in the SES index, the magnitude of negative association further increases by 4.83 points for math, 4.36 for science, and 4.75 for reading. The negative associations suggest that socioeconomically advantaged parents may have paid greater costs of participation in terms of student achievement. This could happen if, for example, socioeconomically advantaged parents who had initially provided higher level of learning support to their child at home ended up with reducing the amount of their support as a result of devoting their time to school management.

On the other hand, no statistically significant interaction effects were found for school-level parent participation. Specification 2 suggests that the association between school-level parent participation and student achievement does not change by school-mean parents' SES. Specification 3 shows that the association does not change according to within-school variation in parents' SES as well. These results imply that the parents' ability to influence school decisions and improve learning environment at school through their participation in school management was not moderated by either a level or a variation of the parents' SES.

However, what matters for parents' power to influence school decisions could be socioeconomic status of parents who actually participated in school management, rather than socioeconomic status of all parents in school. Therefore, in specification 4 and 5, I examined interaction effects between school-level parent participation and the level and variation of socioeconomic status of only parents who participated in school management. The results of the modified interaction models show that neither interaction effects are statistically significant for any of the three subjects. The results corroborate the previous findings that parents' SES did not moderate the association between school-level parent participation and student achievement.

Country Analysis

Association between parent participation and student achievement. Tables 3.9, 3.10, and 3.11 present the results of full specification regression models performed for each of the countries and economies. The country analyses show that the association between parent participation in school management and student achievement varies by country and economy but any statistically significant associations lie in a negative direction.

Table 3.9.

Results of Regression Analysis by Country/Economy, Math Score

Variable	Math score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
Parent participation								
Parent-reported participation	-10.80*** (3.20)	-1.20 (3.60)	-1.80 (4.11)	-7.51** (3.11)	-1.34 (2.40)	-6.18 (5.22)	9.30 (14.40)	5.99 (20.01)
School-reported participation (%)	0.00 (0.07)	-0.26*** (0.09)	-0.08 (0.07)	0.06 (0.08)	0.04 (0.06)	0.10 (0.08)	0.14 (0.31)	-1.76 (4.13)
Student characteristics								
Socioeconomic status	14.43*** (2.07)	24.93*** (2.48)	11.75*** (1.58)	4.03** (1.80)	8.16*** (1.20)	29.94*** (2.97)	7.81 (5.15)	19.11* (9.84)
Age	-12.60** (5.22)	1.75 (5.92)	1.49 (4.68)	-10.29** (3.93)	-4.93 (4.92)	10.13 (6.32)	3.07 (10.73)	10.69 (23.94)
Female	-26.59*** (3.71)	9.23*** (3.17)	-24.62*** (2.59)	-5.75* (3.00)	-9.52*** (2.21)	3.01 (4.53)	-23.07** (10.51)	-1.96 (13.96)
Native immigration status	2.68 (3.79)	6.67 (12.04)	4.92 (6.70)	27.56** (12.18)	46.56*** (10.51)	53.57 (52.89)	-15.65* (8.67)	-13.14 (15.74)
Home/test language match	28.65*** (9.27)	43.54*** (9.87)	9.82 (10.34)	9.58 (8.62)	24.22*** (8.56)	89.11*** (33.40)	40.02 (24.38)	102.30*** (30.54)
Relative school grade	29.07*** (4.31)	26.58*** (3.03)	61.06*** (2.21)	21.50*** (1.54)	23.44*** (3.41)	11.81 (8.05)	29.08*** (6.00)	46.11*** (11.97)
School program								
Pre-vocational	-	-	-80.47** (20.10)	-	-	-	-	-24.73 (25.51)
Vocational	-72.08*** (4.52)	-82.49*** (16.90)	-53.31*** (6.06)	26.03*** (8.45)	-0.17 (5.32)	-53.22*** (9.18)	-	-
School characteristics								
School location								
Population: 3,000-15,000	11.74 (9.16)	3.56 (8.54)	14.11 (10.73)	1.31 (6.19)	4.94 (7.88)	-	-	-
Population: 15,000-100,000	23.20** (10.21)	16.04** (7.25)	12.03 (10.30)	11.20 (7.74)	6.33 (7.13)	59.96*** (12.49)	-	-
Population: 100,000-1,000,000	30.68*** (9.55)	14.15* (7.75)	9.70 (11.86)	9.98 (7.88)	1.98 (6.11)	53.09*** (11.93)	-	-
Population: >1,000,000	10.75 (18.79)	35.49*** (9.55)	15.13 (15.23)	28.31* (16.01)	5.58 (7.23)	59.46*** (11.92)	-	-
School size	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)	0.01 (0.01)	0.01** (0.00)	0.02*** (0.01)	0.17 (0.16)	0.15 (0.25)
Additional controls for endogeneity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,675	4,734	6,897	3,401	6,635	3,703	403	121

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Variables that have no variation are omitted from the model. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.10.
Results of Regression Analysis by Country/Economy, Science Score

Variable	Science score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
Parent participation								
Parent-reported participation	-10.35*** (2.79)	-5.70* (3.06)	-4.52 (3.83)	-7.84*** (2.82)	-4.25** (2.03)	-6.71 (4.80)	7.46 (14.38)	2.35 (18.80)
School-reported participation (%)	0.00 (0.06)	-0.18** (0.08)	-0.01 (0.05)	0.04 (0.07)	0.03 (0.05)	0.14 (0.08)	0.09 (0.26)	-0.52 (3.16)
Student characteristics								
Socioeconomic status	14.11*** (1.41)	22.71*** (2.12)	11.97*** (1.23)	5.91*** (1.86)	8.10*** (0.98)	23.46*** (2.52)	6.43 (4.82)	19.37* (10.17)
Age	-10.01* (5.47)	3.74 (5.26)	6.27* (3.33)	-7.06 (4.65)	-5.48 (4.47)	10.74* (5.62)	11.89 (8.53)	-4.24 (24.08)
Female	-19.35*** (3.03)	12.98*** (2.76)	-23.41*** (2.14)	-12.95*** (2.69)	-9.47*** (2.17)	4.75 (4.39)	-19.02** (8.49)	-1.48 (13.34)
Native immigration status	10.91*** (3.53)	2.22 (11.46)	-3.21 (5.67)	24.21*** (8.85)	40.77*** (10.04)	51.80 (50.71)	-14.65** (6.49)	1.86 (15.23)
Home/test language match	21.99*** (7.57)	35.94*** (8.86)	16.57 (10.03)	11.97 (7.62)	19.53*** (6.87)	84.73** (35.51)	59.00*** (17.79)	118.12*** (30.44)
Relative school grade	22.8*** (4.37)	19.12*** (2.82)	56.39*** (1.90)	22.97*** (1.54)	20.87*** (2.56)	17.60** (6.98)	26.28*** (4.58)	46.52*** (10.30)
School program								
Pre-vocational	-	-	-75.16*** (18.12)	-	-	-	-	-19.25 (28.23)
Vocational	-71.91*** (4.56)	-72.60*** (13.93)	-54.05*** (5.51)	28.07*** (6.43)	1.19 (4.55)	-48.86*** (7.81)	-	-
School characteristics								
School location								
Population: 3,000-15,000	21.68*** (7.37)	0.76 (7.66)	11.70 (8.72)	1.79 (5.72)	7.47 (6.15)	-	-	-
Population: 15,000-100,000	30.49*** (8.34)	10.62 (6.92)	16.85* (8.67)	13.46** (6.62)	10.48* (5.60)	57.88*** (10.25)	-	-
Population: 100,000-1,000,000	38.83*** (8.13)	7.87 (7.75)	14.29 (9.10)	3.86 (6.48)	6.79 (5.26)	44.67*** (9.40)	-	-
Population: >1,000,000	26.44 (18.80)	28.31*** (8.52)	23.98** (11.34)	31.71** (15.84)	11.05 (6.79)	50.68*** (10.51)	-	-
School size	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)	0.01* (0.01)	0.01*** (0.00)	0.02** (0.01)	0.13 (0.14)	0.14 (0.18)
Additional controls for endogeneity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,675	4,734	6,897	3,401	6,635	3,703	403	121

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Variables that have no variation are omitted from the model. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.11.

Results of Regression Analysis by Country/Economy, Reading Score

Variable	Reading score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
Parent participation								
Parent-reported participation	-11.11*** (3.11)	-5.12 (3.84)	-3.75 (3.93)	-7.94** (3.49)	-4.61* (2.39)	-9.21* (4.88)	4.48 (15.64)	-9.08 (19.47)
School-reported participation (%)	0.00 (0.08)	-0.21** (0.10)	-0.01 (0.07)	-0.01 (0.08)	0.03 (0.06)	0.12 (0.08)	0.08 (0.24)	-2.09 (3.45)
Student characteristics								
Socioeconomic status	14.41*** (2.05)	26.04*** (2.36)	10.99*** (1.51)	5.78*** (1.69)	8.92*** (1.17)	22.93*** (2.83)	3.78 (5.07)	27.52** (10.44)
Age	-15.58*** (5.51)	1.35 (5.94)	-3.04 (3.95)	-4.11 (4.57)	-3.48 (5.36)	13.43** (5.99)	9.13 (11.22)	21.74 (26.65)
Female	12.50*** (3.09)	53.73*** (3.64)	2.62 (2.17)	14.57*** (2.72)	13.67*** (2.09)	34.49*** (4.61)	5.07 (9.80)	24.44* (13.04)
Native immigration status	6.54* (3.82)	-0.76 (12.54)	-12.67** (5.30)	19.32** (9.48)	46.54*** (11.54)	-2.00 (45.14)	-17.17* (9.85)	2.93 (16.72)
Home/test language match	21.12*** (7.72)	42.91*** (11.74)	20.00** (9.74)	17.02* (9.65)	21.49** (8.46)	56.13* (30.59)	68.18*** (18.14)	94.41*** (31.22)
Relative school grade	31.21*** (4.66)	27.81*** (3.49)	56.49*** (2.07)	32.23*** (1.66)	23.83*** (3.11)	19.36** (7.70)	25.55*** (6.60)	45.85*** (10.26)
School program								
Pre-vocational	-	-	-74.44*** (18.41)	-	-	-	-	-28.05 (31.62)
Vocational	-71.93*** (5.27)	-87.27*** (20.91)	-52.25*** (5.76)	24.10*** (7.00)	0.30 (4.72)	-49.26*** (7.51)	-	-
School characteristics								
School location								
Population: 3,000-15,000	28.35** (10.90)	2.19 (9.39)	24.82** (10.28)	9.84 (6.96)	10.16 (7.51)	-	-	-
Population: 15,000-100,000	39.05*** (11.85)	18.89** (7.66)	33.76*** (10.17)	23.65*** (8.72)	17.42** (6.86)	62.15*** (14.33)	-	-
Population: 100,000-1,000,000	48.87*** (11.70)	24.78*** (9.03)	33.76*** (12.15)	16.07* (9.26)	16.21** (6.65)	49.82*** (13.98)	-	-
Population: >1,000,000	42.97** (19.21)	43.95*** (10.06)	36.26*** (11.32)	38.61** (15.79)	18.15* (9.33)	56.52*** (15.31)	-	-
School size	0.00 (0.01)	0.01 (0.01)	0.00 (0.00)	0.01 (0.01)	0.01** (0.00)	0.01 (0.01)	0.01 (0.14)	0.27 (0.20)
Additional controls for endogeneity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,675	4,734	6,897	3,401	6,635	3,703	403	121

Note. The table shows coefficients and standard errors in parentheses. Sampling and replicate weights are used for estimation. The reference category is a general program for school program and population <3,000 for school location. Variables that have no variation are omitted from the model. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.9 shows the results of full specification regression models for math achievement. The results show that participation of a student's own parents in school management is not statistically significantly associated with student math achievement in the majority of countries and economies, except for Croatia and Dominican Republic. On average, participation of a student's own parents in school management is associated with decrease in math scores by 10.80 points in Croatia and 7.51 points in Dominican Republic at the 1% and 5% significance level respectively. Similarly, school-level parent participation is not statistically significantly associated with math achievement in the majority of countries and economies. An exception is Georgia where a 10-percentage-point increase in the proportion of parents who participate in school management is associated with decrease in math achievement by 2.60 points at the 1% significance level.

Table 3.10 shows the results of full specification regression models for science achievement. Unlike the results for math achievement, participation of a student's own parents in school management is negatively associated with science scores not only in Croatia (-10.35 points) and Dominican Republic (-7.84 points), but also in Mexico (-4.25 points) at the 5% significance level. On the other hand, school-level parent participation is negatively associated with science achievement in Georgia. On average, a 10-percentage-point increase in the share of parents who participate in school management is associated with decrease in science scores by 1.80 points in the country at the 5% significance level.

Table 3.11 shows the results of full specification regression models for reading achievement. The results for reading achievement are similar to those for math achievement. Participation of a student's own parents in school management is associated with decrease in reading scores by 11.11 points in Croatia and 7.94 points in Dominican Republic at the 1% and

5% significance level respectively. School-level parent participation is also negatively associated with reading achievement in Georgia at the 5% significance level. A 10-percentage-point increase in the share of parents who participate in school management is associated with decrease in reading scores by 2.10 points on average in the country.

Overall, the country analyses found no evidence that parent participation in school management contributed to improving student achievement in any of the countries or economies. Instead, the findings suggest that the negative associations are derived from different mechanisms depending on country context. There is a negative association between individual-level parent participation and student achievement in Croatia, Dominican Republic, and Mexico. This implies that, in these countries, parents who participated in school management may have provided a lower level of learning support at home. In addition, there is also a negative association between school-level parent participation and student achievement in Georgia. This suggests that engaging a larger number of parents in school management may have influenced school decisions in a way that reduced school effectiveness in that country.

Roles of socioeconomic status as a moderating factor. Tables 3.12, 3.13, and 3.14 summarize the results of interaction regression models that examine interaction effects between parent participation in school management and parents' SES by country and economy for math, science, and reading achievement, respectively. Although the cross-country interaction models indicate that the association between participation of a student's own parents and student achievement varies according to the level of parents' SES, the country analyses show that parents' SES does not moderate participation-achievement association for either individual-level and school-level parent participation at the 5% significance level in any of the countries or economies.

Table 3.12.

Participation-SES Interaction Effects by Country/Economy, Math Score

Main effect (participation) and interaction term	Math score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × SES								
Parent-reported participation	-11.15*** (3.50)	0.57 (4.19)	-0.08 (4.41)	-10.91** (4.97)	-3.20 (3.90)	-6.41 (5.39)	6.09 (16.38)	-16.33 (24.75)
Participation × Parent SES	-0.92 (3.33)	3.60 (3.93)	3.32 (2.96)	-3.06 (3.09)	-1.36 (2.18)	-1.17 (6.24)	-6.43 (12.11)	-22.12 (18.30)
(2) School-level participation × School-mean SES								
School-reported participation (%)	0.02 (0.07)	-0.33** (0.14)	-0.05 (0.08)	-0.04 (0.27)	-0.12 (0.14)	0.10 (0.09)	0.17 (0.50)	-5.21 (11.02)
Participation (%) × School-mean SES	0.05 (0.15)	-0.16 (0.19)	0.07 (0.11)	-0.08 (0.21)	-0.12 (0.08)	0.03 (0.21)	-0.22 (0.48)	3.46 (7.86)
(3) School-level participation × Within-school SES variation								
School-reported participation (%)	0.39 (0.45)	-0.61* (0.35)	0.05 (0.52)	-0.19 (0.46)	0.08 (0.29)	0.35 (0.50)	0.14 (1.86)	-1.76 (4.13)
Participation (%) × Within-school SES variation	-0.55 (0.63)	0.45 (0.44)	-0.13 (0.51)	0.29 (0.54)	-0.04 (0.32)	-0.44 (0.84)	0.02 (2.02)	-
(4) School-level participation × School-mean SES of participating parents								
School-reported participation (%)	0.03 (0.07)	-0.27** (0.12)	-0.07 (0.08)	0.11 (0.26)	-0.07 (0.15)	0.10 (0.08)	0.16 (0.38)	3.75 (6.05)
Participation (%) × School-mean SES of participating parents	0.15 (0.11)	-0.05 (0.15)	0.00 (0.09)	0.04 (0.20)	-0.08 (0.08)	0.13 (0.16)	0.00 (0.42)	3.93 (4.84)
(5) School-level participation × Within-school SES variation of participating parents								
School-reported participation (%)	-0.25 (0.26)	-0.38* (0.20)	-0.14 (0.14)	0.13 (0.35)	-0.05 (0.21)	0.33* (0.18)	-0.24 (0.73)	-1.76 (4.13)
Participation (%) × Within-school SES variation of participating parents	0.34 (0.36)	0.15 (0.22)	0.07 (0.14)	-0.07 (0.41)	0.11 (0.24)	-0.43 (0.30)	0.36 (0.63)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 3 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.13.
Participation-SES Interaction Effects by Country/Economy, Science Score

Main effect (participation) and interaction term	Science score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × SES								
Parent-reported participation	-10.42*** (2.90)	-4.38 (3.72)	-2.91 (4.04)	-11.65** (4.58)	-6.91* (3.51)	-7.08 (4.80)	1.82 (16.21)	-10.16 (27.62)
Participation × Parent SES	-0.18 (3.25)	2.68 (3.55)	3.11 (3.01)	-3.43 (2.75)	-1.95 (1.83)	-1.80 (6.29)	-11.30 (9.37)	-17.74 (18.06)
(2) School-level participation × School-mean SES								
School-reported participation (%)	0.04 (0.07)	-0.21 (0.13)	0.00 (0.06)	0.06 (0.24)	-0.03 (0.12)	0.11 (0.09)	0.21 (0.46)	-0.22 (10.01)
Participation (%) × School-mean SES	0.08 (0.15)	-0.08 (0.18)	0.02 (0.09)	0.02 (0.20)	-0.05 (0.07)	-0.07 (0.18)	-0.07 (0.45)	3.46 (8.64)
(3) School-level participation × Within-school SES variation								
School-reported participation (%)	0.41 (0.44)	-0.47 (0.32)	-0.42 (0.40)	0.09 (0.41)	0.26 (0.28)	0.18 (0.45)	0.47 (1.56)	-0.52 (3.16)
Participation (%) × Within-school SES variation	-0.56 (0.61)	0.38 (0.40)	0.40 (0.38)	-0.05 (0.47)	-0.25 (0.30)	-0.09 (0.75)	-0.40 (1.72)	-
(4) School-level participation × School-mean SES of participating parents								
School-reported participation (%)	0.05 (0.06)	-0.17 (0.11)	-0.02 (0.06)	0.10 (0.21)	-0.01 (0.13)	0.14 (0.08)	0.12 (0.35)	7.23 (5.47)
Participation (%) × School-mean SES of participating parents	0.16 (0.11)	0.00 (0.14)	-0.04 (0.06)	0.04 (0.17)	-0.03 (0.07)	0.03 (0.14)	0.02 (0.39)	4.84 (4.03)
(5) School-level participation × Within-school SES variation of participating parents								
School-reported participation (%)	-0.19 (0.29)	-0.24 (0.19)	-0.11 (0.09)	0.18 (0.34)	-0.02 (0.21)	0.30* (0.18)	-0.11 (0.59)	-0.52 (3.16)
Participation (%) × Within-school SES variation of participating parents	0.27 (0.40)	0.08 (0.21)	0.11 (0.09)	-0.13 (0.38)	0.05 (0.23)	-0.34 (0.27)	0.20 (0.50)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 3 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.14.

Participation-SES Interaction Effects by Country/Economy, Reading Score

Main effect (participation) and interaction term	Reading score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × SES								
Parent-reported participation	-11.28*** (3.13)	-3.15 (4.42)	-1.27 (4.11)	-13.17** (5.23)	-8.43** (3.37)	-9.44* (4.98)	-2.18 (13.77)	-29.33 (24.56)
Participation × Parent SES	-0.44 (3.33)	4.00 (3.99)	4.79 (3.00)	-4.71 (2.88)	-2.80 (1.82)	-1.18 (6.36)	-13.38 (10.94)	-20.04 (18.20)
(2) School-level participation × School-mean SES								
School-reported participation (%)	0.05 (0.07)	-0.19 (0.13)	0.02 (0.07)	-0.08 (0.26)	0.00 (0.14)	0.11 (0.09)	0.19 (0.48)	1.67 (10.87)
Participation (%) × School-mean SES	0.12 (0.17)	0.02 (0.18)	0.07 (0.11)	-0.06 (0.22)	-0.03 (0.08)	-0.01 (0.20)	-0.05 (0.46)	0.71 (9.66)
(3) School-level participation × Within-school SES variation								
School-reported participation (%)	0.07 (0.49)	-0.41 (0.36)	-0.51 (0.52)	0.00 (0.45)	0.22 (0.31)	-0.07 (0.49)	0.38 (1.55)	-2.09 (3.45)
Participation (%) × Within-school SES variation	-0.10 (0.68)	0.25 (0.46)	0.49 (0.50)	0.01 (0.52)	-0.21 (0.33)	0.33 (0.83)	-0.31 (1.65)	-
(4) School-level participation × School-mean SES of participating parents								
School-reported participation (%)	0.06 (0.07)	-0.17 (0.11)	-0.01 (0.07)	0.00 (0.22)	0.03 (0.15)	0.12 (0.09)	0.11 (0.33)	5.64 (5.23)
Participation (%) × School-mean SES of participating parents	0.19 (0.13)	0.06 (0.14)	-0.02 (0.09)	0.00 (0.17)	0.00 (0.08)	0.07 (0.16)	0.02 (0.38)	3.84 (3.17)
(5) School-level participation × Within-school SES variation of participating parents								
School-reported participation (%)	-0.29 (0.26)	-0.27 (0.20)	-0.10 (0.14)	0.08 (0.35)	-0.03 (0.24)	0.30* (0.16)	-0.12 (0.57)	-2.09 (3.45)
Participation (%) × Within-school SES variation of participating parents	0.42 (0.34)	0.07 (0.23)	0.09 (0.14)	-0.08 (0.41)	0.06 (0.25)	-0.38 (0.26)	0.21 (0.49)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 3 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.12 presents the results of interaction regression models for math achievement by country and economy. Specification 1 suggests that the association between participation of a student's own parents and math achievement does not change according to the level of the parents' SES in any of the countries or economies. Specifications 2 and 3 indicate that the association between school-level participation and student math achievement does not vary by either the level or the variation of parents' SES within the school for any of the countries and economies. This result does not change even if I use the SES of parents who actually participated in school management in specifications 4 and 5, which would measure parents' power to influence school decisions through their participation in school management more accurately.

Like the results for math achievement, no statistically significant interaction effects were identified for science and reading achievements, as presented in Table 3.13 and Table 3.14, respectively. Specification 1 indicates that the association between participation of a student's own parents and student achievement does not change by the level of the parents' SES for either the science or reading achievement. Specifications 2-5 show that neither a school-mean SES nor a within-school SES variation moderates the association between school-level parent participation and student achievement for either science or reading in any of the countries or economies.

These results indicate that parents' SES did not moderate the participation-achievement association for either individual-level or school-level parent participation in any of the countries or economies. This suggests that parents' SES did not affect the parents' ability to capitalize upon their own participation to strengthen their learning support at home nor the parents' power to influence school decisions and generate school-wide effects on student achievement through their participation in school management.

Exploration of Moderating Factors

In this section, I explore potential factors other than socioeconomic status that could moderate the association between parent participation in school management and student achievement in the countries and economies. I examine whether the association differs by 1) the parents' academic orientation, 2) the school's openness to parental engagement, and 3) the degree of school autonomy, by interacting these factors with the parent participation measures in the full-specification regression models. The results of these interaction models are presented in Table 3.15, 3.16, and 3.17 for math, science, and reading achievement, respectively. The results show statistical evidence that a degree of school's openness to parental engagement moderated the association between participation of a student's own parents and student achievement in all the three subjects in Macao as well as the association between school-level parent participation and reading achievement in Dominican Republic at the 5% significance level.

Table 3.15.
Exploration of Moderating Factors by Country/Economy, Math Score

Main effect (participation) and Interaction term	Math score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × Parents' academic orientation								
Parent-reported participation	-10.86*** (3.21)	-0.44 (3.71)	-0.55 (4.43)	-5.97* (3.23)	-1.46 (2.45)	-6.25 (5.26)	7.50 (13.21)	-0.52 (20.7)
Participation × Parents' academic orientation	-0.57 (2.49)	-3.98 (4.13)	-3.68 (3.91)	-3.94 (2.69)	1.21 (2.28)	-0.94 (5.52)	12.46 (23.83)	-11.14 (14.23)
(2) Individual-level participation × Parents' perception of school's openness to parental engagement								
Parent-reported participation	-9.72*** (3.21)	-0.46 (4.42)	-1.29 (4.18)	-6.57** (3.29)	-0.74 (2.51)	-5.41 (5.30)	6.34 (16.09)	12.37 (19.13)
Participation × Parents' perception of school's openness	-3.60 (2.85)	-0.05 (3.95)	-1.66 (3.65)	-1.94 (2.19)	-1.56 (1.99)	-2.12 (6.17)	6.02 (20.51)	-38.07** (16.30)
(3) School-level participation × School-mean parents' academic orientation								
School-reported participation (%)	0.04 (0.06)	-0.19* (0.10)	-0.12 (0.09)	0.04 (0.11)	0.07 (0.06)	0.11 (0.10)	0.21 (0.29)	-4.66 (4.19)
Participation (%) × School-mean parents' academic orientation	0.18 (0.17)	-0.42 (0.28)	0.11 (0.23)	0.04 (0.21)	-0.28* (0.16)	0.06 (0.25)	-1.26 (0.89)	8.08 (4.91)
(4) School-level participation × School-mean parents' perception of school's openness to parental engagement								
School-reported participation (%)	0.03 (0.07)	-0.27** (0.11)	-0.08 (0.07)	-0.07 (0.10)	0.04 (0.08)	0.10 (0.10)	0.07 (0.45)	-1.76 (4.13)
Participation (%) × School-mean parents' perception of school's openness	-0.28 (0.29)	0.03 (0.18)	0.22 (0.25)	0.22* (0.13)	0.05 (0.18)	-0.02 (0.34)	-0.07 (0.59)	-
(5) School-level participation × School autonomy								
School-reported participation (%)	-0.02 (0.07)	-0.27*** (0.10)	-0.09 (0.07)	0.20 (0.20)	0.00 (0.08)	0.04 (0.17)	0.15 (0.29)	-1.76 (4.13)
Participation (%) × School autonomy	-0.05 (0.10)	-0.01 (0.08)	0.07 (0.09)	0.09 (0.11)	-0.04 (0.05)	0.07 (0.18)	-0.01 (0.19)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 4 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.16.
Exploration of Moderating Factors by Country/Economy, Science Score

Main effect (participation) and Interaction term	Science score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × Parents' academic orientation								
Parent-reported participation	-10.26*** (2.79)	-4.60 (3.23)	-4.66 (4.04)	-6.92** (3.05)	-4.60** (2.07)	-6.82 (4.81)	6.46 (12.87)	-12.54 (19.83)
Participation × Parents' academic orientation	0.80 (2.54)	-5.77 (4.16)	0.42 (3.81)	-2.35 (3.08)	3.48 (2.13)	-1.35 (5.44)	6.81 (17.88)	-25.48* (13.39)
(2) Individual-level participation × Parents' perception of school's openness to parental engagement								
Parent-reported participation	-9.10*** (2.76)	-4.62 (3.81)	-3.69 (4.64)	-6.47** (3.23)	-4.09* (2.13)	-6.10 (4.89)	4.48 (15.80)	8.16 (17.72)
Participation × Parents' perception of school's openness	-4.43 (2.91)	0.43 (3.90)	0.31 (3.30)	-2.81 (2.54)	-0.74 (1.97)	-2.48 (6.09)	1.60 (19.20)	-47.81*** (15.96)
(3) School-level participation × School-mean parents' academic orientation								
School-reported participation (%)	0.05 (0.06)	-0.11 (0.09)	-0.06 (0.07)	0.01 (0.10)	0.05 (0.05)	0.14 (0.11)	0.14 (0.25)	-1.60 (2.84)
Participation (%) × School-mean parents' academic orientation	0.21 (0.17)	-0.37 (0.25)	0.14 (0.18)	0.09 (0.19)	-0.16 (0.15)	0.04 (0.27)	-0.82 (0.69)	3.01 (4.34)
(4) School-level participation × School-mean parents' perception of school's openness to parental engagement								
School-reported participation (%)	0.03 (0.07)	-0.15 (0.10)	-0.02 (0.05)	-0.08 (0.09)	0.01 (0.07)	0.19** (0.10)	0.08 (0.39)	-0.52 (3.16)
Participation (%) × School-mean parents' perception of school's openness	-0.24 (0.29)	-0.11 (0.16)	0.36* (0.21)	0.19 (0.13)	0.08 (0.16)	0.35 (0.30)	-0.11 (0.52)	-
(5) School-level participation × School autonomy								
School-reported participation (%)	-0.02 (0.07)	-0.18** (0.09)	-0.01 (0.06)	0.14 (0.17)	-0.04 (0.06)	-0.06 (0.15)	0.09 (0.26)	-0.52 (3.16)
Participation (%) × School autonomy	-0.06 (0.10)	0.00 (0.07)	0.01 (0.06)	0.06 (0.10)	-0.07 (0.04)	0.22 (0.16)	0.00 (0.16)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 4 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Table 3.17.

Exploration of Moderating Factors by Country/Economy, Reading Score

Main effect (participation) and Interaction term	Reading score							
	Croatia	Georgia	Portugal	Dominican Republic	Mexico	Korea	Hong Kong	Macao
(1) Individual-level participation × Parents' academic orientation								
Parent-reported participation	-10.97*** (3.11)	-4.72 (3.92)	-4.01 (4.42)	-6.55* (3.70)	-4.96** (2.44)	-9.23* (4.88)	3.60 (14.46)	-19.85 (20.99)
Participation × Parents' academic orientation	1.29 (2.53)	-2.09 (4.50)	0.77 (4.09)	-3.56 (2.91)	3.47 (2.31)	-0.33 (5.68)	6.10 (17.91)	-18.42 (14.21)
(2) Individual-level participation × Parents' perception of school's openness to parental engagement								
Parent-reported participation	-9.73*** (3.02)	-4.26 (4.75)	-3.39 (4.01)	-7.17* (3.92)	-4.59* (2.45)	-8.66* (4.97)	0.86 (16.85)	-4.39 (18.93)
Participation × Parents' perception of school's openness	-4.87 (3.05)	1.30 (4.05)	-1.18 (3.64)	-1.48 (2.81)	-0.22 (2.17)	-4.91 (5.32)	5.04 (20.00)	-38.07** (15.52)
(3) School-level participation × School-mean parents' academic orientation								
School-reported participation (%)	0.06 (0.06)	-0.15 (0.10)	-0.12 (0.11)	-0.07 (0.12)	0.05 (0.06)	0.11 (0.11)	0.12 (0.24)	-2.30 (3.33)
Participation (%) × School-mean parents' academic orientation	0.26 (0.17)	-0.35 (0.29)	0.29 (0.24)	0.16 (0.21)	-0.18 (0.19)	-0.04 (0.27)	-0.55 (0.68)	0.58 (4.65)
(4) School-level participation × School-mean parents' perception of school's openness to parental engagement								
School-reported participation (%)	0.05 (0.07)	-0.02* (0.11)	-0.02 (0.07)	-0.22* (0.11)	0.01 (0.08)	0.14 (0.10)	0.02 (0.34)	-2.09 (3.45)
Participation (%) × School-mean parents' perception of school's openness	-0.33 (0.36)	-0.02 (0.18)	0.32 (0.23)	0.36** (0.15)	0.08 (0.18)	0.09 (0.35)	0.02 (0.52)	-
(5) School-level participation × School autonomy								
School-reported participation (%)	0.01 (0.08)	-0.21** (0.10)	-0.03 (0.06)	0.10 (0.17)	-0.05 (0.08)	-0.02 (0.18)	0.08 (0.24)	-2.09 (3.45)
Participation (%) × School autonomy	0.01 (0.10)	-0.02 (0.09)	0.08 (0.08)	0.07 (0.10)	-0.08 (0.06)	0.16 (0.20)	-0.02 (0.15)	-

Note. The table shows coefficient and standard errors in parentheses for parent participation (main effects) and a corresponding interaction term. The interaction term in specification 4 and 5 in Macao is omitted due to a dependency among predictors. All models include individual- and school-level parent participation measures, student and school characteristics, additional controls addressing potential sources of endogeneity, and country dummies. Sampling and replicate weights are used for estimation. Significance level: * p<0.10; ** p<0.05; *** p<0.01.

Parents' academic orientation. It could be hypothesized that academically oriented parents seek information and networks that help their child's learning at home through their participation in school management. In addition, these parents may attempt to exert greater influence on school decisions through their participation in school management in order to improve the learning environment at school and to hold the school accountable for higher achievement. To examine whether parents' academic orientation moderates the participation-achievement association, individual parents' academic orientation is interacted with their own participation and school-mean parents' academic orientation is interacted with school-level parent participation, respectively, in separate models. The results show that the association between parent participation and student achievement in math, science, and reading does not change according to parents' academic orientation for either the individual-level or school-level parent participation for any of the countries or economies.

School's openness to parental engagement. Parent participation may be effectively leveraged for improving student achievement when schools recognize the importance of engaging parents in school management and promote it proactively. Such schools may provide a welcoming and supportive environment that enables parents who participate in school management to obtain information and networks that can, in turn, strengthen learning support at home and/or play an active role in school decision-making. Therefore, I examine whether the participation-achievement association differs by the degree of school's openness to parental engagement.

A school's openness to parental engagement is measured based on parents' perception rather than schools' self-reporting. Even if schools report that they have a positive attitude to parental engagement, it does not necessarily guarantee that parents are actually engaged by the school. In this sense, whether parents themselves feel welcomed and involved by school would be a more precise measure of the degree of school's openness to parental engagement. Parents who feel truly involved by school may be more likely to benefit from their participation and influence school decision-making.

I used factor analysis to generate a latent variable that measures parents' perception about their school's openness to parental engagement from a set of questions that asked parents to assess school's parental engagement practices via a four-point scale. Five school practices were used: 1) providing parents with an inviting atmosphere; 2) providing parents with effective home-school communications; 3) including parents in school decisions; 4) providing parents with regular and useful information on child's progress; and 5) informing parents about how to help homework and other school-related activities. The factor analysis generated a single factor with its eigenvalue equal to or greater than one, which accounts for 62% of the total variation[17]. The derived factor score was used as a weighted measure of parents' perception of the school's openness to parental engagement. The variable was interacted with individual-level parent participation, and the school-mean parents' perception was interacted with school-level parent participation, respectively, in separate models.

The analysis found several statistically significant interaction effects at the 5% significance level. In Macao, the association between individual-level parent participation and student achievement in math, science, and reading differs by the degree of parents' perception about school's openness to parental engagement. The negative interaction effects indicate that parents who felt more involved by school received less benefits from their own participation or paid greater cost of participation. The results suggest that, for every one unit increase in the parent's

[17] The Kaiser criterion suggests to retain factors that have eigenvalues equal to or higher than 1 (Kaiser, 1960). See appendix 3E for factor loadings.

perception about the school's openness to parental engagement (i.e., feeling more involved by school), the association between participation of a student's own parents and student achievement trended in a negative direction by 38.07 points for math, 47.81 points for science, and 38.07 points for reading on average. With respect to math achievement, for instance, participation of a student's own parents in Macao is associated with 17.55-point increase for students whose parents have an average level of perception about the school's openness (-0.14). However, for parents whose perception about the school's openness is one standard deviation higher than the average (0.77), their participation in school management is associated with decrease in student achievement by 17.08 points[18]. This could happen if, for example, parents who are welcomed and encouraged to be actively involved in school management (and therefore feel involved by school) devoted considerable time to school management and, as a result, ended up with cutting the amount of their learning support at home.

In Dominican Republic, the association between school-level parent participation and student achievement in reading differs by the degree of school-level parents' perception about school's openness to parental engagement at the 5% significance level. The interaction effects suggest that the association moves in a positive direction as parents feel more involved by the school, although the interaction effects are marginal in size. In schools where parents' perception about their school's openness is at the country's average (0.64), a 10-percentage-point increase in the proportion of parents who participate in school management is associated with increase in reading achievement by 0.11 points. However, in schools where the parents' perception is one standard deviation higher than the country average (1.05), a 10-percentage-point increase in the

[18] The average and standard deviation are estimated from non-imputed data by using sampling weights and replicate weights.

share of parents who participate in school management is associated with increase in reading achievement by 1.59 points[19]. This implies that, in schools where parents strongly felt involved by school, parents may have been more likely to influence school decisions in a way that improved student reading scores, although the effects are marginal.

School autonomy. Decentralization of decision-making authority to the school level may facilitate parents in exerting influence on school decisions through their participation in school management. In other words, parents may have a limited ability to influence school decisions that, in turn, generate school-wide effects on student achievement, if their school has limited autonomy. In order to examine whether school autonomy moderates the participation-achievement association, a measure of school autonomy was interacted with school-level parent participation.

In multiple-choice questions in PISA surveys, principals were asked to report who has a considerable responsibility for 12 school management tasks. The choices included the principal, teachers, a school governing board, regional/local education authority, and national education authority. I used six decision-making tasks directly related to teaching and learning: 1) selecting teachers for hire, 2) firing teachers, 3) establishing student assessment policies, 4) choosing textbooks, 5) deciding which courses are offered, and 6) determining course content. For each of the six tasks, I created a dummy variable, which enters a "one" if the task is delegated to any of the school-level actors, i.e., a principal, teachers, or a school governing board. Then I performed factor analysis to derive linearly uncorrelated latent factors from the six tasks. The factor analysis generated two factors that have an eigenvalue equal to or greater than one[20]. For the

[19] The average and standard deviation are estimated from non-imputed data by using sampling weights and replicate weights.
[20] The Kaiser criterion suggests to retain factors that have eigenvalues equal to or higher than 1 (Kaiser, 1960). See appendix 3E for factor loadings.

purpose of creating an interaction term, I used only the first factor, which accounts for 35% of the total variation as a measure of school autonomy. The results of interaction models shows that the association between school-level parent participation and achievement in math, science, and reading does not change by the degree of school autonomy in any of the countries or economies at the 5% significance level.

Table 3.18 summarizes the statistically significant associations and interaction effects identified in the country analysis.

Table 3.18.
Summary of Statistically Significant Associations Between Parent Participation in School Management and Student Achievement at the 5% Level by Country/Economy

Variable	Country/Economy							
	Croatia	Georgia	Portugal	Dom. Republic	Mexico	Korea	Hong Kong	Macao
Individual-level participation	–			–	– **(science only)**			
Interaction effects								
Level of parents' SES								
Parents' academic orientation								
School's openness								–
School-level participation		–						
Interaction effects								
Level of parents' SES								
Variation in parents' SES								
Parents' academic orientation								
School's openness				+ (reading only)				
School autonomy								

Note. A positive sign indicates a statistically significant positive association at the 5% significance level. A negative sign indicates a statistically significant negative association at the 5% significance level.

Limitations

There are several limitations in this study. First, the analyses may still be subject to biases resulting from endogeneity. The regression models in this study controlled for potential sources of endogeneity, including the degree of parents' academic orientation and whether the school involves parents in decision-making. The models also addressed reverse causality by controlling for parents' behavioral patterns, such as instances where the parents of a poorly performed child participate in school management to improve the school learning environment for their child. Even though the inclusion of these variables help account for the major sources of endogeneity, there might be other factors that explain both parent participation and student achievement. Therefore, no causal inference can be made from the findings of this study.

Second, school-level participation measure may be subject to measurement error. This study used a school-reported share of parents participating in school management as a measure of school-level parent participation rather than aggregating parent-reported participation to school level, due to the relatively large missing data in the parent-reported participation measure. The school-reported participation measure has an advantage in that it reflects participation of parents who were not sampled for the survey and who did not report their participation status. However, the information provided by school may not necessarily be accurate especially in case the data did not come from official school records.

Third, this study does not take account of what type of school governing bodies and decision-making tasks parents are engaged in. For example, it is unknown whether parents participated in a school council, school management committee, or parent-teacher association in the PISA data. Although these terms are used with no absolute consistency (Car-Hill, 2017), they may differ in their function. In addition, there is suggestive evidence that the most variation in school's decision-making authority exists between schools rather than between countries (Gunnarsson et al., 2009). Therefore, even if parents participate in school management in a given country, the scope of school decision-making parents are allowed to influence would differ by school. These notions imply that the results of this study might be influenced by the variation in types of school governing bodies and the degree of decision-making authority accorded to them.

Fourth, there are a series of limitations derived from the cross-national design of PISA surveys. Methodological limitations include, among others, insufficient guarantees of standardization of the design and administration of sampling and performance tests across countries (Fernandez-Cano, 2016). The validity and compatibility of measurements are also threatened by cross-cultural differences in response styles and the unproven linguistic equivalence of survey instruments (e.g., Buckley, 2009; Goldstein & Thomas, 2008; Rutkowski & Rutkowski, 2013). Another challenge of cross-national studies lies at the interpretation of results that may converge or diverge (Hantrais, 1999). Even if we obtain similar results across nations, it is difficult to draw consistent evaluative inferences that cover an entire schooling system by using the data of 15 year-old students sampled by PISA (Fernandez-Cano, 2016).

Despite the aforementioned limitations, the results of this study provide suggestive evidence on how parent participation in school management is associated with student achievement through the different mechanisms in different contexts. I discuss the findings and their implications to participatory school governance in decentralized education system in the following section.

Discussion and Conclusion

This study examined how individual-level and school-level parent participation in school management, each of which would have a distinct mechanism for learning gain or loss, is associated with student achievement respectively in and across eight countries and economies. Overall, the analysis shows that the association between parent participation in school management and student achievement varies by country and economy. However, any statistically significant associations identified lie in a negative direction, even after controlling for student and school characteristics and potential sources of endogeneity. The results suggest that parent participation in school management may not contribute to improving student achievement and, in some of the countries and economies, the cost of participation may have even exceeded its benefits. However, depending on the country or economy, the negative associations were identified in either participation of a student's own parents that is more likely to affect home input or participation of a group of parents that is assumed to affect school input.

This study also found that parents' SES did not moderate the participation-achievement associations for either individual-level or school-level parent participation in any of the countries and economies. However, the country analyses indicate that the parents' perception of their school's openness to parental engagement (whether parents felt involved by school) moderated the participation-achievement association in some countries and economies.

The inconsistency of the findings across the countries and economies may partly be attributed to the aforementioned limitations in data and methodologies including the issue of linguistic and cultural equivalence in the cross-national surveys, which could affect responses of students and parents. However, the inconsistency derived from cross-national research may exist within in its own, and if so, it provides an opportunity to identify some of the contextual and idiosyncratic factors as the nation's dynamics (Elder 1976). In other words, cross-national research is valuable for revising our interpretations of a given concept and phenomenon to account for cross-national differences and contradictions that could not be uncovered in single-nation study (Kohn, 1987). This notion indicates that parental engagement in school management, which has been advocated globally as a means to improve student achievement, could be a concept and strategy that are not equivalent across countries and in different contexts and thus produce different results. In order to interpret and evaluate cross-national differences, one needs to pay attention to historical, political, economic, social, and cultural particularities (Hantrais, 1999; Kohn, 1987). Therefore, I discuss the findings of this study in specific country contexts and provide insights into participatory school governance in the section below.

Association Between Participation of Student's Own Parents and Achievement

Participation of a student's own parents in school management was found to be not associated with math scores but negatively associated with science and reading achievement in the cross-country analysis, controlling for school-level parent participation that would influence school decisions and change the learning environment at school. In the country analyses, no statistically significant association was found for any subjects in the majority of countries and economies at the 5% significance level. However, a negative association was found for all the three subjects in Croatia and Dominican Republic, and only in the science achievement scores in Mexico.

The literature suggests that parents obtain information and networks that can be utilized to strengthen their learning support at home through their participation in school. However no positive associations were found for any of the subjects in any of the countries and economies. One potential explanation could be that the information and networks obtained at school did not contribute to improving the quality of learning support at home since parents who participated in school management already provided high quality learning support at home. The descriptive analysis presented in Table 3.4 suggested that parents who participated in school management cared about their child's education and academic success more than non-participating parents. This implies that participating parents may have already provided an optimal level of learning support at home even before their participation in school management.

However this hypothesis does not explain the negative associations between participation of a student's own parents and student achievement. These negative associations suggest that parents who participate in school management may have ended up providing a lower level of home input. If this scenario is true, it implies that opportunity cost of parent participation exceeded its potential benefits. This could happen if, for example, parents who had provided relatively high-level learning support to their child at home had to cut the amount of their support as a result of participating in school management and were unable to obtain useful information and network to further strengthen their learning support at home. In other words, the negative association for individual-level parent participation could be explained by high opportunity cost and a low level of benefits of parent participation.

In fact, there is suggestive evidence that participation of a student's own parents in school management in Croatia, Dominican Republic, and Mexico is characterized by high opportunity cost and/or low benefit. First, the opportunity cost of participation would be relatively high in Croatia, Dominican Republic, and Mexico since parents of public school students in these countries actively support their child's learning at home. According to the parent survey in PISA 2015, Dominican Republic, Croatia, and Mexico rank first, fifth, and sixth out of 17 countries and economies, respectively, in terms of the frequency of the parent helping their child with homework[21]. By devoting their time to school management, however, they may have given up some amount of learning support at home.

Second, the benefits of participating in school management for individual parents would be low, at least, in Croatia, i.e., parents may not obtain useful information and network to strengthen

[21] Parents were asked about their learning support at home with particular reference to science, which was the focus subject in PISA 2015 survey. It is however hypothesized that parents who supported learning of science also supported other subjects. The data collected from parents of public school students is available in 17 countries and economies out of 19 countries and economies that administered the parent survey module in the PISA 2015.

their learning support at home in the country. According to the study of Pahić et al. (2010), only parents who truly engaged in the work of school boards realized their participation useful for their own children in Croatia (as cited in Ercegovac, 2016). This notion implies that the degree of engagement, rather than just participation, is an important condition for parents to benefit from their own participation in school management. These cases of high opportunity cost and/or low benefit of parent participation in school management may explain why participation of a student's own parents in school management is negatively associated with student achievement in the three countries although no causality can be established.

Another important implication drawn from the analyses is that opportunity cost of parent participation in school management may differ by subject. This study suggests that opportunity cost of participation of a student's own parents could be higher for science and reading achievement than math achievement. The cross-country analysis found the statistically significant negative association in science and reading achievement only. In country analyses, the negative association is found only for science achievement in Mexico. These findings imply that opportunity cost of participation of a student's own parents, i.e., reduction in learning support at home, could be potentially higher for science and reading than math achievement. At least for reading and math, the findings are consistent with the idea that learning support and environment at home influence child's reading achievement more than math. In fact, it is suggested that family support and environment are more likely to contribute to reading and language skills than math (e.g. Cooper et al., 1996; Harris & Sass, 2009; Sonnenschein et al., 2016), while math achievement, especially for older students, is more likely to be affected by school, where instruction on advanced math is mostly delivered (e.g., Allinder et al., 1992; Bryk & Raudenbush, 1988).

The idea of opportunity cost receives little attention in the literature on parent participation in school management and decision-making, even though this study suggests that opportunity cost could be an important factor that offsets potential benefits of parent participation in some of the countries. If the negative association is derived from individual-level participation, which could suggest high opportunity cost and low benefit of participation, policy makers may need to develop more efficient participatory school governance models from which parents can obtain more useful information and networks with less time commitment into school management tasks.

Association Between School-Level Parent Participation and Achievement

School-level parent participation in school management was found to have no significant association with student achievement in both the cross-country analysis and most of the country analyses, except for Georgia. The literature suggests that parents who have direct incentives to improve their child's learning would seek to influence school decisions to improve the learning environment and hold the school accountable for learning outcomes through their participation in school management. However, the results suggest that engaging a larger number of parents in school management may not necessarily generate positive school-wide effects on student achievement in the majority of the countries and economies.

One potential explanation for the lack of association could be a relatively weak sense of urgency to improve the quality of school education among parents who participated in school management. According to the descriptive analysis presented in Table 3.4, parents who participated in school management had a greater level of satisfaction with the quality of their child's school than those who did not in most of the countries and economies. This implies that parents may not have exerted influence over school decision-making even if they participated in school management since they were already content with education provided at their child's school.

One unique case is Georgia where the proportion of parents participating in school management was negatively associated with student achievement, even after controlling for the participation of a student's own parents that would affect the level of learning support at home. The finding implies that parents may have influenced school decisions in a way that reduced school effectiveness in student achievement in the country, although the magnitude of association was small. This suggests that, in Georgia, the cost of parent participation in school management may have exceeded its potential benefits because parents hampered professional decision-making of principals and teachers although no causal relationship can be established.

The possibility of the reduction in school effectiveness in Georgia could be explained by the fact that schools were not properly prepared to engage parents in school decision-making due to a lack of capacity in addition to frequent changes in the decentralization policy in the country. The government of Georgia launched education reform that promoted decentralization of school governance during the 2000s. As a part of the reform, school boards consisting of teachers, parents, and students were created as self-governance systems. According to an interview survey targeting policy makers, however, the majority of school communities did not have sufficient capacity for independent and effective decision-making under the new governance model (Gorgodze, 2016). Although the government established Education Resource Centers to support capacity development of school boards, the Centers not only failed to provide necessary support (The World Bank, 2014) but also turned into a resource hub that created the sense of nepotism and corruption among principals, teachers, and parents (Dzotsenidze, 2018). In addition, the government has changed its education governance policy several times, first by promoting recentralization and then turning back to decentralization again during the 2000s, creating chaos in the school governance (Gorgodze, 2016). In such unregulated and inconsistent governance structures where the capacity of board members is also insufficient, allowing parents who are not education professionals to influence school management and decision-making may have caused detrimental effects on the functioning of school operation and students' learning at school. These factors could explain why school-level parent participation in school management is negatively associated with student achievement in Georgia. If a negative association is derived from school-level participation, which could suggest that parents hamper effective school management, policy makers may need to provide parents with an enabling environment so that parents can play an effective role in school decision-making.

Factors Moderating Association Between Parent Participation and Achievement

This study found that parents' SES did not moderate the participation-achievement association for both individual-level and school-level participation in any of the countries or economies. Although the cross-country analysis that took advantage of between-country variation in parent participation found negative interaction effects between participation of a student's own parents and their SES for math, science, and reading achievement, the interaction effects were not identified in country analyses for any of the countries or economies. In addition, the country analysis found that neither the average level of parents' SES in school nor a within-school variation in SES moderated the association between school-level parent participation and student achievement. This implies that parents' SES did not affect either the parents' ability to capitalize on their own participation to strengthen their learning support at home, or the parents' power to influence school decisions and generate school-wide effects on student achievement through their participation in school management.

However, the study found that the parents' perception of school's openness to parental engagement (whether parents felt involved by school) did moderate the participation-achievement association in Macao and Dominican Republic. In Macao, negative interaction effects were found between participation of a student's own parents and the degree of the parents' perception about their school's openness to parental engagement. The negative interaction effects suggest that parents who strongly felt involved by the school may have paid greater opportunity cost of participation, indicating that what matters may not be participation per se but a degree of involvement.

In Macao, the role of parents and school tends to be defined by a clear demarcation of tasks with parents as home-based supporters and teachers as school-based educators (Ho, 2009). Therefore, parents do not show strong dissatisfaction with school education in general (Chou, 2012) and, with trust in the school, express a low level of desire to influence school decisions (Ho, 2009). Under such a unique cultural circumstance, it is likely that parents volunteer a minimum level of commitment and time to school management tasks even if they participate in a school governing body. This suggests that the opportunity cost of parent participation in Macao could be relatively small on average. In such cases, the opportunity cost of participation is assumed to increase only when participating parents are encouraged to actively involved in school management and start devoting substantial time and commitment to school management tasks (and therefore feel involved by school). This speculative explanation can be confirmed only if there is data on not only the state of parent participation in school management but also the degree of their involvement in school management, such as the frequency of meetings and time spent on school management tasks. It is expected that surveys like PISA will collect such information in the future to allow researchers to examine conditions in which parent participation affects student achievement.

On the other hand, in Dominican Republic, a small but positive interaction effect was identified between school-level parent participation and the parents' perception of the school's openness to parental engagement for reading achievement. This positive interaction effect may indicate that a group of parents who strongly felt welcomed and involved by school could be more likely to influence school decisions that improved student achievement through their participation in school management. Unfortunately, a scarcity of literature on parent participation in school management in Dominican Republic poses a challenge in exploring reasons why parents feeling involved by school may have been more successful in generating positive school-wide effects on student achievement, especially in reading. More research is needed to understand the context and enabling factors of parent participation in school management in the country.

Conclusion

Strengthening school-parent partnerships has been advocated as a strategy for improving the quality of school education and for holding schools accountable for learning outcomes. The results of this study, however, indicate that, despite the theoretical underpinnings, parent participation in school management may not necessarily be a promising strategy for improving education quality and outcomes.

The results of this study relay the importance of carefully examining how parental participation can positively and negatively affect student learning in the context of each country and identifying factors that moderate the associations in order to realize the purported positive effects of parent participation. For instance, this study found that, depending on the country or economy, the association between parent participation in school management and student achievement is derived from either participation of a student's own parents that would be more likely to impact home input or participation of a group of parents that is assumed to affect school input. This study also found that, in some countries and economies, participation-achievement association is moderated by parents' perception of school's openness to parental engagement, suggesting that what matters may not be participation per se but a degree of engagement.

The findings of this cross-national study call into question the recommendations to increase parental participation in school management without attending to various contextual factors. This study demonstrates the importance of identifying mechanisms that account for participation-achievement associations in a given country and key conditions under which parent participation can effectively increase home and school input for their children. Establishing a better understanding of how parent participation works in a given context helps policy makers and public school authorities to remove bottlenecks and provide enabling environments for leveraging the school-parent partnership to improve students' learning outcomes.

APPENDICES

Appendix 3A: A Note for Imputation

I performed Multiple Imputation by Chained Equations (MICE) with Stata "mi impute" commands for the public school student data in the sample countries and economies to add 20 imputations to the data set. Although five imputations are considered sufficient to obtain valid inference, using 20 imputations reduces the sampling error due to imputations because the reference distribution for multiple imputation inference becomes approximately normal when the number of imputations is large (StataCorp, 2017).

All variables to be used in the model, including interaction terms, are included in imputation models as "just another variable" (Williams, 2018). There is on-going argument whether sampling weights are used in imputation model. However, it is recommended to include sampling weights in imputation models if variables that determined the probability of selection are not presented as covariates (The Methodology Center, 2018). Since participating countries in PISA 2015 used various strata reflecting education system and environment unique to each country, I used the student final sampling weights in imputation models.

For continuous variables that have no theoretical bounds, I used regression (regress). However, there are several cases where imputed data contained apparent outliers whose value is way beyond the range in original data. For continuous variables that have upper and/or lower bounds, I used truncated regression (truncreg) that can estimate values with specific upper and lower limits. However truncated regression often causes a convergence problem. In these cases, I used predictive mean matching (PMM) instead of regression and truncated regression. This method predicts a value for a given observation but uses it to identify observations whose observed value of the variable is close to the predicted value and select one of them randomly as the imputed value. Since PMM draws its imputed values from the observed values, imputed values are never outside the range of the observed values. I set “knn(#)” in a way that 10 closest observations are considered as matches, as recommended by Morris et al (2014).

In estimation using imputed data with Stata, the “vceok” option command was used to allow Stata to apply repeated weights that account for complex sampling design (Household Finance and Consumption Network, 2016; van Kerm, 2017). In regression analysis using imputed data, residual degrees of freedom that are used for the statistical inference are different for each parameter depending on the number of imputations and the rates of missing information in each variable (StataCorp, 2017). The degree of freedom for each variable also varies slightly by plausible value of student achievement used for each regression model. Therefore, for each parameter estimate, there are 10 degrees of freedom for the 10 plausible values. For the statistical inference, the average of 10 degrees of freedom is used to perform t-test for each parameter estimate. I confirmed that the results of statistical testing based on significance level at 10%, 5% and 1% remain the same even if I used the largest and smallest degree of freedom in a given variable.

Appendix 3B: List of Variables

Table 3.19.
List of Variables

Variable	Type	Definition
Outcomes		
Student achievement	Continuous	Plausible values of test score in math, science and reading.
Parent participation		
Participation of a student's own parents in school management	Dummy	Parents' report on whether they participate in local school government.
A proportion of parents who participate in school management	Continuous	School's report on a proportion of parents who participate in local school government.
Student characteristics		
Socioeconomic status	Continuous	PISA index derived from parental education, highest parental occupation and home possessions.
Age	Continuous	Student's age.
Female	Dummy	Whether the student is female.
Native immigration status	Dummy	Whether at least one parent was born in the country.
Home/test language match	Dummy	Whether the test language is the same as home language.
Relative school grade	Continuous	A difference from the modal grade at which the majority of 15-year-old students are enrolled.
School program	Categorical	School program (general, pre-vocational or vocational).
School characteristics		
School location	Categorical	The population in a community where school is located in five categories.
School size	Continuous	The number of students in school.

Table 3.19. (cont'd)

Variable	Type	Definition
Controls for endogeneity		
Parents' academic orientation (individual-level)	Continuous	The factor score derived from the three variables, which asked parents the importance of reasons for choosing a school for their child in a four-point scale (1. good reputation; 2. course/subjects; and 3. student achievement).
Parents' academic orientation (school-level)	Continuous	School average of the above factor score, excluding the score of a student's own parents from calculation.
Parents discussing progress with a teacher on one's own initiative (individual-level)	Dummy	Parents' report on whether they discussed progress with a teacher on their own initiative.
Parents discussing progress with a teacher on their own initiative (school-level)	Continuous	School report on a share of parents who discussed progress with a teacher on their own initiative.
Whether school involves parents in decision-making	Dummy	School report on whether school involves parents in decision-making.
Variables for interaction		
School-level SES	Continuous	School-mean SES of parents, excluding SES of a student's own parents from calculation.
School-level SES of participating parents	Continuous	School-mean SES of parents who participate in school government.
Within-school variation in SES	Continuous	Within-school standard deviation in SES of parents.
Within-school variation in SES of participating parents	Continuous	Within-school standard deviation in SES of parents who participate in school government.
Parents' perception of school's openness to parent engagement (individual-level)	Continuous	The factor score derived from the five variables, which asked parents their perception of schools' parental engagement practices in a four-point scale (1. providing an inviting atmosphere; 2. providing effective school-home communication; 3. involving in decision-making; 4. providing regular information on child's progress; and 5. informing about how to help child's homework and school activities).
Parents' perception of school's openness to parent engagement (school-level)	Continuous	School average of the above factor score on parent's perception of schools' parental engagement practices.
A degree of school autonomy	Continuous	The factor score derived from the six dummy variables on whether a given decision-making authority is devolved to school level (1. selecting teachers; 2. firing teachers; 3. establishing assessment policies; 4. choosing textbooks; 5. deciding which courses are offered; and 6. determining course contents).

Table 3.19. (cont'd)

Variable	Type	Definition
Parents' characteristics		
Education level index	Continuous	The PISA index of highest education level of parents, which corresponds to the higher International Standard Classification of Education (ISCED) level of either parent.
Occupation status index	Continuous	The PISA index of highest occupational status of parents, which corresponds to the higher international socio-economic index of occupational status (ISEI) score of either parent.
Household possession index	Continuous	The PISA index of household possession items.
Reason for school choice: - Good reputation	Continuous	The importance of a good reputation as a reason for choosing a school for their child in a four-point scale.
Reason for school choice: - Courses offered	Continuous	The importance of offering of particular courses or subjects as a reason for choosing a school for their child in a four-point scale.
Reason for school choice: - High achievement	Continuous	The importance of high academic achievement as a reason for choosing a school for their child in a four-point scale.
Satisfaction with school quality	Continuous	The PISA index of parents' perceptions of the quality of school learning

Appendix 3C: Replicate Weights in PISA Surveys

Balanced repeated replication (BRR) is a statistical method for estimating the sampling variability of a statistic obtained by complex sampling design (e.g., stratified sampling). Theoretically the standard error of an estimate measures the variation of a statistic across multiple samples of a given population. Replicate weights allow a single sample to simulate multiple samples to generate more informed standard errors while retaining all information about the complex sampling design (IPUMS USA, 2019).

In PISA surveys, 80 replicate weights are developed in the following procedures (OECD, 2017a; 2017b). Within explicit strata, primary sampling units (schools) are listed in the order in which they appear on the sampling frame. Then, schools are paired within each explicit stratum according to the sequence of sampling systematically. For instance, pairing school 1 with school 5 and school 8 with school 10 in each explicit stratum. For a stratum with an odd number of schools, a triplet is formed consisting of the last three schools on the sorted list. The pairs are referred to pseudo-strata, variance strata, or zones. If there are 160 schools, 80 pseudo-strata are formed.

Replicates weights are obtained by computing replicate factors in each pseudo-stratum and multiplying the sampling weights by the replicate factors. In case of the jackknife repeated replication, one of the two schools within each pseudo-stratum are dropped and the remaining school has its weight doubled. In PISA, the particular variant of the BRR known as Fay's method is used to avoid a risk of dropping one of the schools and deleting a domain completely. In this method, replicate weights are formed by multiplying the sampling weights of one of the two schools by a replicate factor of 1.5 and the weights of the other school by a replicate factor of 0.5.

The determination as to which schools receive inflated weights and deflated weights is carried out in a systematic fashion based on the entries in a Hadamard matrix. A Hadamard matrix is a k x k matrix that contains entries that are +1 and -1 in value. A row is each pseudo-stratum and a column is each replicate. The +1 in the Hadamard matrix is converted to a factor of 1.5 for the first school of the pair and 0.5 for the second school of the pair. The -1 in the Hadamard matrix is converted to a factor of 0.5 for the first school of the pair and 1.5 for the second school of the pair. In cases there are three schools a pseudo-stratum, randomly selected one school received a factor of 1 .7071 for a given replicate. The other two schools receive factors of 0.6464 or, if the matrix indicates that the pair should be selected, a factor of 0.2929 and 1.3536, respectively.

Eighty replicate weights are computed for each student by multiplying their sampling weights by the replicate factor (1.5 or 0.5 in case of pseudo-strata with two schools) assigned to their schools. The replicate weights are also slightly disturbed since school and student non-response adjustment is repeated for each set of replicate weights.

The Stata commands for analyzing PISA data with sampling and replicate weights are developed based on the examples suggested by Kreuter & Valliant, 2007.

Appendix 3D: Computation of Coefficients and Standard Errors with Plausible Values

I used the following formulas presented in the PISA Analytical Manual (OECD, 2009) to compute final regression coefficients and their standard errors with plausible values.

1. Regression models are estimated for each plausible value using the student final weights and the 80 replicate weights. This returns 10 estimates and 10 standard errors per explanatory variable.

   The ten regression coefficients per explanatory variable is denoted as:
   $\hat{\beta}_1, \hat{\beta}_2, \ldots\ \hat{\beta}_{10}$

   The ten standard errors per explanatory variable is denoted as:
   $\hat{\sigma}_{(\hat{\beta}_1)}, \hat{\sigma}_{(\hat{\beta}_2)}, \ldots\ \hat{\sigma}_{(\hat{\beta}_{10})}$

2. The final regression coefficient estimate is equal to:
   $$\hat{\beta} = \frac{\left(\hat{\beta}_1 + \hat{\beta}_2 + \cdots \hat{\beta}_{10}\right)}{10}$$

3. The final sampling variance estimate is equal to:
   $$\sigma^2_{(\hat{\beta})} = \frac{\left(\sigma^2_{(\hat{\beta}_1)} + \sigma^2_{(\hat{\beta}_2)} + \cdots \sigma^2_{(\hat{\beta}_{10})}\right)}{10}$$

4. The imputation variance is equal to:
   $$\sigma^2_{(test)} = \frac{1}{M-1}\sum_{i=1}^{M}\left(\hat{\beta}_i - \hat{\beta}\right)^2 = \frac{1}{9}\sum_{i=1}^{10}\left(\hat{\beta}_i - \hat{\beta}\right)^2$$
   where M is the number of plausible values.

5. The final error variance is equal to:
   $$\sigma^2_{(error)} = \sigma^2_{(\hat{\beta})} + \left(\left(1 + \frac{1}{M}\right)\sigma^2_{(test)}\right) = \left(\left(1 + \frac{1}{10}\right)\sigma^2_{(test)}\right) = \sigma^2_{(\hat{\beta})} + \left(1.1\sigma^2_{(test)}\right)$$

6. The final standard error is equal to:
   $$\text{SE} = \sqrt{\sigma^2_{(error)}}$$

Appendix 3E: Factor Loadings

I used principal-components factor analysis with a varimax rotation to generate factors (latent variables) from a set of variables. Factor loadings are the correlation coefficients between the variables and factors. They represent how strongly each variable is associated with the underlying factor. A factor score is a weighted sum of the variables where each variable's weight is its factor loading. Cronbach's alpha greater than 0.6 indicates an acceptable level of reliability of a set of items that form an underlying construct (Hair et al., 2014; Hinton et al., 2004), although it is argued that a high value of alpha does not necessarily provide the evidence of reliability (Taber, 2018).

Table 3.20.
Factor Loadings: Parents' Academic Orientation

Variable	Factor 1	Cronbach's α
Parents' report on reasons for choosing a school for your child		0.63
Good reputation	0.80	
Offering of particular courses/subjects	0.71	
High academic achievement	0.77	

Table 3.21.
Factor Loadings: Parents' Perception of School's Openness to Parental Engagement

Variable	Factor 1	Cronbach's α
Parents' assessment of school's parental engagement practices		0.84
Providing an inviting atmosphere	0.82	
Providing effective school-home communications	0.84	
Involving parents in school decision-making process	0.79	
Providing regular and useful information on child's progress	0.77	
Informing about how to help child's homework and school activities	0.72	

Table 3.22.

Factor Loadings: School Autonomy

Variable	Factor 1	Factor 2	Cronbach's α
Whether a decision-making authority is devolved to school level			0.62
Selecting teachers for hire	0.60	0.67	
Firing teachers	0.51	0.76	
Establishing student assessment policies	0.51	-0.33	
Choosing textbooks	0.55	-0.22	
Deciding which courses are offered	0.66	-0.41	
Determining course content	0.70	-0.33	

REFERENCES

REFERENCES

Allinder, R. M., Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1992). Effects of summer break on math and spelling performance as a function of grade level. *Elementary School Journal, 94*(45), 51-60.

American Psychological Association. (2006). *Report of the APA task force on socioeconomic status*. Washington, DC: American Psychological Association.

Anderson, D. (1992). The interaction of public and private school systems. *Australian Journal of Education, 36*(3), 213-236.

Anderson, G. L. (1998). Toward authentic participation: Deconstructing the discourses of participatory reforms in education. *American Educational Research Journal, 35*(4), 571-603.

Barrera-Osorio, F., Fasih, T., Patrinos, H. A. (2009). *Decentralized decision-making in schools: The theory and evidence on school-based management*. Washington, DC: The World Bank.

Bassani, C. (2008). Parent classroom involvement and the development of social capital: A reading program in East Vancouver. *Journal of Educational Enquiry, 8*(2), 51-70.

Bonnet, G. (2002) Reflections in a critical eye: On the pitfalls of international assessment. *Assessment in Education: Principles, Policy & Practice, 9*(3), 387-399.

Briggs, K. L., & Wohlstetter, P. (2003). Key elements of a successful school-based management strategy. *School Effectiveness and School Improvement, 14*(3), 351-372.

Bryk, A S., & Raudenbush, S. W. (1988). Toward a more appropriate conceptualization of research on school effects: A three-level hierarchical linear model. *American Journal of Education, 97*, 65-108.

Bruns, B., Filmer, D., & Patrinos, H. A. (2011). *Making schools work: New evidence on accountability reforms*. Washington, DC: The World Bank.

Buckley, J. (2009). *Cross-national response styles in international education assessments: Evidence from PISA 2006*. Retrieved from https://edsurveys.rti.org/pisa/documents/buckley_pisaresponsestyle.pdf

Car-Hill, R. (2017). *Exploring the composition of school councils and its relationship to council effectiveness as an accountability tool*. Background paper prepared for the 2017/8 global education monitoring report. Paris: UNESCO.

Carr, A. A. (1996). The participation “race”: Kentucky’s site-based decision teams. *The School Community Journal, 6*(2), 27-45.

Chaudhury, N., & Parajuli, D. (2010). *Giving it back: Evaluating the impact of devolution of school management to communities in Nepal*. Unpublished manuscript, The World Bank, Washington, DC.

Chikoko, V. (2008). The role of parent governors in school governance in Zimbabwe: Perceptions of school heads, teachers, and parents. *International Journal of Education, 54*(2), 243-263.

Child Trends. (2013). *Parent involvement in schools: Indicators on children and youth, September 2013*. Bethesda, MD: Child Trends. Retrieved on September 26, 2016 from https://www.childtrends.org/

Chou, B. K. P. (2012). The paradox of educational quality and education policy in Hong Kong and Macau. *Chinese Education and Society, 45*(2), 96-110.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*, S95-120.

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse. S. (1996). The effects of summer vacation on Achievement test scores: A narrative and meta-analytic review. *Review of Educational Research, 66*(3), 227-268.

Cornwall, A. (2002). *Making spaces, changing places: Situating participation in development* (IDS Working Paper No. 170). Falmer: Institute of Development Studies, University of Sussex.

Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: Longitudinal associations between and within families. *Journal of Educational Psychology, 98*(4), 653-664.

Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *The Journal of Educational Research, 93*(1), 11-30.

Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education, 78*, 233–249.

Dzotsenidze, N. (2018). The school decentralization process in Georgia and South Africa through the lens of world culture theory: A comparative analysis. In A. W. Wiseman & P. M. Davidson (Eds.), *Cross-nationally comparative, evidence-based educational policy making and reform* (pp. 101-124). Bingley: Emerald Publishing.

Edwards, D. B., Jr., & DeMatthews, D. E. (2014). Historical trends in educational decentralization in the United States and developing countries: A periodization and comparison in the post-WWII context. *Education Policy Analysis Archives, 22*(40), 1-35.

Elder, J. W. (1976). Comparative cross-national methodology. *Annual Review of Sociology, 2*, 209-230.

Epstein, J. L. (1995). School/family/community partnerships: Caring for the children we share. *Phi Delta Kappan, 76*(9), 701-712.

Ercegovac, I. R., Koludrović, M., & Bubić, A. (2016). School governance models and school boards: Educational and administrative aspects. In N. Alfirević, J. Burušić, J. Pavičić, & R. Relja (Eds.), *School effectiveness and educational management: Towards a south-eastern Europe research and public policy agenda* (pp. 107-124). Cham: Palgrave Macmillan.

Fan, X. (2001). Parental involvement and students' academic achievement: A growth modeling analysis. *Journal of Experimental Education, 70*(1), 27-61.

Fernandez-Cano, A. (2016). A methodological critique of the PISA evaluations. *Revista Electrónica de Investigación y Evaluación Educativa, 22*(1), 1-16.

Galiani, S., Gertler, P., & Schargrodsky, E. (2008) School decentralization: Helping the good get better, but leaving the poor behind. *Journal of Public Economics 92*(10-11), 2106-2120.

Gershberg, A. I., Meade, B., & Andersson, S. (2009). Providing better education services to the poor: Accountability and context in the case of Guatemalan decentralization. *International Journal of Educational Development, 29*(3), 187-200.

Goldstein, H., & Thomas, S. M. (2008). Reflections on the international comparative surveys debate. *Assessment in Education: Principles, Policy & Practice, 15*(3), 215-222.

Gorgodze, S. (2016). Rise and fall of decentralized school governance – Decision-making practices in Georgia. *International Education Studies, 9*(11), 25-39.

Gunnarsson, V., Orazem, P. F., Sánchez, M. A., & Verdisco, A. (2009). Does local school control raise student outcomes? Evidence on the roles of school autonomy and parental participation. *Economic Development and Cultural Change, 58*(1), 25-52.

Hair, J. F., Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Essex: Pearson Education Limited.

Hantrais, L. (1999) Contextualization in cross-national comparative research. *International Journal of Social Research Methodology, 2*(2), 93-108.

Harris, D. N., & Sass, T. R. (2009). *What makes for a good teacher and who can tell*? (CALDER Working Paper 30). Washington, DC: National Center for Analysis of Longitudinal Data in Education Research.

He, J., & van de Vijver, F. (2012). Bias and equivalence in cross-cultural research. *Online Readings in Psychology and Culture, 2*(2).

Hill, N. E. & Taylor, L. C. (2004). Parental school involvement and children's academic achievement: Pragmatics and issues. *Current Directions in Psychological Science, 13*(4), 161-164.

Hinton, P. R., Brownlow, C., McMurray, I., & Cozens, B. (2004). *SPSS explained*. London: Routledge.

Ho, E. S. C. (2009). Home-school collaboration in two Chinese societies: Hong Kong and Macao. In R. Deslandes (Ed.), I*nternational perspectives on contexts, communities and evaluated innovative practices: Family-school-community partnerships* (pp. 37-49). New York: Routledge.

Hooge, E., Burns, T., & Wilkoszewski, H. (2012). *Looking beyond the numbers: Stakeholders and multiple school accountability* (OECD Education Working Papers No. 85). Paris: OECD Publishing.

Household Finance and Consumption Network (2016). *The household finance and consumption survey: Methodological report for the second wave* (ECB Statistics Paper No. 17). Frankfurt: European Central Bank.

Iftene, C. (2014). Educational systems' autonomy: Facts and analysis. *Procedia - Social and Behavioral Sciences, 142*, 47-53.

IPUMS USA (2019). *Replicate weights in the American community survey / Puerto Rican community survey.* Retrieved from https://usa.ipums.org/usa/repwt.shtml

Johnson, D. R., & Young, R. (2011). Toward best practices in analyzing datasets with missing data: Comparisons and recommendations. *Journal of Marriage and Family, 73*(5), 926-945.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement. 20*, 141–151.

Khan, S. R. (2003). Participation via collective action in government and NGO schools in Pakistan. *Development in Practice, 13*(4), 361-376.

Kohn, M. L. (1987). Cross-national research as an analytic strategy. American Sociological Association, 1987 presidential address. *American Sociological Review, 52*(6), 713-731.

Kreuter, F., & Valliant, R. (2007). A survey on survey statistics: What is done and can be done in Stata. *The Stata Journal, 7*(1), 1-21.

Lareau, A. (1987). Social class differences in family-school relationships: The importance of cultural capital. *Sociology of Education, 60*(2), 73-85.

Lee, J. H., & Huber, J., Jr. (2011). *Multiple imputation with large proportions of missing data: How much is too much?* United Kingdom Stata Users' Group Meetings 2011 23, Stata Users Group.

Leithwood, K., & Menzies, T. (1998). Forms and effects of school-based management: A review. *Educational Policy, 12*(3), 325-346.

Marshall, J. H., & Bunly, S. (2017). School grants and school performance in rural Cambodia, *Journal of Development Effectiveness, 9*(3), 305-328.

McNeal, R. B., Jr. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces 78*(1), 117-144.

McNeal, R. B., Jr. (2012). Checking in or checking out? Investigating the parent involvement reactive hypothesis. *The Journal of Educational Research, 105*(2), 79–89.

McQueen, J., & Mendelovits, J. (2003). PISA reading: Cultural equivalence in a cross-cultural study. *Language Testing, 20*(2), 208-224.

Morris, T. P., White, I. R., & Royston, P. (2014). Tuning multiple imputation by predictive mean matching and local residual draws. *BMC Medical Research Methodology, 14*(75).

Muskin, J. A. (1999). Including local priorities to assess school quality: The case of Save the Children Community Schools in Mali. *Comparative Education Review, 43*(1), 36-63.

OECD (2009). *PISA data analysis manual: SPSS® second edition*. Paris: OECD Publishing.

OECD (2017a). *PISA-based test for schools: Technical report 2016*. Paris: OECD Publishing.

OECD (2017b). *PISA 2015 technical report*. Paris: OECD Publishing.

Park, S., & Holloway, S. D. (2017). The effects of school-based parental involvement on academic achievement at the child and elementary school level: A longitudinal study. *The Journal of Educational Research, 110*(1), 1-16.

Ponce, J. (2006). *The impact of a school-based management program on students' cognitive achievement: A case study of Redes Amigas in rural Ecuador*. FLASCO-Ecuador.

Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy, 6*(1), 65-78.

Ross, C. E., & Wu, C. (1995).The links between education and health. *American Sociological Review, 60*, 719-745.

Rutkowski, D., & Rutkowski, L. (2013). Measuring socioeconomic background in PISA: One size might not fit all. *Research in Comparative and International Education, 8*(3), 259-278.

San Antonio, D. M. (2008). Creating better schools through democratic school leadership. *International Journal of Leadership in Education, 11*(1), 43-62.

Santibañez, L., Abreu-Lastra, R., & O'Donoghue, J. (2014). School based management effects: Resources or governance change? Evidence from Mexico. *Economics of Education Review, 39*, 97-109.

Shatkin, G., & Gershberg, A. I. (2007). Empowering parents and building communities: The role of school-based councils in educational governance and accountability. *Urban Education, 42*(6), 582-615.

Shumow, L., & Miller, J. D. (2001). Parents' at-home and at-school academic involvement with young adolescents. *The Journal of Early Adolescence, 21*, 68–91.

Social Science Computing Cooperative (2013). *Multiple imputation in Stata: Deciding to impute*. University of Wisconsin – Madison. Retrieved from https://www.ssc.wisc.edu/sscc/pubs/stata_mi_decide.htm.

Sonnenschein, S., Metzger, S. R., & Thompson, J. A. (2016) Low income parents' socialization of their preschoolers' early reading and math skills. *Research in Human Development, 13*(3), 207-224.

StataCorp (2017). *Stata multiple-imputation reference manual: Release 15*. College Station, TX: A Stata Press publication.

Stewart, A. J., & McDermott, C. (2004). Gender in psychology. *Annual Review of Psychology, 55,* 519-544.

Sui-Chu, E. H., & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education, 69*(2), 126–141.

Swift-Morgan, J. (2006). What community participation in schooling means: Insights from Southern Ethiopia. *Harvard Education Review, 76*(3), 339-368.

Taber, K. S. (2018). The use of Cronbach's Alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*, 1273-1296.

Talley, W. K., & Keedy, J. L. (2006). Assessing school council contribution to the enabling conditions for instructional capacity building: An urban district in Kentucky. *Education and Urban Society, 38,* 419-454.

The Methodology Center (2018). *Multiple imputation and survey weights*. Pennsylvania State University. Retrieved from https://www.methodology.psu.edu/resources/ask/mi-weights/

The World Bank (2014). *Georgia: Technical assistance to support preparation of education sector strategy: Education sector policy review: Strategic issues and reform agenda*. Washington, DC: The World Bank.

UNESCO (2008). *EFA Global Monitoring Report 2009. Overcoming inequality: Why governance matters*. Paris: UNESCO Publishing.

UNESCO (2013). *The global learning crisis: Why every child deserves a quality education*. Paris: UNESCO.

UNESCO (2014). *EFA Global Monitoring Report 2013/4. Teaching and learning: Achieving quality for all*. Paris: UNESCO Publishing.

UNESCO (2015a). *Education 2030: Incheon declaration and framework for action for the implementation of Sustainable Development Goal 4*. Paris: UNESCO.

UNESCO (2015b). *EFA Global Monitoring Report 2015. Education for all 2000-2015: Achievements and challenges*. Paris: UNESCO Publishing.

UNESCO Institute for Statistics (2018a). *Sills and innovation in G20 countries*. Montreal: UNESCO Institute for Statistics.

UNESCO Institute for Statistics (2018b). *UIS.Stat*. Montreal: UNESCO Institute for Statistics. Retrieved from http://data.uis.unesco.org.

van Kerm, P. (2017). *Estimation and inference for quantiles and indices of inequality and poverty with survey data*. United Kingdom Stata Users' Group Meetings 2017 12, Stata Users Group.

Williams, R. (2018). *Missing data part II: Multiple imputation & maximum likelihood*. Revised February 2, 2018. Retrieved from https://www3.nd.edu/~rwilliam/