A person wearing a red hoodie and a red beanie is seen from behind, holding a long wooden stick and pointing it towards a dark blue chalkboard. The chalkboard has some faint, illegible markings. The bottom of the image shows a wooden paneling.

SCHOOL CHOICE INTERNATIONAL

EXPLORING PUBLIC-PRIVATE
PARTNERSHIPS

Edited by Rajashri Chakrabarti
and Paul E. Peterson

School Choice International

School Choice International

Exploring Public-Private Partnerships

edited by Rajashri Chakrabarti and Paul E. Peterson

**The MIT Press
Cambridge, Massachusetts
London, England**

© 2009 Massachusetts Institute of Technology

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

For information about special quantity discounts, please email special_sales@mitpress.mit.edu.

This book was set in Palatino on 3B2 by Asco Typesetters, Hong Kong.
Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

School choice international : exploring public-private partnerships / edited by Rajashri Chakrabarti and Paul E. Peterson.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-262-03376-3 (hardcover : alk. paper)

1. School choice—Cross-cultural studies. 2. Public schools—Cross-cultural studies.

3. Charter schools—Cross-cultural studies. 4. Education and state—Cross-cultural studies. I. Chakrabarti, Rajashri. II. Peterson, Paul E.

LB1027.9.S333 2009

379.1'11—dc22

2008007297

10 9 8 7 6 5 4 3 2 1

Contents

Preface vii

- I School Choice: Worldwide Perspectives**
- 1 Perspectives in Public-Private Partnerships in Education 3**
Rajashri Chakrabarti and Paul E. Peterson
- 2 Public-Private Partnerships and Student Achievement:
A Cross-Country Analysis 13**
Ludger Wößmann
- 3 Mobilizing the Private Sector in the United States:
A Theoretical Overview 47**
Thomas J. Nechyba
- 4 The Practice of Public-Private Partnerships 71**
Norman LaRocque
- II Traditional Forms of School Choice**
- 5 Public-Private Schools in Rural India 91**
Karthik Muralidharan and Michael Kremer
- 6 School-Sector Effects on Student Achievement in India 111**
Geeta G. Kingdon
- III Public Funding of Privately Managed Schools**
- 7 School Vouchers in Colombia 143**
Eric Bettinger

- 8 The Public-Private School Controversy in Chile 165**
Cristian Bellei
- 9 The Concession Schools of Bogotá, Colombia 193**
Felipe Barrera-Osorio
- 10 Public and Private Schooling Initiatives in England 219**
Stephen Machin and Joan Wilson
- IV Conclusions**
- 11 Education Contracting: Scope of Future Research 245**
Harry A. Patrinos
- List of Contributors 259
- Index 261

Preface

The importance of school choice in education cannot be overemphasized and public-private partnerships play an important role in providing such choice all over the world. While they have received considerable attention in the United States, research on such initiatives in other parts of the world has been very limited. This book brings together a set of essays that provide a comprehensive overview and analysis of international initiatives of this kind—on the one hand, it presents essays that conduct rigorous impact evaluations of these initiatives in other countries, and on the other hand, it presents essays that provide comprehensive descriptions of the initiatives and discuss their theoretical underpinnings.

The increased role of such initiatives in today's education policy arena, and the lack of adequate understanding of the effects of such initiatives, prompted Harvard's Program on Education Policy and Governance and the World Bank to come together to organize a conference on public-private partnerships in education. The event, held at Harvard University on October 5–6, 2005, attracted many of the foremost economists, political scientists, policy makers, and practitioners with an interest in education policy. Each paper presented at the conference was critically discussed by practitioners and researchers specializing in education policy. A selected set of papers presented at this conference was subsequently revised in the light of these comments and editorial suggestions; they form this volume.

We are indebted to many people who helped us in the preparation of this volume. In addition to the authors, we would like to thank the following conference participants, presenters, and discussants for their valuable comments, suggestions, and critical discussions of the papers: Joshua Angrist, Carl Bistany, Xiaonon Cao, Jorge Cela, Christopher Cerf, John Chubb, Paul Dovere, Susan Dynarski, Guy Elena, Ronald

Ferguson, Chester Finn, Ariel Fiszbein, Roland Fryer, Edward Glaeser, Charles Glenn, Stephen Goldsmith, Isabel Guerrero, Frederick Hess, William Howell, Caroline Hoxby, Brian Jacob, Pablo Jaramillo, Thomas Kane, Elizabeth King, Michael Latham, Bridget Terry Long, Frank Lysy, José Mora, Neil McIntosh, Richard Murnane, Ronald Perkinson, George Psacharopoulos, Richard Romano, Robert Taylor, Carlos Vélez, Martin West, and Richard Zeckhauser. We would also like to thank the minister of education of Colombia, Cecilia Maria Vélez White, for her insightful speech at the conference.

We gratefully acknowledge financial support for the conference from the Center for British Teachers (CfBT), International Finance Corporation, John M. Olin Foundation, Harvard's Program on Education Policy and Governance, Taubman Center for State and Local Government at the John F. Kennedy School of Government of Harvard University, the World Bank, and the World Bank Institute. We are thankful to Antonio Wendland, associate director of the Program on Education Policy and Governance, for his invaluable help in organizing the conference, and also to Mark Linnen of the Program on Education Policy and Governance, and Suzanne Roddis of International Finance Corporation for their able assistance.

I School Choice: Worldwide Perspectives

1 Perspectives in Public-Private Partnerships in Education

Rajashri Chakrabarti and Paul E. Peterson

The undeniable importance of human capital for economic growth has made its accumulation a top priority in developing and developed countries alike. To further that goal, many have looked ever more closely at the contributions that can be made by public-private partnerships in the field of education. Indeed, there has been a burgeoning of such initiatives across the world—from Latin America to Asia, New Zealand, and Australia to Europe and North America. They vary importantly in their forms and structures as well as in the extent of public and private participation. Understanding the different forms of such partnerships and the role they play in the production and delivery of education is crucial, if broader policy implications are to be teased out. Yet apart from initiatives in the United States, careful documentation and systematic evaluation of their impact has been scattered, with very little attention paid to bringing together in a coherent fashion the work that is being done. The essays in this volume are designed to take some initial steps in this direction as well as to instigate further exploration and research.

Resources and management are two of the main factors that give shape to a school, Ludger Wößmann points out in chapter 2. Considering just these two critical factors, public-private partnerships can be divided into four broad categories, as shown in figure 1.1—publicly funded resources that are publicly managed, privately funded resources that are privately managed, publicly funded resources that are privately managed, and privately funded resources that are publicly managed. Schools in the first group constitute the most conventional form of public schools, while the second group constitutes the private schools. Unlike these two categories, the third category of initiatives requires both public and private participation. Some examples of such partnerships discussed in this book are vouchers in the United States,

		Management	
		Public	Private
Funding	Public	Public Schools	Vouchers, Charters, Concession Schools, City Academies
	Private	Government Tuition Schools	Private Schools

Figure 1.1

A Typology of the Interconnection between Public and Private Sectors in Education

Chile, and Colombia; charter schools in the United States; concession schools in Colombia; and city academies in the United Kingdom (see figure 1.1). Publicly funded and privately managed schools are also often considered to be public. For example, publicly funded schools in Britain managed by churches or synagogues are regarded as public schools. Charter schools in the United States are also considered public schools, though the first group of schools (publicly funded, publicly managed) is regarded as the traditional form. Unless otherwise stated, “public schools” in this volume will refer to this first group of schools. Publicly funded privately managed schools can in turn be divided into two subcategories: schools where the nongovernmental authority approached the state for funding (example, many schools in France are managed by the Catholic Church) and schools where private authorities have been invited to manage. The second subcategory includes charter schools, concession schools, and city academies. The final category of initiatives (privately funded, publicly managed) is less common, and consists of government tuition schools where the government manages the schools and families pay tuition to attend them. As Wößmann points out, these are mainly found in Mexico, but also to a lesser extent in Italy, New Zealand, Brazil, and Greece.

Part I of this volume provides a series of broad, overarching assessments of the promise that public-private partnerships provide. Parts II and III focus on specific partnerships in particular countries. The chapters in part II examine the most conventional division between the public and private sector—publicly financed and managed schools

versus privately financed and managed schools. Chapters in part III evaluate initiatives that are publicly funded but privately managed.¹

Following this introductory chapter, part I consists of three chapters. Chapter 2 provides a big-picture scenario of the efficacies of these different forms of public-private partnerships. In an instructive cross-country analysis using student-level data from the Program for International Student Assessment (PISA) international test, Wößmann finds that public school operation is associated with lower student outcomes, but public school funding with higher student outcomes. Thus public-private partnership systems that combine private operation with public funding are the most efficient, while systems that combine public operation with private funding are less so.

Chapter 3 by Thomas Nechyba provides a penetrating analysis of the arguments behind mobilizing the private sector for public education. He starts with the public school choice and private school choice systems, and their efficiency and equity aspects of these systems. Then he moves on to vouchers, the most common form of publicly funded and privately managed initiative in education. He shows that the form of the voucher and the underlying conditions in the economy are key determinants of how vouchers affect schools and students—differences in these factors can have vastly different effects on these agents. He argues that effective design of voucher proposals can go a long way to enhance both the efficiency and equity aspects of an educational system.

Chapter 4 by Norman LaRocque provides an excellent overview of international examples of different types of public-private partnerships. It is especially valuable for any policy maker or researcher interested in examples of public-private initiatives in education. These initiatives differ in forms, structure, and scope, and hence are likely to have different effects on schools, students, and teachers. LaRocque considers experiences in Australia, Brazil, Colombia, Côte d'Ivoire, Germany, Lebanon, the Netherlands, New Zealand, Philippines, Venezuela, the United Kingdom, and the United States.

Part II of this volume brings together country-specific studies that focus on the first two types of schools: public and private. Using data from an elaborate nationally representative survey of rural private schools in India, in chapter 5 Karthik Muralidharan and Michael Kremer find that private schools are much less likely to be plagued by teacher absenteeism than public schools, although private school teacher salaries are considerably lower than those in public schools. A

possible answer to this apparent puzzle is that head teachers in private schools are much more likely to take disciplinary actions against shirking teachers, while such actions are virtually absent in public schools. The authors go on to compare school facilities, teacher characteristics, student and parent characteristics, and student achievement in these two types of schools, to consider relative efficacies of these two sectors in providing education in India.

Chapter 6 in part II also focuses on India. Geeta G. Kingdon compares the achievement and cost effectiveness of the different types of schools in India: public schools, private schools, and aided (publicly funded, privately managed) schools. She finds that private schools are considerably better than public schools on both counts. She also argues that the passage of several acts in the early 1970s led to a draining of accountability from the aided schools so that they became virtually indistinguishable from the public schools.

Part III focuses on publicly funded, privately operated initiatives. The most well known of such initiatives are publicly funded voucher programs, and the most hotly debated ones are found in the United States. The first such program in the United States, the Milwaukee Parental Choice Program (MPCP), was implemented in 1990. The program made low-income families residing in the city of Milwaukee, Wisconsin, eligible for vouchers that enabled them to move to private schools. While the program started small, with less than 1 percent of the city's students, it has grown steadily in size. In the 2005–06 school year around 15 percent of the students availed themselves of vouchers under the program.

The Milwaukee program was closely followed by the Cleveland Scholarship and Tutoring program in 1996 that made low-income students in Cleveland, Ohio, eligible for vouchers to move to private schools. Moreover, Ohio recently enacted a statewide voucher program that allows students in failing schools to enroll in private schools using publicly funded vouchers from the 2006–07 school year.

The third publicly funded voucher program in the United States was established in the state of Florida in 1999. Unlike the two previously enacted programs, the Florida Opportunity Scholarship program made students in failing schools eligible for vouchers to move to private and higher performing public schools. (A January 2006 ruling of the Florida Supreme Court found the movement to private schools with vouchers unconstitutional; however, students in failing schools can still move to higher performing public schools.) The first federally funded

voucher program in the United States was established in Washington, D.C., in 2004. Like the Milwaukee and Cleveland programs, this program made low-income students residing in D.C. eligible for vouchers to move to private schools. There is a considerable body of literature that studies publicly funded voucher programs in the United States. This literature mainly focuses on two issues: the effect on students who utilize vouchers² and the competitive effect of vouchers on public schools.³

Publicly funded vouchers are also found in Colombia and Chile. Chapters 7 and 8 in part III consider the effect of vouchers in these two countries on students and schools. While the U.S. experience with vouchers has been mostly in terms of small experiments and pilot programs restricted to specific cities or states, in both Colombia and Chile, vouchers have been implemented on a large-scale, country-wide basis, which makes these two chapters all the more instructive.

In chapter 7, Eric Bettinger analyzes the effect of school vouchers in Colombia on student outcomes. In 1991, Colombia implemented a voucher program that made private school vouchers available to low-income students entering sixth grade, the start of Colombian secondary school. The program also mandated the use of lotteries whenever the demand for vouchers exceeded supply. Since the demand always exceeded supply, the program generated two groups of students—one group was randomly selected to receive vouchers (the treatment group), the other randomly rejected (the control group). Taking advantage of this random design, Bettinger reports that voucher lottery winners scored higher on standardized exams, were more likely to have attended private school, were less likely to have repeated a grade, and in the longer run were more likely to have taken a college entrance exam and score higher in this exam.

While results from Colombia show considerable promise, the effects in Chile are much less clear. In chapter 8, Cristian Bellei looks at the effect of vouchers in Chile on student outcomes. Bellei starts with a careful review of the Chilean literature on vouchers, pointing out the discrepancies among the various studies and their merits and limitations. He points out that different studies on vouchers in Chile have reached very different conclusions. He argues that this can be attributed to the studies' differences in methodologies; data limitations in some of the studies; and differences in researchers' abilities to include appropriate controls and interaction effects, and to control for various biases such as selection bias. Chapter 8 highlights the immense

importance of using correct empirical methodology and high-quality data in impact evaluation analyses. Given the continuing methodological debate, it remains a matter of interpretation whether the Chilean experience with vouchers has been positive or negative.

While vouchers publicly fund private schools with but minimal oversight and regulation, another form of public-private partnership involves a more direct supervisory role for the government. Once again, the most well known of such initiatives, the charter school, are to be found in the United States. Charter schools are privately managed entities that must receive a governmental charter in order to operate. Their charter typically runs for five years, at which point the authority that granted the charter may renew it. The first charter school opened its doors in Minneapolis-St. Paul in 1992; today there are more than 3,500 charter schools in the United States, enrolling more than one million students. A number of studies have looked at the effect of charter schools in the United States on students who move to these schools.⁴ In contrast, research on such initiatives in other parts of the world has been very limited. In part IV, chapters 9 and 10 bring together evidence on such initiatives in two countries, Colombia and the United Kingdom.

The concession schools program was implemented in Bogotá, Colombia, in 1999. In chapter 9, Felipe Barrera-Osorio studies the effect of this initiative in Colombia on student outcomes in concession schools compared to nearby public schools. Using propensity score matching, Barrera-Osorio finds that dropout rates were lower and test scores higher in concession schools in comparison to similar public schools. Further, he presents evidence that competition from concession schools has led to a decline in dropout rates in the public schools.

In chapter 10, Stephen Machin and Joan Wilson present evidence from a high-profile public-private initiative in the United Kingdom. The city academies program, implemented in 2000, authorized the establishment of academies that represented partnerships between the central government and private sector sponsors. These academies mainly serve the socially and academically disadvantaged, and the objective of the policy was to raise the educational standards of these groups of students. In their study, Machin and Wilson analyze the effect of these city academies on student achievement. Matching the academy schools to an appropriate group of public schools and taking into account pre-policy time trends, the authors find that there is no short-run positive-impact effect of academy status. However, they

point out that the program is still in its very early phase and a more conclusive picture is likely to be obtained a few more years into the program.

In the concluding chapter of this book, Harry A. Patrinos reviews the evidence on the impact of educational contracting in both developing and developed countries, including vouchers, charter schools and their variants in different countries, and private finance of school infrastructural arrangements. He suggests that research on these initiatives in developing countries is still very limited, and calls for rigorous impact evaluations.

We believe that the chapters that follow give us important insights relating to the different kinds of educational choice prevailing in other countries. Combining informative descriptions of such programs along with rigorous policy evaluations, the essays provide a balanced and comprehensive look at this very important strand of educational initiatives in other parts of the world.

Overall, the results seem very promising. While Nechyba in chapter 3 shows that private school vouchers have the potential to raise both equity and efficiency, Wößmann's study (chapter 2) shows that publicly funded, privately managed initiatives provide an effective means of improving cognitive outcomes of students, and Bettinger (chapter 7) and Barrera-Osorio (chapter 9) respectively provide evidence that two forms of public-private partnerships in Colombia have led to improvements of educational outcomes for the students involved. The chapters by Muralidharan and Kremer (chapter 5) and Kingdon (chapter 6) show similar promising findings for private schools in India. Although the establishment of explicit public-private partnerships (under the "Right to Education" Bill) is still being vigorously debated in India, the comparative efficiency of the private sector implies that such initiatives hold considerable promise there.

The results from Chile and the United Kingdom are, however, much less definitive. The English city academies program is still in its very early stages and it is too early to say anything conclusive as to its impacts. The Chilean program, however, has been in operation for a long time. In the absence of random assignments of students between public and voucher schools (as is the case in Chile), it is very difficult to accurately determine whether or not voucher schools are more effective than public schools. While Bellei's essay (chapter 8) constitutes an improvement over some of the existing literature on Chile, even his most preferred specifications are likely to suffer from endogeneity

bias.⁵ As a result, the results from the Chilean study cannot be considered as conclusive. However, this study does an excellent job of demonstrating that results are often sensitive to the methodology and data used by researchers, which in turn points to the importance of choosing the correct methodology and data.

The findings of the chapters that follow suggest that the effects of a program depend crucially on the conditions under which it is implemented, the design of the specific policy, as well as the design of the empirical methodology. While the chapters in this volume provide important and valuable insight into public-private partnerships in education under various situations and in various countries, we need much more research before we can understand in a conclusive manner the effects of different kinds of initiatives.

Notes

Chakrabarti was a postdoctoral fellow at Harvard University in the John F. Kennedy School of Government's Program on Education Policy and Governance when work on this chapter and book was initiated.

1. While Barrera-Osorio's chapter on concession schools also considers the effect on dropout rates, the outcome measure mainly considered in this volume is student test scores. This is not to say that other measures are not important, but this is an area where research is very limited and further research on other outcome measures would certainly help our understanding of the effect of such partnerships. Also, "choice" in this volume mainly refers to choice between schools. However, there are other kinds of choices involved in the delivery of education, for example, choice of text books, choice of test preparation service and materials, choice of the consulting firm or the contracting firm for various services, etc. Again, these are beyond the scope of this volume. Finally, the chapters are limited to primary and secondary education, though choice pervades not only these two sectors, but also other sectors of education such as higher education, vocational education, and technical education. These caveats should be kept in mind while reading the chapters that follow.

2. See John F. Witte, Troy D. Sterr, and Christopher A. Thorn, Fifth year report: Milwaukee Parental Choice Program, mimeo, University of Wisconsin, 1995; John F. Witte, Christopher A. Thorn, Kim M. Pritchard, and Michele Claibourn, Fourth year report: Milwaukee Parental Choice Program, mimeo, University of Wisconsin, 1994; Jay P. Greene, Paul E. Peterson, and Jiangtao Du, The effectiveness of school choice: The Milwaukee experiment, Harvard University, Program on Education Policy and Governance working paper, PEPG No. 97-1, 1997; Cecilia E. Rouse, Private school vouchers and student achievement: An evaluation of the Milwaukee voucher program, *Quarterly Journal of Economics* 113 (2): 553-602; Kim K. Metcalf, Natalie A. Legan, Kelli M. Paul, and William J. Boone, Evaluation of the Cleveland scholarship and tutoring program, 1998-2003, Indiana University School of Education, 2004; Paul E. Peterson, William G. Howell, and Jay P. Greene, Evaluation of the Cleveland voucher program after two years, Harvard University, Program on Education Policy and Governance working paper, PEPG No. 99-02, 1999; Jay P. Greene, William G. Howell, and Paul E. Peterson, Lessons from the Cleve-

land scholarship program, in Paul E. Peterson and Bryan C. Hassel (eds.), *Learning from School Choice* (Washington, D.C.: Brookings Institution, 1998); Patrick J. Wolf, Babette Gutmann, Nada Eissa, Michael Puma, and Marsha Silverberg, *Evaluation of the DC Opportunity Scholarship Program: First Year Report on Participation*, U.S. Department of Education, National Center for Education Evaluation and Regional Assistance (Washington, D.C.: U.S. Government Printing Office, 2005). For a comprehensive analysis and lessons from school choice in New Zealand, see Edward B. Fiske and Helen F. Ladd, *When Schools Compete: A Cautionary Tale* (Washington, D.C.: Brookings Institution, 2000).

3. See Caroline M. Hoxby, School choice and school productivity (Or, could school choice be the tide that lifts all boats?), in Caroline M. Hoxby (ed.), *The Economics of School Choice* (Chicago: University of Chicago Press, 2003); Caroline M. Hoxby, School choice and school competition: Evidence from the United States, *Swedish Economic Policy Review* 10 (2003); Rajashri Chakrabarti, Can increasing private school participation and monetary loss in a voucher program affect public school performance? Evidence from the Milwaukee voucher experiment, forthcoming, *Journal of Public Economics*; Jay P. Greene and Marcus Winters, When schools compete: The effects of vouchers on Florida public school achievement, Education Working Paper 2, Manhattan Institute, 2003; Jay P. Greene, *An evaluation of the Florida A-Plus Accountability and School Choice Program* (New York: Manhattan Institute for Policy Research, 2001); Rajashri Chakrabarti, Impact of voucher design on public school performance: Evidence from the Florida and Milwaukee voucher programs, mimeo, Harvard University, Program on Education Policy and Governance, 2004; David Figlio and Cecilia Rouse, Do accountability and voucher threats improve low-performing schools?, *Journal of Public Economics* 90 (2006): 239–255; Martin R. West and Paul E. Peterson, The efficacy of choice threats within school accountability systems: Results from legislatively induced experiments, *The Economic Journal* 116 (2006): C46–C62; Rajashri Chakrabarti, Vouchers, public school response and the role of incentives: Evidence from Florida, mimeo, Harvard University, Program on Education Policy and Governance, 2006. For a comprehensive review of this literature, and the literature on privately funded voucher programs in the United States, see William G. Howell and Paul E. Peterson with Patrick J. Wolf and David E. Campbell, *The Education Gap: Vouchers and Urban Schools*, revised edition (Washington, D.C.: Brookings Institution, 2006); and see William G. Howell and Elena Llaudet, School vouchers, *International Encyclopedia of the Social Sciences*, second edition (Framington Hills, MI: MacMillan Reference USA/Thomas Gale, 2007), for a review of the U.S. and international literature.

4. Eric P. Bettinger, The effect of charter schools on charter students and public schools, *Economics of Education Review* 24 (2005): 133–147; Robert Bifulco and Helen F. Ladd, The effects of charter schools on student achievement: Evidence from North Carolina, *Education Finance and Policy* 1 (2006): 50–90; Eric A. Hanushek, John F. Kain, and Steven G. Rivkin, The impact of charter schools on academic achievement, Hoover Institution, Stanford University, 2002; Bryan Hassel, Charter school achievement: What we know, Charter School Leadership Council, 2005; Robin J. Lake and Paul T. Hill (eds.), *Hopes, fears, and reality: A balanced look at American charter schools in 2005*, Center on Reinventing Public Education at the University of Washington, 2005; Caroline M. Hoxby and Jonah E. Rockoff, The impact of charter schools on student achievement, <<http://post.economics.harvard.edu/faculty/hoxby/papers/hoxbyrockoff.pdf>>, 2004; Caroline M. Hoxby and Jonah E. Rockoff, The truths about charter schools: Findings from the City of Big Shoulders, *Education Next* (Fall 2005); Robert Bifulco and Helen F. Ladd, The truths about charter schools: Results from the Tar Heel State, *Education Next* (Fall 2005).

5. Some of the explanatory variables, such as *books at home*, *school mean books at home*, *% selected students in school*, and *selected student* are likely to be correlated with unobserved characteristics of families and schools and hence endogenous.

2 Public-Private Partnerships and Student Achievement: A Cross-Country Analysis

Ludger Wößmann

The issue of public-private partnership (PPP) is a much-debated topic, and increasingly so in the education sector (for examples, see Human Development Network 2001; Peterson 2003). However, given that PPPs are mostly either project-based endeavors or systemic features of whole education systems, evidence usually comes only in the case-study form (e.g., World Bank 2004, chapter 7; Patrinos 2000, 2002). This chapter, by contrast, uses the opportunities of internationally comparable data to provide cross-country evidence on the association between student achievement and PPPs across different countries. The Program for International Student Assessment (PISA) tested students' basic skills in math, reading, and science in an internationally comparable way. The PISA microdatabase is unique among recent international tests in containing information for each tested school both about whether it is publicly or privately operated and about what share of its funding comes from public and private sources. These data provide the opportunity of presenting "big picture" cross-country evidence on PPPs in schooling.

Such an international perspective carries two particular advantages relative to analyses within a country. First, comparisons across countries allow for the recognition of systemic effects, in that the existence of private schools may affect the behavior and performance of nearby public schools. If public schools behave differently because there are private schools nearby, then there may be effects of private involvement even though the performance between individual private and public schools may not differ. Cross-country evidence can detect such systemic effects where both private and public schools may perform at a higher level because of the existence of private competition. The second advantage of cross-country evidence is that it allows analyzing

possible differences in the effects of PPPs when they exist in different situations.

In basically all countries, the ultimate responsibility and supervision of the school system remain with the state—whether the system makes use of PPPs or not. But beneath this state supervision, both the operation and the funding of schools may show differing shares of public versus private involvement. If we think of school operation and school funding as the two broad tasks under consideration, and if we understand PPPs as any collaboration between public and private entities, then conceptually there are two specific ways in which PPPs can exist in the school system. In the first case, schools are operated (managed) by a public entity, but draw heavily on private funding—that is, parents have to pay tuition fees. In the second case, schools are operated by a private entity—be it a business, the church, or other—but get most of their funding from a public entity—be it through base funding or vouchers.

As figure 2.1 shows, both forms of PPPs exist in a system-wide manner.¹ In the first type of PPP, prevalent in the systems in the top left quadrant of figure 2.1, the majority of schools are operated by private entities, but all schools receive the vast majority of their funding from public sources. This combination is given in the Netherlands, Belgium, Ireland, and, to a lesser degree, in Denmark. The second type of system-wide PPP combines a high share of public operation with a relatively low share of public funding. This combination of private financing of publicly managed schools, depicted in the bottom right quadrant of figure 2.1, exists particularly in Mexico, but to a lesser extent it can also be observed in Italy, New Zealand, Brazil, and Greece.

Figure 2.1 depicts two more groups of countries that do not constitute partnerships between the public and the private, but rather are mostly private or purely public. The systems in the bottom left quadrant combine relatively low shares of public operation and public funding. This is true in Korea, where about half of both operation and funding is private, and to a lesser extent in Japan, France, and Spain. Finally, in the systems in the top right quadrant, the vast majority of schools is both publicly operated and publicly funded. This is particularly true in Norway, Iceland, Finland, Sweden, Latvia, and Germany. But actually, most countries have the vast majority of their schools both publicly operated and publicly funded. Both in terms of the share of publicly operated schools and in terms of the average share of pub-

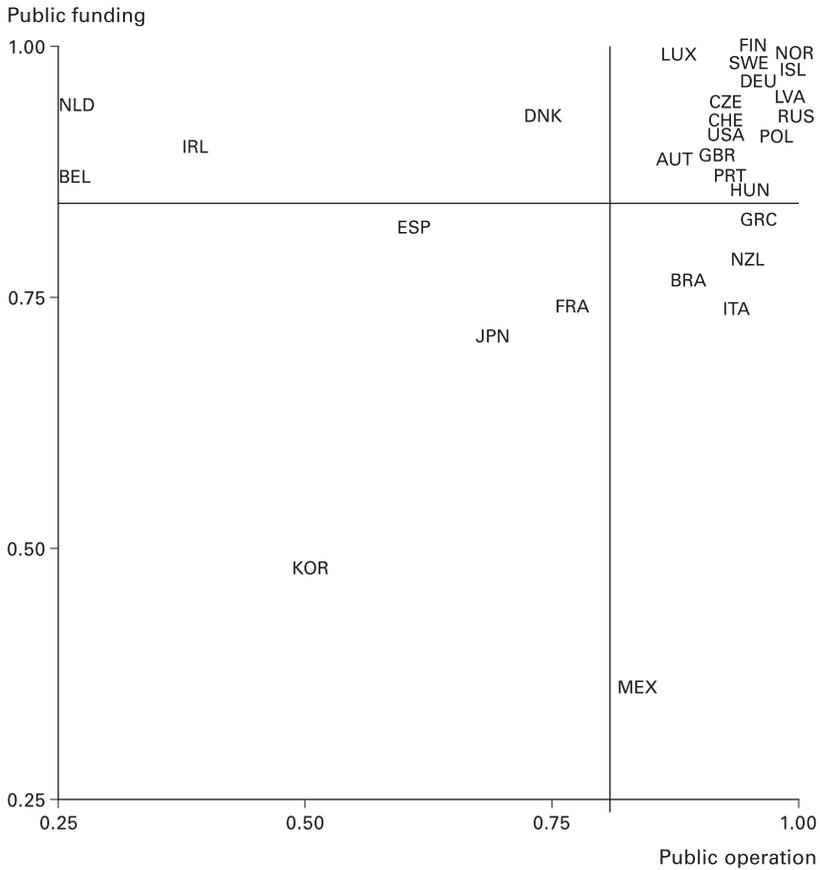


Figure 2.1

Public Funding and Public Operation of Schools

Note: Average share of public funding and share of publicly operated schools in the country, respectively. The acronyms stand for: AUT: Austria, BEL: Belgium, BRA: Brazil, CZE: Switzerland, CHE: Czech Republic, DEU: Germany, DEN: Denmark, ESP: Spain, FIN: Finland, FRA: France, GBR: United Kingdom, GRC: Greece, HUN: Hungary, IRL: Ireland, ICE: Iceland, ITA: Italy, JPN: Japan, KOR: Korea, LUX: Luxembourg, LVA: Latvia, MEX: Mexico, NLD: Netherlands, NOR: Norway, NZL: New Zealand, POL: Poland, PRT: Portugal, RUS: Russian Federation, SWE: Sweden, USA: United States.

Source: Own calculations based on PISA microdatabase.

lic funding of schools, 20 out of 29 countries have more than 87% public involvement.

This chapter will analyze the efficacy of the four types of systems—private operation with public funding, public operation with private funding, substantial private operation and funding, and purely public operation and funding—in terms of student outcomes. While it will detect substantial performance differences between the different forms of systems, a quick glance at figure 2.1 already reveals that a simple division between public operation and funding on the one side and private operation and funding on the other side does not seem to be fundamentally decisive for student performance. For example, two well-known top performers in PISA, Finland and Korea, characterize the opposite systems of sole public responsibility (100% public funding and 97% publicly operated schools in Finland) and large private involvement (51% private funding and 49% privately operated schools in Korea). But we will see that the more intricate combination of public and private involvement in the two forms of PPPs seems to have important consequences for students' educational performance.

While there are the discussed advantages of cross-country evidence, it also has shortcomings. Despite the extensive information on family and school background that allows accounting for other observable influence factors, thereby allowing the comparing of students who are equal in terms of other observable characteristics, the international student achievement test still provides observational data. In this data, private involvement is not randomly divided between a treatment group that has private involvement and a control group that does not. Therefore, in contrast to randomized experimental evidence, the evidence presented here has to be interpreted cautiously in terms of descriptive conditional correlations, which do not necessarily allow for causal inferences because they may also reflect effects of other, unobservable characteristics. Still, the multivariate analysis goes substantially beyond bivariate correlations in terms of detecting underlying relationships by disentangling these relationships from other observable influences at the student level. Furthermore, as will be discussed in section 2.3.1, theory offers some guidance as to which direction some of the main sources of potentially remaining bias in the presented “higher-level descriptives” point, which can help in the interpretation of results. But ultimately, remaining bias due to selection on unobservables cannot be ruled out.

While this chapter goes into the question of effects of different forms of private involvement in some detail, it should also be clarified right from the start what the chapter is *not* about. The topic here is explicitly the *effectiveness* of PPPs in providing *cognitive* skills for students. Therefore, this chapter does not deal with questions of efficiency (for which relative costs would have to be taken into account), or with questions of equity of school systems with differing private involvement, or with questions of the provision of noncognitive skills. While it goes without saying that all these issues are of tremendous importance, they go beyond the scope of this chapter.

2.1 Public and Private Involvement in Schooling around the World

Before we describe the models and econometric evidence, this section provides some background on the international data as well as some more thorough descriptive patterns of public and private involvement in schooling around the world.

2.1.1 The PISA Database

The database of the Program for International Student Assessment (PISA) distinguishes itself from previous international tests by providing data both on whether individual schools are publicly or privately operated and on what shares of schools' funding stems from public and private sources. PISA is an international student achievement test of representative random samples of 15-year-old students conducted in 2000 by the Organisation for Economic Co-Operation and Development (OECD). The study tested student performance in math, reading, and science in 32 developed and emerging countries, 29 of which can be used in this chapter.² The OECD ensured a consistent and coherent study design and as much comparability as possible among the participating countries.³

The PISA 2000 study had a special focus on the reading literacy of students, with a sample size of the database used here of 130,242 students. The sample sizes in the other two academic subjects are 72,493 students in math and 72,388 students in science. In this chapter, the main focus will be on reading performance—because of the larger sample size—and on math performance, which is generally viewed as being most readily comparable across countries. Also, math performance has often been found to be most strongly related to productivity

(e.g., Bishop 1992). The specific student-level database used in this chapter was constructed by Fuchs and Wößmann (2007), who provide more detailed information and notes on the specific database. They combine the test results with rich background information on students and schools from PISA background questionnaires answered by the specific students and heads of schools tested in PISA and with additional country-level data.⁴

As general background on the data, table 2.1 provides descriptive statistics for each country on the level and variation of test performance in the three subjects. The test results were scaled on a score with an OECD mean of 500 points and an OECD standard deviation of 100 points. In all data descriptions and analyses presented in this chapter, only students in schools that had both data on private versus public operation and on the share of private versus public funding were included. The sample size stands at an average of 4,500 students in 168 schools per country.

2.1.2 Differing Patterns of Public and Private Funding and Operation

In the PISA database, data on public versus private operation of schools comes in the form of a dummy that classifies each school as either public or private. In the school background questionnaire, a public school was defined as “a school managed directly or indirectly by a public education authority, government agency, or governing board appointed by government or elected by public franchise.” A private school, by contrast, was defined as “a school managed directly or indirectly by a non-government organization; e.g., a church, trade union, businesses, other private institutions.”

Data on public versus private funding of schools is recorded as the respective share of total funding coming from public and private sources. Heads of school were asked, “About what percentage of your total funding for a typical school year comes from the following sources?” with the answer categories “Government (includes departments, local, regional, state and national),” “Student fees or school charges paid by parents,” “Benefactors, donations, bequests, sponsorships, parent fund raising” and “Other.” For our purposes here, only the first category was classified as public funding, and the remaining sources as private funding.

Descriptive statistics on the share of publicly operated schools and the average share of public funding in each country, already visualized

in figure 2.1, are provided in table 2.2. On average across the 29 countries, 83% of schools are publicly operated, and the remaining 17% are managed by a private entity. But the share of publicly operated schools varies substantially across countries, with Belgium (25%) and the Netherlands (26%) at the bottom end and Russia (100%), Latvia (99%), and Iceland (99%) at the top end. The average share of public funding of schools across the countries is 87%, with Mexico (37%) and Korea (49%) at the lower end and Luxembourg, Sweden, Finland, Norway, and Iceland all with a public share above 99%.

From the perspective of PPPs, it is particularly interesting to note that the shares of public involvement in operation and funding can differ substantially within a country (column M in table 2.2). At the one extreme, the public share is substantially larger in funding than in operation in the Netherlands (a difference of 69 percentage points), Belgium (63), and Ireland (52). At the other extreme, the public share can also be substantially larger in operation than in funding, as for example in Mexico (difference of 48 percentage points) and Italy (19).

It is also revealing to look at the relative shares of public funding in publicly versus privately operated schools in each country (columns N and O in table 2.2). Thus, while in most countries publicly operated schools receive nearly all of their funding from public sources, 56% of the funding of publicly operated schools in Mexico stems from private sources, and 45% in Korea. On average across all countries, the share of public funding in publicly operated schools (at 91%) is 25 percentage points higher than in privately operated schools (at 66%). The share of public funding in privately operated schools differs particularly strongly across countries, with the privately operated schools tested in Brazil, Greece, and Mexico receiving no funding at all from public sources (and those in the United Kingdom only 2%), while privately operated schools in the Netherlands, Finland, Luxembourg, and Sweden receive more than 95% of their funding from public sources.

Even more striking is the difference in public funding that publicly and privately operated schools in a country receive (column P in table 2.2). At the one extreme, the share of public funding in U.K. public schools is 96 percentage points higher than in U.K. private schools. This difference is also quite large in other countries, such as Greece (87 percentage points), Brazil (87), Poland (76), the United States (74), and Switzerland (73). At the other extreme, there is no difference at all in the share of public funding between publicly and privately operated schools in the Netherlands and Luxembourg, and the differences

Table 2.1
Test Performance and Sample Size

	Math		Reading		Science		Sample size (students) (G)	Sample size (schools) (H)	Number of privately operated schools in sample (I)	Missing in original sample ¹ (J)
	Score (A)	S.D. (B)	Score (C)	S.D. (D)	Score (E)	S.D. (F)				
AUT	515	92	507	93	519	91	4,501	203	20	5.1
BEL	520	106	507	107	496	111	6,345	203	149	4.9
BRA	334	97	396	86	375	90	3,956	256	27	19.1
CHE	529	100	494	102	496	100	5,830	269	26	4.4
CZE	498	96	492	96	511	94	5,343	228	23	0.4
DEU	490	103	484	111	487	102	4,442	192	8	12.4
DNK	514	87	497	98	481	103	4,009	208	51	5.3
ESP	476	91	493	85	491	95	5,818	174	65	6.4
FIN	536	80	546	89	538	86	4,864	155	6	0.0
FRA	517	89	505	92	500	102	4,080	153	36	12.7
GBR	529	92	523	100	532	98	8,676	337	16	7.1
GRC	447	108	474	97	461	97	4,305	144	5	7.9
HUN	488	98	480	94	496	103	4,766	183	8	2.5
IRL	503	84	527	94	513	92	3,793	137	83	1.6
ISL	514	85	507	92	496	88	3,236	125	2	4.0
ITA	457	90	487	91	478	98	4,704	161	9	5.6
JPN	557	87	522	86	550	90	5,217	134	39	0.7
KOR	547	84	525	70	552	81	4,676	137	64	6.1

LUX	446	93	441	100	443	96	3,251	22	3	7.9
LVA	463	103	458	102	460	98	3,038	123	1	22.0
MEX	387	83	422	86	422	77	3,894	156	26	15.3
NLD	556	89	530	91	527	96	2,246	89	66	10.3
NOR	499	92	505	104	500	96	3,972	165	3	4.2
NZL	537	99	529	108	528	101	3,456	144	7	5.8
POL	470	103	479	100	483	97	3,586	125	5	1.9
PRT	454	91	470	97	459	89	4,554	148	11	0.7
RUS	478	104	462	92	460	99	6,566	242	0	2.0
SWE	510	93	516	92	512	93	4,416	154	6	0.0
USA	493	98	504	105	499	101	2,947	116	6	23.4
Mean	492	94	492	95	492	95	130,487 ²	4,883 ²	771 ²	6.6

Notes: See note to figure 2.1 for a list of country acronyms.

1. Percentage of observations without information on public operation or funding. These observations are not counted in the columns on sample size.

2. Sum.

Source: Own calculations based on PISA microdatabase.

Table 2.2
International Differences in Public Funding and Public Operation of Schools

	Average share of public funding (K)	Share of publicly operated schools (L)	Difference (M)	Average share of public funding in publicly operated schools (N)	Average share of public funding in privately operated schools (O)	Difference (P)
AUT	90.4	88.8	1.6	96.2	44.2	52.1
BEL	87.5	24.6	63.0	95.1	85.0	10.1
BRA	78.0	89.4	-11.4	87.3	0.0	87.2
CHE	93.8	93.5	0.3	98.5	25.5	73.0
CZE	94.9	93.9	1.0	96.2	74.5	21.7
DEU	97.3	95.9	1.4	98.2	77.1	21.1
DNK	94.3	75.5	18.8	99.9	76.9	23.0
ESP	82.9	61.9	20.9	95.3	62.8	32.5
FIN	99.8	97.2	2.6	99.9	98.3	1.5
FRA	75.5	77.8	-2.4	77.3	69.1	8.2
GBR	89.8	90.8	-1.0	98.7	2.2	96.4
GRC	83.7	95.8	-12.0	87.4	0.0	87.4
HUN	87.4	95.3	-7.8	87.9	78.3	9.5
IRL	91.1	39.5	51.6	98.0	86.6	11.4
ISL	99.4	99.2	0.2	99.9	40.4	59.5
ITA	75.2	94.2	-19.0	79.2	10.1	69.1
JPN	72.5	69.6	2.9	88.4	36.0	52.4
KOR	49.1	50.6	-1.5	54.9	43.3	11.6
LUX	100.0	87.9	12.1	100.0	100.0	0.0
LVA	95.6	99.2	-3.6	95.7	89.0	6.7
MEX	36.8	84.5	-47.6	43.6	0.0	43.6
NLD	94.7	26.0	68.7	94.7	94.7	0.0
NOR	99.5	98.5	1.0	99.8	82.3	17.5
NZL	80.2	95.1	-14.9	83.4	18.4	65.0
POL	92.2	97.1	-4.9	94.4	18.1	76.4
PRT	87.9	92.7	-4.8	88.5	80.1	8.4
RUS	93.5	100.0	-6.5	93.5	—	—
SWE	99.9	96.6	3.3	99.9	99.3	0.6
USA	91.6	94.6	-2.9	95.6	22.1	73.6
Mean	86.9	83.0	3.9	91.2	65.9	25.4

Notes: In percent. See note to figure 2.1 for a list of country acronyms.

Source: Own calculations based on PISA microdatabase.

are also very small in Sweden (0.6 percentage points) and Finland (1.5).

2.2 Why Should the Public-Private Division Matter?

Do these cross-country differences in public versus private involvement in the operation and funding of schools matter for student achievement? From a theoretical point of view, positive and negative aspects of both operation and funding of schools by the state versus the private sector have been advanced in the literature. The main case usually made in terms of the operation of schools is that private operation is more efficient than public operation because market forces create incentives for cost containment and performance-conducive qualitative innovation in private school management (e.g., Chubb and Moe 1990; Hanushek et al. 1994; Shleifer 1998; Bishop and Wößmann 2004). In accordance with this reasoning, empirical evidence tends to find that performance in privately managed schools is superior to performance in publicly managed schools.⁵ Some of the empirical contributions also show that the existence of private schools improves the performance of nearby public schools that face their competition, an issue that complicates the empirical identification of the effects of private school operation, to which we will return.

The case in favor of public provision of schools is less clear, if we separate it from the conceptually different case of public versus private funding, in particular because the government could always write specific contracts with private providers to ensure that certain requirements are observed (cf. Shleifer 1998). However, one point sometimes advanced in favor of public provision is that only direct public provision of schooling could yield an inculcation of students with ideological and cultural goals and beliefs pursued by the government, a task that might not be easily contracted out to the private sector (e.g., Gradstein and Justman 2002; Pritchett 2003). Ideological inculcation may be an issue hard to pin down empirically, and it is certainly beyond the scope of a paper focusing on cognitive skills. But in a similar vein, direct public school operation might allow a closer monitoring of implemented curricula—although the incentives for monitoring may again be stronger in the private sector.

In terms of the relative merits of public and private funding (as opposed to operation) of schools, it is sometimes argued that private or parent-based funding can increase accountability and provide

incentives for efficient behavior from the demand side (cf. Jimenez and Paqueo 1996; Chubb and Moe 1990). It is not obvious, though, to what extent this benefit of private involvement would go beyond the benefit of private provision and the choice that parents can make between different private providers, which would already induce performance-conducive incentives from the demand side.

This latter point can even be turned into the opposite case favoring public funding, if combined with the idea that some families may be too poor to choose privately operated schools if they have to be funded privately. As long as there are credit constraints that prevent poor families from borrowing against possible future income gains of their children due to improved educational performance (cf. Loury 1981; Galor and Zeira 1993; Gradstein, Justman, and Meier 2004), poor families' choices of better schools that require higher private funding will be constrained. Public funding can relax the credit constraints, which can allow greater choice for all families and therefore increase schools' incentives to behave efficiently. The empirical evidence of positive performance effects of (mostly publicly provided) school vouchers to finance the attendance of privately operated schools (see preceding references) can be viewed as one aspect of this possible positive effect of public funding.⁶

Given the different theoretical arguments as summarized in table 2.3, we might expect the public versus private nature of the operation and funding of schools to have an impact on student achievement. The direction and size of this impact remains an empirical question, though.

2.3 The Empirical Models

This section describes the different specifications of the empirical model of the association between PPPs and student performance ana-

Table 2.3
Aspects of Public and Private Involvement in School Provision and Funding

	Positive aspects of involvement of:	
	Public sector	Private sector
Operation	Inculcation of beliefs and cultural values	Incentives for cost containment and qualitative innovation
Funding	Enabling choice for credit-constrained families	Increased accountability

lyzed in this chapter, and how they may or may not be affected by selection bias.

2.3.1 Observables, Unobservables, and the Possibility of Selection Bias

Given the separate arguments for and against public involvement in the operation and funding of schools, assume that the true achievement model includes separate effects of operation and funding and can be represented by:

$$T_i = \alpha + \beta_1 O_s + \beta_2 F_s + \mathbf{B}_i \beta_3 + \mathbf{U}_i \beta_4 + \varepsilon_i, \quad (2.1)$$

where T_i is the achievement test score of student i , O_s is a dummy showing whether the student's school s is publicly (as opposed to privately) operated, and F_s is the share of the school's funding stemming from public (as opposed to private) sources. \mathbf{B} are additional background features that can be observed, like parents' level of education, \mathbf{U} are additional features affecting performance that remain unobserved, for example parents' valuation of their children's education, and ε_i is an error term.

What are the consequences of \mathbf{B} and \mathbf{U} for our estimates of the association between public involvement and student performance? Two observations can help us understand the specific nature of one of the main sources of possible bias in our empirical models. First, given that we look at the effects of operation and funding separately, the arguments on credit constraints discussed in section 2 bear on the association between family background and funding, but not on the private versus public operation of schools. Second, families who can afford to send their children to schools that require large shares of private funding may tend to have other, often unobserved features conducive to the children's learning. For example, they may show a greater valuation of educational outcomes per se, or they may simply use their larger income also to buy private afternoon lessons for their children if they are underperforming in a given subject. Therefore, the selection bias due to credit constraints would generally make privately funded schools look better than they really are. Thus, we would expect this particular source of bias to affect estimates of funding effects rather than operation effects, and we would expect this bias to point in the direction that publicly funded schools look worse than they are. We will depict these ideas more formally before we go on to discuss other possible sources of remaining bias.

Consider first the observable background features \mathbf{B} . Following the above-mentioned theories of credit constraints, it seems reasonable to assume that \mathbf{B} will be positively related with the share of private funding in the school, that is, negatively related with F . Therefore, there will be nonzero elements in the covariance matrix between the \mathbf{B} features and F . But if $F'\mathbf{B} \neq 0$, estimating the effect of F under disregard of controls for \mathbf{B} will yield a biased estimate of the true effect β_2 of equation (2.1). However, given that we assume \mathbf{B} to be observable, we can easily control for \mathbf{B} in our regression, so that the estimated effect is no longer biased by the observables. This is the reason why we include an unusually extensive set of controls for background factors \mathbf{B} in all our empirical specifications. Specifically, the control vector \mathbf{B} of background data encompasses 60 variables, including 8 variables on student characteristics, 28 variables on students' family background, 14 variables on resource inputs at home and at school, and 10 variables on institutional features of the school system.⁷

Now, consider the unobserved background features \mathbf{U} . If the covariance matrix $F'\mathbf{U} \neq 0$, estimating the funding effect under disregard of controls for \mathbf{U} yields the following biased estimate γ , using the standard formula for omitted-variable bias (cf., e.g., Greene 2000, p. 334):

$$E(\gamma) = \beta_2 + [(F_s F_s)^{-1} F_s' \mathbf{U}_i] \beta_4. \quad (2.2)$$

Assuming for the moment only one unobserved variable U_i , we can also write:

$$E(\gamma) = \beta_2 + \frac{\text{cov}(F_s, U_i)}{\text{var}(F_s)} \beta_4. \quad (2.3)$$

This derivation allows us to pin down the likely direction of the bias that emanates from credit constraints. The estimate γ will be *lower* than the true effect β_2 of equation (2.1) if β_4 is positive and $\text{cov}(F_s, U_i)$ is negative. And this is likely to be the case in this particular application. Let's say that U_i is (unmeasured) parents' valuation of education. Then β_4 is positive, that is, parents' valuation of education has a positive impact on their children's educational performance. And $\text{cov}(F_s, U_i)$ is negative, because parents' valuation of education is positively associated with their willingness (and probably ability) to provide private funding, and thus negatively related to the share of public funding in their school. Therefore, the estimate γ will be a lower bound for the true effect β_2 . The larger the covariance between the unobserved

features U and the share of private funding, and the larger the effect β_4 of the unobserved features on student performance, the larger will be the underestimation of the effect of public funding. However, once we allow for multiple unobserved variables, the uniqueness of this result is no longer given.

Note also that there may be other possible sources of remaining bias than credit constraints. Although credit constraints are often viewed as the main cause of concern for selectivity in education, other unobservable features may give rise to different kinds of bias. As one example, the selection may not only originate on the student/parent side, but also on the school side. If privately operated schools have more freedom to choose their students, and if the selected students have features unobserved by the researcher that differ from those of students in publicly operated schools, then this may give rise to bias also on the operation side. For example, privately operated schools may have a preference to admit students who are particularly smart for their observable features, which would bias the coefficient estimate on O downwards. Moreover, in empirical applications that use variation across countries, there may be unobserved country features that are associated with the share of public operation and funding in a nonrandom way. Therefore, the extent and direction of any remaining bias must ultimately remain an open issue.

2.3.2 Alternative Empirical Specifications

Altogether, in this paper we will estimate six different versions of the basic empirical model. In specification (2.4), the variables on public versus private involvement are measured at the country level and entered in a cross-country regression performed at the student level:

$$T_i = \alpha + \beta_1 O_c + \beta_2 F_c + \mathbf{B}_i \beta_3 + v_c + \eta_s + \varepsilon_i, \quad (2.4)$$

where O_c and F_c are the share of publicly operated schools and the average share of public funding of schools in country c , respectively. Both student test scores T_i and background features \mathbf{B}_i are measured at the student level (the school characteristics in \mathbf{B} at the school level), so as to yield as clean a control for other influence factors as possible. Note that in the empirical application, the error term will have higher-level components at the school and country level, which is implemented by clustering the standard errors at the higher level, and that students are weighted by their sampling probabilities within each country (see

section 4.3 in Wößmann 2006 for details on the specifics of the micro-econometric model).

The reason we start with a cross-country specification with country-level public-private data is the possibility discussed in section 2.2: that the mere existence of private schools in a city may have systemic effects due to their effect on how the public schools in the city perform, because these public schools are now faced with competition from private schools. Thus, looking at the simple relative performance of privately and publicly operated schools may well fail to observe the effects of the existence of the privately operated school. By contrast, such systemic effects will be captured in the specification that measures private involvement at the level of the country. The specification shows whether countries with a larger sector of publicly operated schools and with a larger share of public funding fare differently on average on the PISA test than countries with larger shares of private involvement.

A second advantage of the specification is that it evades the problem of selection bias just discussed. While it may be the case that students whose performance differs for other reasons may select (or be selected) into private schools in nonrandom ways, such selection effects will cancel out at the country level. Under the quite confident assumption that there is no school selection across country borders of an order of magnitude that might affect the presented results, any nonrandom selection would occur within the observation level of the public-private measures in specification (2.4) and would therefore not affect the estimates of β_1 and β_2 in this specification. Note, though, that one can never perfectly rule out remaining endogeneity due to unobservables at the country level.

Specification (2.5) simplifies the picture even further, by classifying the countries into the four quadrants of figure 2.1 established by the shares of public operation and public funding. That is, public-private involvement will be measured just by attributing dummies to the countries whether they belong to the top left (*TL*), the bottom left (*BL*) or the bottom right (*BR*) quadrant of figure 2.1, where the reference category is the top right quadrant:

$$T_i = \alpha + \beta_1 TL_c + \beta_2 BL_c + \beta_3 BR_c + \mathbf{B}_i \beta_4 + v_c + \eta_s + \varepsilon_i. \quad (2.5)$$

This quadrant-dummy specification has the same advantages as the specification with country-level public-private data, except that it pro-

vides the results in an even simpler (but also coarser) way: Do the performances of the countries in the four quadrants of figure 2.1 differ systematically from each other?

Specification (2.6) adds an interaction term between public operation and public funding to specification (2.4):

$$T_i = \alpha + \beta_1 O_c + \beta_2 F_c + \mathbf{B}_i \beta_3 + (O_c F_c) \beta_4 + v_c + \eta_s + \varepsilon_i. \quad (2.6)$$

The coefficient on the interaction term ($O_c F_c$) depicts whether any effect of public funding F differs between countries with lower or higher shares of publicly operated schools.

The next specification makes use of the individual-level data of public-private involvement in schools. That is, both public operation O_s and public funding F_s are now measured at the level of each school s , still in a regression encompassing all countries:

$$T_i = \alpha + \beta_1 O_s + \beta_2 F_s + \mathbf{B}_i \beta_3 + (O_s F_s) \beta_4 + \eta_s + \varepsilon_i. \quad (2.7)$$

Note that O_s is now a dummy representing whether the student's school is publicly (as opposed to privately) operated, while F_s is the share of public funding of the school.

In this specification, the considerations on possible selection bias now come into play, which suggested that one particularly relevant source of bias, due to credit constraints, points in the direction that the estimate β_2 on the effect of public funding may be biased downwards, that is, biased in favor of schools with larger shares of private funding. The specification can again be estimated with and without an interaction effect. In the specification using school-level data on public-private involvement, the coefficient on the interaction term depicts whether any association between student performance and public funding F differs between publicly and privately operated schools.

Specification (2.8) adds country fixed effects to specification (2.7):

$$T_i = \alpha_c + \beta_1 O_s + \beta_2 F_s + \mathbf{B}_i \beta_3 + (O_s F_s) \beta_4 + \eta_s + \varepsilon_i, \quad (2.8)$$

where α_c is a country-specific intercept implemented by adding a full set of controls for country dummies. By disregarding any variation that exists between countries, this specification in effect estimates the average effect of public operation and funding *within* the countries in the pooled dataset. That is, the specification shows whether on average, publicly operated and publicly funded schools in a country fare differently from privately operated and privately funded schools in the

same country. The previous considerations suggest that the relative importance of selection bias may get ever more severe in this specification, because the selection-free variation that exists between countries is now no longer considered.

Finally, specification (2.9) estimates the same specification separately within each country c :

$$\forall c: T_i = \alpha + \beta_1 O_s + \beta_2 F_s + \mathbf{B}_i \beta_3 + \eta_s + \varepsilon_i \text{ if } i \in c. \quad (2.9)$$

By doing so, this specification can depict whether the within-country associations between public-private involvement and student performance are heterogeneous across the countries. The presented results on this specification will not consider an interaction term ($O_s F_s$), because initial experimentation showed that samples seem to get too small in most countries to properly identify the interaction effect within individual countries.

2.4 Empirical Results on Public-Private Division and Student Achievement

This section presents the empirical results on the association between PPPs and student achievement. It shows how student performance is associated with public versus private involvement in the operation and funding of schools both across and within countries.

2.4.1 Public vs. Private Funding and Operation Measured at the Country Level

The specifications (2.4) and (2.5) that use only the variation between countries and disregard variation within countries by aggregating the measures of public-private involvement at the country level have the advantages of capturing system-level effects and evading within-country selection biases. Column Q in table 2.4 presents the results of the quadrant-dummy specification (2.5) for math performance. This specification compares student performance in the four basic system types of figure 2.1, with the type representing the largest number of countries—the top right quadrant of systems with large public shares in both operation and funding—serving as the reference category.⁸

The results show that there are large and statistically significant systematic performance differences between systems that make strong use of PPPs and systems that do not. Systems with a relatively low share of public operation, but a large share of public funding perform best.

Table 2.4
Public-Private Involvement and Math Performance across Countries

	Country-level public-private measures				School-level public-private measures				
	(Q)	(R)	(S)	(T)	(U)	(V)	(W)	(X)	(Y)
Top left quadrant	37.93*** (12.52)								
Bottom left quad.	0.02 (7.73)								
Bottom right quad.	-36.64*** (8.17)								
Public operation		-74.55*** (14.78)		-93.80*** (13.81)	-193.15** (94.26)	-19.68*** (2.40)		-24.69*** (2.69)	-9.05 (5.98)
Public funding			24.51 (26.69)	91.05*** (27.03)	3.73 (77.00)		1.64 (3.53)	18.56*** (3.96)	30.18*** (6.40)
Interaction					113.45 (109.86)				-20.37*** (7.63)
Observations	72,493	72,493	72,493	72,493	72,493	72,493	72,493	72,493	72,493
Strata						29	29	29	29
PSUs	29	29	29	29	29	4,870	4,870	4,870	4,870
R ²	0.314	0.309	0.293	0.315	0.316	0.297	0.293	0.298	0.298

Notes: Dependent variable: PISA international math test score. Least squares regressions weighted by students' sampling probabilities. Regressions include 60 control variables for student, family, and school characteristics. Robust standard errors adjusted for clustering in parentheses (columns Q to U: clustering by country; columns V to Y: clustering by school). Quadrant dummies refer to country's position in figure 2.1. Interaction = interaction term between public operation and public funding.
Significance level (based on clustering-robust standard errors): ***1 percent; **5 percent; *10 percent.
Source: Own calculations based on PISA microdatabase.

Their average performance is 37.9 PISA test-score points higher than the average performance of systems that are mainly publicly operated and funded. Given that the test scores are scaled to have an international standard deviation among the OECD countries of 100, the effect size can be interpreted as percentage points of an international standard deviation. That is, PPP systems that combine public funding with private operation perform more than one third of an international standard deviation better than pure public systems. To provide an alternative benchmark for the size of this performance difference, we can also compare it to the unconditional performance difference between ninth-grade and tenth-grade students (the two largest grades in PISA), which is 30.3 PISA test-score points in math.⁹ That is, 15-year-old students in public-funding private-operation PPP systems on average perform more than the equivalent of a whole grade level better than same-aged students in mainly publicly funded and operated systems.

By contrast, students in systems that combine large shares of public operation with relatively low shares of public funding, that is, the second type of PPP, perform 36.6 test-score points *worse* than students in purely public systems. Interestingly, there is no difference at all in the average performance of students in systems that combine large shares of private operation and funding and students in systems that combine large shares of public operation and funding.

Figure 2.2 depicts the result pattern graphically. It shows that the two forms of PPPs—public funding with private operation and public operation with private funding—have diametrically opposite consequences relative to all-public or mainly private systems. The performance difference between the two forms of PPPs adds up to 74.6 points. These results suggest that it makes a fundamental difference *how* the partnership between public and private in PPPs is conceived: reserving funding for the public side but contracting the operation to the private sector brings huge gains in performance, but transferring funding to the private side and leaving the operation of schools in public hands brings huge losses. The picture also suggests that there are no significant interactions between operation and funding at this level: public operation has a negative effect, independent of the mode of funding, and public funding has a positive effect, independent of the mode of operation. Therefore, in a mainly privately operated and funded system, the two effects cancel out and average performance is similar to a mainly publicly operated and funded system.

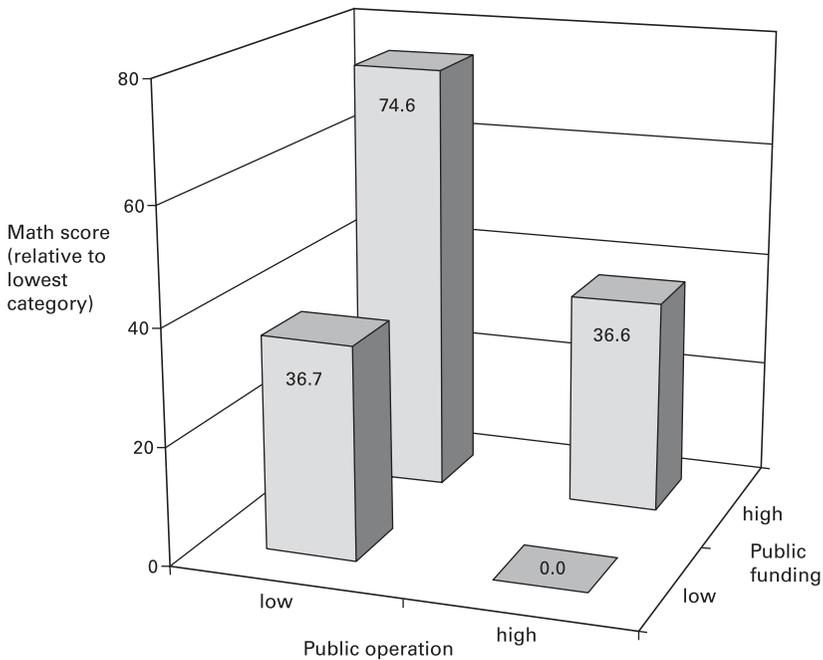


Figure 2.2

Student Achievement in the Four Quadrants of Public-Private Involvement

Note: The distinction into countries with relatively low and relatively high shares of public operation and funding follows the quadrants in figure 2.1.

Source: table 2.4, column Q.

The basic pattern of results is exactly the same in the other two subjects, reading and science, as the results reported in columns Z and AE in table 2.5 show. The size of the performance differences in these two subjects is somewhat smaller, though, and there are slight but statistically insignificant differences in the size of the estimate on the coefficient on the bottom left quadrant.

The very same pattern of negative effects of public operation and positive effects of public funding emerges in specification (2.4) with country-level data on public-private operation and funding. As the results reported in columns T, AA, and AF in tables 2.4 and 2.5 reveal, the coefficient on public operation is statistically significantly negative in all three subjects, and the coefficient on public funding is positive in all three subjects and statistically significantly so in math and reading.¹⁰ Note that the positive coefficient on public funding in math is

Table 2.5
Public-Private Involvement and Performance in Reading and Science across Countries

	Reading						Science							
	Country-level public-private measures		School-level public-private measures		Country-level public-private measures		School-level public-private measures		Country-level public-private measures		School-level public-private measures			
	(Z)	(AA)	(AB)	(AC)	(AD)	(AE)	(AF)	(AG)	(AH)	(AI)				
Top left quadrant	28.28** (10.45)					17.00 (12.45)								
Bottom left quad.	-9.56 (6.39)					5.86 (6.61)								
Bottom right quad.	-13.06** (5.76)					-18.36*** (6.53)								
Public operation		-56.95*** (10.71)	-35.15 (70.13)	-19.27*** (2.30)	-7.04 (4.88)			-55.61*** (11.86)	-183.89** (80.54)	-17.94*** (2.42)			-6.31 (5.01)	
Public funding		59.06** (23.62)	78.07 (59.05)	8.35** (3.29)	17.42*** (5.37)			22.07 (20.49)	-90.88 (66.11)	0.79 (3.36)			9.39* (5.24)	
Interaction			-24.80 (84.64)		-15.91** (6.30)				146.01 (94.11)				-15.11** (6.41)	
Observations	130,242	130,242	130,242	130,242	130,242	72,388	72,388	72,388	72,388	72,388	72,388	72,388	72,388	72,388
Strata				29	29					29			29	29
PSUs	29	29	29	4,882	4,882	29	29	29	29	4,870	29	29	4,870	4,870
R ²	0.310	0.311	0.311	0.306	0.306	0.254	0.256	0.257	0.252	0.252	0.252	0.252	0.252	0.252

Notes: Dependent variable: PISA international reading/science test score. Least squares regressions weighted by students' sampling probabilities. Regressions include 60 control variables for student, family, and school characteristics. Robust standard errors adjusted for clustering in parentheses (columns Z to AB and AE to AG; clustering by country; columns AC, AD, AH, and AI; clustering by school). Quadrant dummies refer to country's position in figure 2.1. Interaction = interaction term between public operation and public funding.

Significance level (based on clustering-robust standard errors): ***1 percent; **5 percent; *10 percent.

Source: Own calculations based on PISA microdatabase.

significant only once the mode of operation is controlled for (compare columns R, S, and T).

2.4.2 Cross-Country Regressions with School-Level Public-Private Measures

Columns X, AC, and AH in tables 2.4 and 2.5 report the results of specification (2.7) that uses individual-level data on public-private involvement, first without an interaction term.¹¹ Note that the difference between this and the previous specifications is not in the level of estimation, because all specifications use student-level data on test scores and background features. The difference is in the level at which the measures of public versus private operation and funding of schools are measured.

The qualitative results of the specification measuring public-private involvement at the school level are the same as those of the specification with country-level public-private measures in all three subjects: Public operation is negatively associated with student achievement and public funding is positively associated with student achievement. As argued in section 2.3.1 above, the selection bias due to credit constraints is likely to bias downward the estimate on public funding in the specification with school-level public-private measures. However, we still get a statistically significant positive estimate. Therefore, the effect of public funding on student achievement seems indeed to be positive, and likely to be even larger than the reported coefficient estimates of this specification suggest. This pattern is also consistent with the relative size of the coefficient estimate in the specifications with country-level and school-level public-private measures. The lower size in the specification with school-level public-private measures could be attributed to the selection bias due to credit constraints, which is operative within countries but not across countries. But obviously, selection biases stemming from other sources may also be at play.

The coefficient estimate on public operation is also smaller in absolute terms in the specification with school-level public-private measures. As previously argued, theories of credit constraints would not predict a bias of the coefficient on public versus private operation. By contrast, such a bias could, for example, be attributed to nonrandom selection of students on the part of the privately operated schools. However, note that most standard versions of selection bias would predict a difference in the coefficient estimates of the two specifications that would go the other way, pushing the coefficient in the

specification with school-level public-private measures even more into the negative. Therefore, a more convincing explanation for the fact that the estimated effect of private operation is larger in the specifications where it is measured at the country level than at the school level is that there are strong systemic effects of competition from privately operated schools also on the publicly operated schools in a system, as discussed in sections 2.2 and 2.3.2.

In sum, all specifications that use the cross-country variation, using country-level and school-level measures of public-private involvement, yield the result that public operation has a negative effect and public funding a positive effect on student performance.

2.4.3 Interactions between Funding and Operation

To see whether the effect of public funding differs under public versus private operation of schools, the next specification adds to the model an interaction term between operation and funding. Columns U, AB, and AG in tables 2.4 and 2.5 report results of specification (2.6) that adds the interaction term to the country-level measure specification (2.4). As already apparent in the quadrant-dummy specification depicted in figure 2.2, there is no significant interaction effect in any of the subjects in this specification with country-level public-private data, which in this specification is mainly due to the fact that the estimates have large standard errors and thus lack statistical power.

But the interaction results are different in specification (2.7) that estimates the interaction term on individual-level data on public-private involvement, reported in columns Y, AD, and AI. In all three subjects, the interaction term is statistically significantly negative. This means that public operation has a slightly negative effect already in schools with low public funding, but this effects gets ever more negative with increasing public funding. This pattern is depicted graphically in panel (a) of figure 2.3. The pattern might either be driven by increasing lack of accountability in schools that do not receive any private funding, or by the selection bias of higher-performing students into schools with larger shares of private funding.

At the same time, the negative interaction term means that the positive effect of public funding is strongly concentrated in schools that are privately operated, while the effect of public funding decreases to about zero in publicly operated schools (cf. panel (b) of figure 2.3). This pattern might suggest that it is particularly the role of public funding in allowing everyone—including low-income families—to opt for pri-

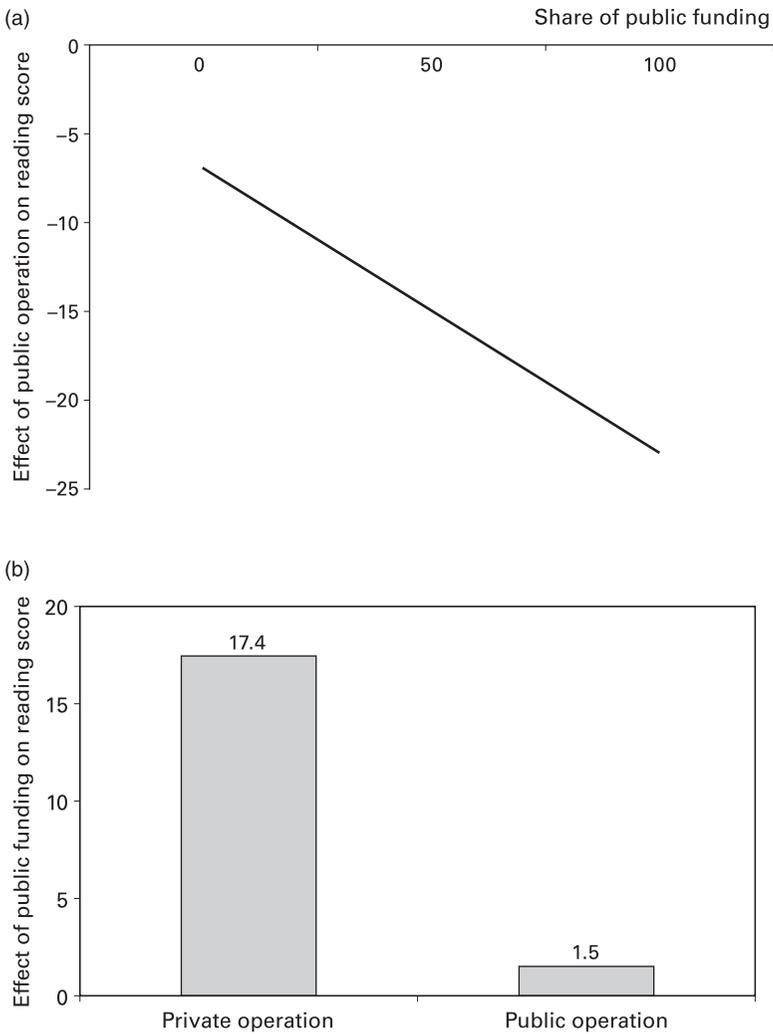


Figure 2.3

The Interaction of Public Operation and Public Funding

(a) Effect of public operation depending on type of funding; (b) Effect of public funding depending on type of operation

Source: table 2.5, column AD.

vately operated schools that drives the positive association between public funding and student performance. In this sense, public funding can enable more choice, in that families that would otherwise be credit constrained can choose privately operated schools if funding comes from public sources.

2.4.4 Regressions Using Only Variation within Each Country

Results of specification (2.8), which adds country fixed effects to the previous specification (2.7), are reported in the top panel of table 2.6. An interaction term between public funding and operation was never statistically significant in the three subjects and was thus dropped from the specification. In this specification that disregards the between-country variation and exploits only the within-country variation, the coefficients on both public operation and public funding are negative, and the coefficient on public funding is the larger one in absolute terms. This might suggest that the association between public funding and student performance within countries is mostly driven by the selection bias of higher-performing children into schools with larger shares of private funding. However, this specification using the within-country variation in the pooled cross-country dataset also foreshadows systematic differences in the associations between countries.

This becomes apparent in the lower panels of table 2.6, which report results of estimating the model separately for each country, as in specification (2.9).¹² We restrict our attention to reading performance here because the reading samples are substantially larger than the samples in the other two subjects, which becomes particularly relevant when restricting the estimations to within each country. It should still be recognized that in some countries, cell sizes get worryingly small, as is evident from the small number of privately operated schools in some country samples, reported in column I in table 2.1.

A broad systematic pattern emerges when we look at the countries separately by their affiliation to the four quadrants of figure 2.1 again. Running the pooled within-country regressions separately for each quadrant (again including country fixed effects), it becomes apparent that the negative coefficient on public operation in the specification pooling all countries is mainly driven by the countries in the top left panel, while the negative coefficient on public funding is mainly driven by the countries in the bottom right panel. All other panel-wise coefficients are statistically insignificant, which may be partly due to a substantially smaller statistical power relative to the pooled cross-country

Table 2.6
Estimations within Countries

	Public operation		Public funding		Observa- tions	PSUs	R ²
<i>Pooled</i>							
Math	-1.63	(2.45)	-10.63***	(3.98)	72,493	4,870	0.346
Science	-4.01*	(2.32)	-10.51***	(3.51)	72,388	4,870	0.281
Reading	-5.99***	(2.14)	-10.43***	(3.52)	130,242	4,882	0.341
<i>Reading</i>							
<i>Top left</i>							
	-13.66***	(3.62)	-12.40	(11.02)	16,388	637	0.348
BEL	-38.51***	(7.07)	-0.17	(14.27)	6,345	203	0.506
DNK	5.94	(11.36)	-44.56	(42.58)	4,006	208	0.238
IRL	-28.17***	(6.18)	-16.86	(13.95)	3,791	137	0.330
NLD	-9.91	(6.81)	-17.80	(35.79)	2,246	89	0.471
<i>Bottom left</i>							
	7.51**	(3.40)	-5.75	(5.99)	19,773	598	0.331
ESP	-13.05*	(7.34)	-11.58	(9.52)	5,805	174	0.383
FRA	6.99	(4.75)	-3.18	(8.73)	4,077	153	0.494
JPN	36.29*	(21.56)	-28.67	(18.40)	5,215	134	0.241
KOR	6.10	(5.67)	-12.04	(11.57)	4,676	137	0.261
<i>Bottom right</i>							
	-4.41	(7.78)	-13.88**	(5.65)	20,284	861	0.418
BRA	15.11	(22.75)	-20.29**	(10.01)	3,951	256	0.342
GRC	-23.64	(17.23)	2.86	(16.66)	4,301	144	0.364
ITA	26.79	(19.39)	-56.49***	(21.08)	4,704	161	0.356
MEX	-32.26***	(11.01)	-0.88	(6.12)	3,873	156	0.433
NZL	-20.21	(14.80)	-68.81***	(19.70)	3,455	144	0.294
<i>Top right</i>							
	-2.79	(4.73)	-11.12	(8.24)	74,022	2,795	0.319
AUT	14.60	(12.70)	-50.38***	(17.32)	4,501	203	0.400
CHE	-34.69*	(19.14)	69.35**	(28.05)	5,822	268	0.429
CZE	-9.14	(12.19)	59.03*	(30.20)	5,343	228	0.384
DEU	-25.25	(20.40)	6.03	(54.93)	4,430	192	0.486
FIN	-2.12	(11.11)	-238.14	(254.08)	4,863	155	0.221
GBR	-83.86***	(26.85)	-5.76	(27.73)	8,658	337	0.331
HUN	-3.99	(12.55)	28.81	(24.81)	4,761	183	0.425
ISL	-48.75***	(17.90)	32.96	(24.56)	3,229	125	0.175
LUX	21.89*	(11.29)	—		3,132	22	0.459
LVA	-40.72***	(13.41)	-20.17	(44.35)	3,037	123	0.315
NOR	-35.83	(24.07)	276.67**	(115.33)	3,967	165	0.182
POL	-23.41	(52.29)	-24.23	(66.03)	3,585	125	0.290
PRT	4.83	(20.68)	-3.01	(10.43)	4,549	148	0.527
RUS	—		-5.81	(25.34)	6,563	242	0.279
SWE	-10.32	(7.85)	275.32	(403.53)	4,415	154	0.209
USA	-47.06	(15.07)	11.81	(19.04)	2,942	116	0.355

Table 2.6
(continued)

Notes: Dependent variable: PISA international test score. Least squares regressions weighted by students' sampling probabilities. Regressions include 60 control variables for student, family, and school characteristics. Robust standard errors adjusted for clustering in parentheses (clustering by school). Regressions that pool countries control for country fixed effects. The organization of countries follows the four quadrants of figure 2.1. See note to figure 2.1 for a list of country acronyms. Significance level (based on clustering-robust standard errors): *** 1 percent; ** 5 percent; * 10 percent.

Source: Own calculations based on PISA microdatabase.

analyses because of the smaller number of observations.¹³ Note that the lower performance of publicly operated schools in the top left quadrant is unlikely to be caused by credit-constraint-based selection patterns, as all schools in the systems of this quadrant—be they publicly or privately operated—receive the vast majority of their funding from public sources.

By contrast, the lower performance of schools with larger shares of public funding in the countries of the bottom right quadrant may well be driven by credit-constraint-based selection bias. Nearly all schools in the systems of this quadrant are publicly operated, but rich families, whose children may perform better for reasons other than the public-private division of school operation and funding, can provide additional private funding for their schools. Finally, note that in the top right quadrant, there is a statistically significant negative association of student achievement with public school operation and a statistically significant positive association with the share of public school funding in several countries, as is the pattern in the specifications using the cross-country variation.

Still, it should be borne in mind that the specifications using the variation within each country face the fundamental problem of selection bias. In particular, credit constraints might be expected to bias the estimates on public funding in the negative direction.

2.5 Conclusion

This paper has presented cross-country evidence on the effectiveness of public-private partnerships (PPPs) in providing cognitive skills to students. The main result is that across countries, public operation of schools is negatively associated with student performance in math,

reading, and science, while public funding of schools is positively associated with student performance in the three subjects. This suggests that school systems based on PPPs in the sense that the state finances schools but contracts their operation out to the private sector are the most effective school systems. By contrast, school systems based on PPPs in the sense that they require a lot of private funding but keep the operation of schools in the public sector fare even worse than systems where operation and funding is either both public or both private. Thus, the results favor the particular form of educational PPPs where the state does the funding and the private sector runs the schools.

While this paper has looked at the relative effectiveness of PPPs in providing cognitive skills, aspects of efficiency, equity, and noncognitive skills have been left for future research. To look at the relative efficiency of PPPs, defined in terms of output per input, one would have to add a comparison of the costs at which PPPs operate relative to mere-public or mere-private schools. If the different systems show systematic differences in their spending levels, then effectiveness is only one side of efficiency (note, though, that the reported results condition on several measures of resource inputs). It would also be interesting to analyze whether the effect of PPPs differs for students from different parts in the performance distribution, in other words, whether the effects are heterogeneous between elite and disadvantaged students. Specifications that interact the public-private measures with family-background measures could also provide evidence on equity aspects of private involvement. It also remains an open issue whether and how PPPs affect the noncognitive skills, behaviors, and beliefs of students.

Another road for future research would be to look at the different channels through which the effects of PPPs may come about. For example, PPPs may differ from other schools in the education level of the teachers that they hire or in the autonomy that they are granted in different areas, and one may get glimpses of the importance of these different channels by comparing the presented results to regressions that do not control for these other aspects of educational production. Finally, countries differ in the extent to which they impose government restrictions and graduation requirements on private schools, and some of these regulations may limit the extent to which PPPs are allowed to differ from public schools.

Notes

Paper prepared for the PEPG–World Bank conference, “Mobilizing the Private Sector for Public Education,” Kennedy School of Government, Harvard University, October 2005. I would like to thank the participants of the conference—in particular the two conference organizers, Rajashri Chakrabarti and Paul Peterson—and my discussant Marty West, as well as Giorgio Brunello and the referees for very useful comments and discussions. A first draft of this chapter was circulated under the title “Public-Private Partnerships in Schooling: Cross-Country Evidence on their Effectiveness in Providing Cognitive Skills” as Harvard University’s Program on Education Policy and Governance Research Paper PEPG 05-09.

1. Details on the data underlying figure 2.1 will be provided in section 2.1.2. Note that the specific subdivision into the four quadrants in the figure is arbitrary, chosen so that each quadrant has at least four countries, and is undertaken for purposes of visualization only.

2. Among the PISA participants, Australia and Canada did not provide data on the public vs. private operation of schools. Liechtenstein was not included in the analysis because it features only 11 schools (with 314 students), 2 of which are private, and because it lacks several internationally comparable country-level data. Data for the Netherlands are provided, although there is a caveat in that the response rate in the Netherlands was relatively low.

3. Adams and Wu (2002), OECD (2001), and the PISA Web page at <www.pisa.oecd.org> provide detailed information on the PISA study.

4. Fuchs and Wößmann (2007) also provide imputed data for missing observations, which are used in this chapter with the exception of the data on private vs. public operation and funding, for which only original data are used.

5. Important contributions to the empirical literature include Howell et al. (2002), Hoxby (2003a, 2003b), and Neal (1997) for the United States; Bradley and Taylor (2002) and Levačić (2004) for England; Sandström and Bergström (2005) for Sweden; Angrist et al. (2002) for Colombia; Cox and Jimenez (1991) for Colombia and Tanzania; James, King, and Suryadi (1996) and Bedi and Garg (2000) for Indonesia; and Mizala and Romaguera (2000), Mizala, Romaguera, and Farren (2002), Sapelli and Vial (2002), Vegas (2002), and Hsieh and Urquiola (2006) for Chile.

6. A lot of the discussion of the relative merits of public vs. private involvement in schooling, in particular on the funding side, also surrounds equity rather than effectiveness outcomes (cf., e.g., Glomm and Ravikumar 1992; Epple and Romano 1998; Nechyba 2000; Ladd 2002). For reasons of scope, in this chapter we do not deal with the issue that public funding might serve to redistribute income or to raise opportunities for specific disadvantaged subgroups of the population, leaving this important issue for future research.

7. See the working-paper version of this paper (Wößmann 2006) for a list of the control variables.

8. Note that given the somewhat arbitrary subdivision into the four quadrants of figure 2.1, this quadrant-dummy specification is meant as a depiction of a broad pattern only. It receives its validity only from the fact that the depicted pattern is vindicated by the richer specification that follows, where public operation and public funding are entered as linear variables.

9. The values in reading and science are 33.2 and 32.4, respectively.
10. The results on public operation are consistent with evidence from a previous international student achievement test, TIMSS, showing that student performance was superior in countries with a larger share of private enrollment and with a larger share of public funding going to privately operated schools (Wößmann 2001, 2003).
11. This specification and the results are very similar to those reported in Fuchs and Wößmann (2007).
12. Previous studies have estimated similar models of the effects of private school operation within several countries from international achievement tests, but without accounting for differences in the source of school funding. Thus, Toma (1996; cf. also 2005) estimates the effect of private school operation in five countries using the 1981 second international mathematics test. She notes that the positive effect of private provision is independent of whether the countries tend to finance the schools publicly or not. Vandenberghe and Robin (2004) estimate the effect of private school operation in eight countries in PISA, comparing several estimation methods that try to address selection bias, but disregarding the funding side of schools.
13. The positive coefficient on public operation in the bottom left quadrant is driven by the highly imprecise estimate in Japan.

References

- Adams, Ray, and Margaret Wu, eds. 2002. *PISA 2000 Technical Report*. Paris: Organisation for Economic Co-operation and Development (OECD).
- Angrist, Joshua, Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer. 2002. Vouchers for private schooling in Colombia: Evidence from a randomized natural experiment. *American Economic Review* 92, no. 5: 1535–1558.
- Bedi, Arjun S., and Ashish Garg. 2000. The effectiveness of private versus public schools: The case of Indonesia. *Journal of Development Economics* 61, no. 2: 463–494.
- Bishop, John H. 1992. The impact of academic competencies on wages, unemployment, and job performance. *Carnegie-Rochester Conference Series on Public Policy* 37: 127–194.
- Bishop, John H., and Ludger Wößmann. 2004. Institutional effects in a simple model of educational production. *Education Economics* 12, no. 1: 17–38.
- Bradley, Steve, and Jim Taylor. 2002. The effect of the quasi-market on the efficiency-equity trade-off in the secondary school sector. *Bulletin of Economic Research* 54, no. 3: 295–314.
- Chubb, John E., and Terry M. Moe. 1990. *Politics, Markets, and America's Schools*. Washington, D.C.: Brookings Institution.
- Cox, Donald, and Emmanuel Jimenez. 1991. The relative effectiveness of private and public schools. *Journal of Development Economics* 34, no. 1: 99–121.
- Epple, Dennis, and Richard E. Romano. 1998. Competition between private and public schools, vouchers, and peer-group effects. *American Economic Review* 88, no. 1: 33–62.
- Fuchs, Thomas, and Ludger Wößmann. 2007. What accounts for international differences in student performance? A re-examination using PISA data. *Empirical Economics* 32, no. 2–3: 433–464.

- Galor, Oded, and Joseph Zeira. 1993. Income distribution and macroeconomics. *Review of Economic Studies* 60, no. 1: 35–52.
- Glomm, Gerhard, and B. Ravikumar. 1992. Public versus private investment in human capital: Endogenous growth and income inequality. *Journal of Political Economy* 100, no. 4: 818–834.
- Gradstein, Mark, and Moshe Justman. 2002. Education, social cohesion, and economic growth. *American Economic Review* 92, no. 4: 1192–1204.
- Gradstein, Mark, Moshe Justman, and Volker Meier. 2004. *The Political Economy of Education: Implications for Growth and Inequality*. Cambridge, MA: The MIT Press.
- Greene, William H. 2000. *Econometric Analysis*. Fourth edition. Upper Saddle River, NJ: Prentice Hall.
- Hanushek, Eric A. et al. 1994. *Making Schools Work: Improving Performance and Controlling Costs*. Washington, D.C.: Brookings Institution.
- Howell, William G., Patrick J. Wolf, David E. Campbell, and Paul E. Peterson. 2002. School vouchers and academic performance: Results from three randomized field trials. *Journal of Policy Analysis and Management* 21, no. 2: 191–217.
- Hoxby, Caroline M., ed. 2003a. *The Economics of School Choice*. A National Bureau of Economic Research Conference Report. Chicago: University of Chicago Press.
- Hoxby, Caroline M. 2003b. School choice and school competition: Evidence from the United States. *Swedish Economic Policy Review* 10, no. 3: 9–65.
- Hsieh, Chang-Tai, and Miguel Urquiola. 2006. The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program. *Journal of Public Economics* 90, no. 8–9: 1477–1503.
- Human Development Network. 2001. *Handbook on Public Private Partnerships in Education*. Washington, D.C.: World Bank. (<http://www.ifc.org/ifcext/edinvest.nsf/Content/PublicPrivatePartnerships>)
- James, Estelle, Elizabeth M. King, and Ace Suryadi. 1996. Finance, management, and costs of public and private schools in Indonesia. *Economics of Education Review* 15, no. 4: 387–398.
- Jimenez, Emmanuel, and Vicente Paqueo. 1996. Do local contributions affect the efficiency of public primary schools? *Economics of Education Review* 15, no. 4: 377–386.
- Ladd, Helen F. 2002. School vouchers: A critical view. *Journal of Economic Perspectives* 16, no. 4: 3–24.
- Levačić, Rosalind. 2004. Competition and the performance of English secondary schools: Further evidence. *Education Economics* 12, no. 2: 177–193.
- Loury, Glenn C. 1981. Intergenerational transfers and the distribution of earnings. *Econometrica* 49, no. 4: 843–867.
- Mizala, Alejandra, and Pilar Romaguera. 2000. School performance and choice: The Chilean experience. *Journal of Human Resources* 35, no. 2: 392–417.
- Mizala, Alejandra, Pilar Romaguera, and Darío Farren. 2002. The technical efficiency of schools in Chile. *Applied Economics* 34, no. 12: 1533–1552.

- Neal, Derek. 1997. The effects of Catholic secondary schooling on secondary achievement. *Journal of Labor Economics* 15, no. 1: 98–123.
- Nechyba, Thomas J. 2000. Mobility, targeting, and private-school vouchers. *American Economic Review* 90, no. 1: 130–146.
- Organisation for Economic Co-operation and Development (OECD). 2001. *Knowledge and Skills for Life: First Results from the OECD Programme for International Student Assessment (PISA) 2000*. Paris: OECD.
- Patrinos, Harry A. 2000. Market forces in education. *European Journal of Education* 35, no. 1: 61–80.
- Patrinos, Harry A. 2002. Private education provision and public finance: The Netherlands as a possible model. NCSPE Occasional Paper No. 59. New York, NY: National Center for the Study of Privatization in Education, Teachers College, Columbia University.
- Peterson, Paul E., ed. 2003. *The Future of School Choice*. Stanford, CA: Hoover Institution Press.
- Pritchett, Lant. 2003. “When Will They Ever Learn”? Why all governments produce schooling. Bread Working Paper 31. Cambridge, MA: Harvard University, Bureau of Research in Economic Analysis of Development.
- Sandström, F. Mikael, and Fredrik Bergström. 2005. School vouchers in practice: Competition will not hurt you. *Journal of Public Economics* 89, no. 2–3: 351–380.
- Sapelli, Claudio, and Bernardita Vial. 2002. The performance of private and public schools in the Chilean voucher system. *Cuadernos de Economía—Latin American Journal of Economics* 39, no. 118: 423–454.
- Shleifer, Andrei. 1998. State versus private ownership. *Journal of Economic Perspectives* 12, no. 4: 133–150.
- Toma, Eugenia F. 1996. Public funding and private schooling across countries. *Journal of Law and Economics* 39, no. 1: 121–148.
- Toma, Eugenia F. 2005. Private schools in a global world: 2004 presidential address. *Southern Economic Journal* 71, no. 4: 693–704.
- Vandenbergh, Vincent, and Stephane Robin. 2004. Evaluating the effectiveness of private education across countries: A comparison of methods. *Labour Economics* 11, no. 4: 487–506.
- Vegas, Emiliana. 2002. School choice, student performance, and teacher and school characteristics: The Chilean case. World Bank Policy Research Working Paper 2833. Washington, D.C.: World Bank.
- World Bank. 2004. *World Development Report 2004: Making Services Work for Poor People*. Washington, D.C.: World Bank.
- Wößmann, Ludger. 2001. Why students in some countries do better: International evidence on the importance of education policy. *Education Matters* 1, no. 2: 67–74.
- Wößmann, Ludger. 2003. Schooling resources, educational institutions and student performance: The international evidence. *Oxford Bulletin of Economics and Statistics* 65, no. 2: 117–170.
- Wößmann, Ludger. 2006. Public-private partnerships and schooling outcomes across countries. CESifo Working Paper 1662. Munich: CESifo.

3 Mobilizing the Private Sector in the United States: A Theoretical Overview

Thomas J. Nechyba

Even in the absence of any government efforts to support private schools, we observe a substantial number of private schools operating successfully alongside nominally “free” public schools. When evaluating possible channels through which the private sector can be mobilized, a first step is therefore to identify the existing channels through which private schools manage to compete in public school environments despite charging nontrivial levels of tuition to parents. Put differently, private schools must have *some* competitive advantages that they currently leverage to attract parents, and these advantages determine the ways in which private schools form and the types of families they attract. Public policy can then alter how the private sector evolves in a public school environment, which families it attracts, and how the nature of public schools changes as a result. While “mobilizing the private sector” can be accomplished through a variety of policy tools, we will use private school vouchers as a focusing device in this chapter.¹ Many of the conceptual lessons, however, are more broadly applicable.

The overview in this chapter is organized around four types of competitive advantages that can potentially explain the existence of private schools. First, private schools may enjoy greater resource efficiency—that is, they may be more effective at translating dollars into outcomes valued by parents. Second, private schools may be able to serve niche markets by more effectively targeting their pedagogical approach to the needs of particular subsets of families. Third, private schools may derive an advantage from positive peer effects by skimming the cream of students. Finally, private schools may allow parents to unbundle schooling and housing choices within a metropolitan area.

There is no firm consensus how these advantages combine to explain the existence of private schools in different settings. Private schools in Brazil are likely to exist for different reasons than private schools in

the United States, and even within the United States, private schools in the more Catholic northeast may exist for different reasons than private schools in the more Protestant south. The challenges for mobilizing the private sector in positive ways may thus take different forms in different regions, and the optimal design of public policies may therefore differ depending on the context.

Our analysis begins in section 3.1 with an overview of the complexity faced by education policy makers—and the resulting complexity of an economic approach to analyzing the policy makers' problem. I then proceed in sections 3.2 through 3.5 to a discussion of how each of the private school advantages relate to the benefits and costs of mobilizing the private sector. In section 3.6 I present results from a model in which different private school advantages are modeled and illustrate how different assumptions we make about private school advantages (and public school responses to competition) can alter our conclusions. Finally, section 3.7 concludes with some final comments.

3.1 The Complex Challenges for Education Policy

A focus on different subsets of the many features of a local economy that might be relevant for education policy may lead different policy makers with identical policy preferences to different conclusion regarding the tradeoffs involved in policy design. Policy makers may further differ in their preferences over what outcomes to emphasize. Before discussing the conceptual issues involved in mobilizing the private sector, I therefore discuss briefly the relevant features of the underlying economic environment.

3.1.1 The Underlying Economic Environment

A typical economic model begins with an outline of the types of *economic agents* that make decisions and respond to incentives, the endowments, tastes, and production possibilities that these agents bring to their economic decisions, and the mechanism by which individual choices lead to an equilibrium in which every agent is doing the best she can given the circumstances she faces. Policy plays a role in defining the constraints that individuals face—and thus impacts the decisions individuals make which then aggregate to the equilibrium outcomes we observe.

To consider relevant economic agents, we can then begin by asking: who are the decision makers most relevant for predicting how educa-

tion policy translates into real world outcomes? First, parents decide where to send their children and how much they are involved in monitoring what happens at home and at school. They have some notion of what they consider important (Hoxby 1999), and they face resource constraints given the financial circumstances. Second, children may be viewed as decision-making agents in the sense that they may exercise some choice over which peer groups within schools and neighborhoods to join and how much effort toward advancing their education to expend (Harris 1998; Cooley 2005). Their relevant endowments are the characteristics (such as innate ability) they bring to the school, and their tastes may be shaped by a combination of parental, school, and peer influences.

Third, school officials—both teachers and administrators, may respond to changes in incentives. While their tastes may align to some extent with those of parents, they may also care about personal “rents” (Chubb and Moe 1990; McMillan 2004; Hoxby 1996) that may be constrained in part by the degree of competition they face (Hoxby 2000) or the types of accountability measures that are in place. Fourth, school entrepreneurs operate in both the public and the private sector. As with school officials, their tastes may take a variety of forms and may include a desire to serve children of particular types as well as to achieve personal rents of some form. Both school entrepreneurs and school officials face technological constraints—the mapping of inputs to outputs that is handed to them by the nature of education production (Hanushek 1999; Krueger 1999).

Finally, homeowners and developers may play an important role when public school access is determined primarily by where parents live. Parental decisions regarding schools are then inherently bundled with decisions regarding housing (Oates 1969; Bayer, Ferreira, and McMillan forthcoming). This, as we will see, impacts both the evolution of housing prices within established housing markets and the incentives by suppliers of new housing.

3.1.2 Equilibrium

In equilibrium, some mechanism must then exist to ration parents and students into neighborhoods and schools and to determine how many and what kinds of private schools operate. Since public schools typically do not charge tuition, other prices—in particular those associated with the cost of housing, adjust to equilibrate supply and demand for such schools. Alternatively, part of the “price” of choosing a public

school may involve monitoring schools or supplementing school production with home production of education. In private schools, on the other hand, explicit pricing governs much of the rationing of children into schools. And an equilibrium typically has a political dimension as well, with resources provided to public schools resulting from voting by residents. School policies—including those seeking to mobilize the private sector—thus result in observable outcomes as individuals do the best they can given their circumstances, which arise in part from equilibrium in housing, private school and political markets.²

3.1.3 Outcomes and Policy Preferences

Once a policy is implemented and a new equilibrium is reached, we can observe a number of outcomes that depend on the particulars of the policy, the way in which individuals respond to the changed incentives from that policy, and the mechanisms by which equilibrium is reached. New schools might emerge, households might move, public school population and school resources might change, and school officials might behave differently—all leading to different outcomes for children.

Even if agreement is reached on how a policy translates into changes in observable equilibrium outcomes, however, policy makers may disagree on the desirability of different policies because they disagree about the appropriate objective for education policy. Are we attempting to maximize average achievement, or achievement of those with the least initial opportunities, or the achievement of the “cream” that might become the engine of economic growth? Is achievement as measured through standardized exams the most important variable of interest? Is one of the aims of the education system to internalize externalities not taken into account by parents? It is one thing to mobilize the private sector in education, but quite another to do so in such a way that it is consistent with potentially competing social aims.

3.1.4 Beginning Simple and Introducing Complexity

Education policy therefore faces a number of complex challenges, and there is little hope of unraveling all of these at one time. It is then most productive to begin with simple and admittedly unrealistic settings and to investigate the most salient forces that may be unleashed by a greater fostering of private school markets. In the following sections, I will therefore discuss particular issues raised by particular private

school advantages—and how this translates into different ways of thinking about how private school markets can be mobilized most effectively given particular social aims.

3.2 A Simple Economic Environment: The Role of Resource Efficiency

Suppose we begin by restricting ourselves to a world in which parents and children are identical, in which there are no geographical constraints that limit access to schools (and thus no role for housing markets), and in which we can think of public schools as a single entity. Parents in this world agree on what makes a good school, and peer effects—to the extent they exist—are the same in all schools. Of our four possible private school advantages, we have thus eliminated three—with no private school advantage resulting from grouping (identical) peers either by ability or through pedagogical targeting, and no advantage to parents of private-school attending students from unbundling housing and school decisions. All that remains is the possibility that private schools may arise as a result of inefficient use of resources in the public school.

In this scenario, private schools emerge to the extent private school entrepreneurs find sufficiently more innovative and efficient uses of resources to produce sufficiently higher school quality that parents are willing to pay for despite their access to the free public school. This may, for instance, involve less rent-seeking behavior or less wasteful use of resources. Alternatively, even with identical peers, private school entrepreneurs may find ways to harness peer pressures and thus coordinate students (who pay attention to what their peers think) on “higher effort” peer equilibria.

3.2.1 Voice versus Exit and the Free Rider Problem

Parents can now either exercise pressure (“voice”) at the public school in an attempt to extract greater effort from school officials while supplementing their children’s education at home, or they can seek out private school alternatives. The former, however, gives rise to a free rider problem as each parent would prefer to have other parents undertake the costly task of monitoring the public school, and in the absence of parents solving the resulting coordination problem, economic theory suggests that a suboptimal level of overall pressure will

be exerted within the public school. In the presence of a competitive private school market, on the other hand, competition by private schools with one another reduces (or, under perfect competition, eliminates) inefficiencies within that sector, leaving parents free to substitute costly monitoring efforts (and home production) with tuition payments.

3.2.2 Equilibrium

An equilibrium with a coexistence of private and public schools can then emerge in a number of ways. As private schools enter, the public school shrinks in size—thus reducing the free rider problem and increasing the pressure felt by public school officials as parents can more effectively coordinate. If efficient private schools can be easily replicated, the resulting equilibrium would be one in which no rents are possible (due to competition) in the private sector, and all parents are indifferent between the lower-quality public school and the higher-quality private schools (that charge tuition). Alternatively, if entrepreneurial talent in the private sector is scarce, each new private school would be less efficient than existing private schools, and rents within the private school sector would remain for more efficient entrepreneurs who can charge higher tuitions for higher school quality. Any equilibrium, however, would be one in which private schools would provide higher quality education than the public school, with the possibility that private schools themselves can be hierarchically ordered based on the quality they offer (due to the entrepreneurial skill differences in the private sector). Parents would be uniformly happier, with some children (whose parents pay higher tuition) experiencing higher school quality than others.

3.2.3 Mobilizing the Private Sector in this Simple Economic Setting

Policy aimed at mobilizing the private sector in such a setting—either through the removal of barriers to entry for private schools or through explicit tuition subsidies in the form of vouchers, then gives rise to relatively straightforward changes in outcomes that are almost certainly positive from most policy perspectives. All students experience an improvement in school quality as a result of such mobilization as competition from the private sector serves to reduce resource inefficiencies. Unless one places sufficiently high negative weight on the emergence of variance in outcomes, fostering private school markets is unambiguously positive.

3.2.4 Introducing Income Heterogeneity

Now suppose that households differ in one respect: their income. This would result in a potentially more disturbing feature of the equilibrium in that educational quality for children could become correlated with parental income as higher income parents are more willing to pay private school tuition. At the same time, the introduction of income heterogeneity raises the possibility of different ways of fostering private school markets—with tuition subsidies potentially set in inverse proportion to household income. Thus policy could be designed to empower the poor to exert greater competitive pressure through the creation of a private school market that serves the poor.

3.2.5 Introducing Politics

We have implicitly assumed above that per-pupil public resources are exogenously fixed as private school markets are mobilized. This means school quality for all children increases as a result of more efficient resource use in both public and private schools (with children attending private school experiencing disproportionately larger increases in school quality—offset by disproportionately higher tuition costs for their parents.) It is unlikely, however, that public school resources are unaffected by increasing activity in the private sector. Several competing forces emerge: First, to the extent to which policies aimed at mobilizing private school markets induce private-school-attending students' parents to supplement public subsidies with their own resources, more resources may be available (on a per-pupil basis) in the public sector. Second, to the extent to which the political voting equilibrium changes as private-school-attending students' parents reduce their political support of public schools, the overall resources allocated to public schools may shrink. Depending on which of these forces dominates, public schools may experience either an increase or a decrease in per-pupil resources, with simulations suggesting that the latter force dominates for initial expansions of the private sector while the former dominates for larger expansion (Nechyba 2003a).

In addition, a more complex (and, in some circumstances, more realistic) model of the politics surrounding public school funding might grant disproportionately more political power to higher-income parents. To the extent to which the private sector focuses disproportionately on higher-income families, public schools that serve the poor might therefore be much more adversely affected than suggested by a simply "one-man, one-vote" model. This may arguably be precisely

what has happened in countries like Brazil, where notoriously inefficient and underfunded public schools serve only the poor while middle- and high-income families almost universally attend private schools.

3.3 Pedagogical Targeting and Horizontal Differentiation

Now suppose we return to the simple setting at the beginning of the previous section but we introduce to this setting “horizontal” heterogeneity of children. By “horizontal” heterogeneity, I mean simply that different children respond differently to alternative pedagogical approaches or that parental tastes on particular characteristics of schools (such as the degree of religious education) differ. Placing all children in the public school might then be inefficient if that school has to commit to a single or a limited set of pedagogical approaches, and private schools gain a competitive advantage by differentiating themselves horizontally (Ferreyra 2007; Cohen-Zada and Justman 2005). This could be viewed as a special case of the resource efficiency advantage of private schools discussed in the previous section—with the public school inefficiency now arising from the limited pedagogical approaches in public schools rather than from rent seeking.

3.3.1 Equilibrium without Peer Effects

Let us begin with the case where there are no cross-type peer effects—that is, conditional on a particular pedagogical approach being used, a student of type A neither benefits nor is hurt by having a student of type B in the same classroom. Separation of types is then unambiguously positive for all students since it allows a more targeted pedagogical approach for each student. Some might benefit more from this separation than others—implying that some (of the otherwise identical) parents are willing to pay more for their child to separate than others. Each parent then makes a choice of whether to attend a private school targeted to her type of child and pay the corresponding private school tuition, or to send her child to public school that is less targeted (and thus of lower quality for her child) but free.

In equilibrium, we would then expect private schools to target those types of children that benefit the most from separation, with the remaining children attending public school. Those children attending private schools will experience higher school quality given the targeted pedagogical approaches, while those in the public school will experi-

ence no decline in school quality and potentially an increase if the public school can target more effectively given that some student types have exited to the private sector. The higher “quality” of horizontally targeted private schools, however, refers to quality as subjectively judged by parents—and this may be at odds with how policy makers define quality. To take an extreme example, some parents may view racial homogeneity of a school as an important dimension of subjectively defined quality, causing schools to erect racial barriers to entry into the school. Policies might therefore require particular demographic mixes of private schools if larger social aims (outside maximizing parental satisfaction) are to be achieved.

3.3.2 Cost Differences of Different Types

It may also be the case, however, that the pedagogical needs of different types of children require different levels of per-child resources. For instance, learning-disabled children, or children with different native languages, may require more. As a result, the private sector would be more likely to attract parents of “low cost” children first, leaving “high cost” children in the public school. Again, however, policies to mobilize the private sector might be designed to take these cost differences into account, offering, for instance, higher voucher levels for children with special needs.

3.3.3 Introducing Cross-Type Peer Effects

The efficiency and welfare implications of mobilizing the private sector become murkier, however, once we introduce the possibility of “cross-type” peer effects. Such peer effects arise when, conditional on a particular pedagogical approach, students of type A benefit from the presence of students of type B (or vice versa), or alternatively if students of type A are hurt by the presence of students of type B (or vice versa). To the extent to which these peer effects are always negative, the case for separation of types becomes even more compelling—increasing the potential for efficiency enhancements from private schools. If the effects are positive in both directions (in ways recognized by parents), some mixing of types may be optimal—but private schools would have an incentive to structure schools accordingly since parents of both types would prefer mixing over separation. There are, however, two types of scenarios under which the private sector might induce separation of types that is suboptimal. The first arises when peer effects are positive in one direction and negative in the other, a

case treated in section 3.4. The second arises if the peer effects take the form of a larger externality that parents themselves have no incentive to internalize.

Consider, for instance, the possibility that interaction of types results in a greater awareness of the needs of others, a greater respect for diversity, and, in the long run, a better equipped citizenry that can result in a more harmoniously functioning society. Parents themselves may place limited value on their own child developing. Put differently, such externalities result in a classic free rider problem, where each parent would like to free ride on the benefits from diversity in other schools while maximizing her own children's human capital accumulation. Under this scenario, a mobilization of the private sector will result in too much separation—separation that maximizes production of human capital at the expense of other social goals. This is not, however, to say that mobilizing the private sector per se will inevitably result in too much separation in the presence of these larger externalities. Rather, to the extent to which policy makers believe that broader social goals might be achieved, policies aimed at mobilizing the private sector would have to be designed more specifically with this goal in mind. For instance, private school voucher amounts could depend on the demographic mix of students within the private schools that accept the voucher.

3.4 “Cream Skimming” and Vertical Differentiation

Suppose now that student ability varies in a “vertical” rather than a “horizontal” fashion—in other words, some students have higher ability than others, with no gains from differentiating pedagogical approaches but potential gains from offering different curricula to different children. Higher-ability students may benefit, for instance, from a more accelerated curriculum than low-ability students.

3.4.1 Equilibrium without Peer Effects

In equilibrium, we would then expect private schools to differentiate themselves based on the curriculum they offer, much as was the case for private schools differentiating themselves based on their pedagogical approach in the previous section. In the absence of peer effects, this simply results again in more specialized schools that serve different student types more effectively, with parents whose children bene-

fit disproportionately from separation first in line to attend private schools. As in the previous section, the introduction of household income differences gives rise to equity concerns as high-income parents become more able to take advantage of targeted private schools, and this concern is exacerbated when parental income is inversely correlated with the costliness of curriculum needs. In principle, these concerns can again be addressed through careful design of voucher policies that vary voucher levels based on household income and student type.

3.4.2 Introducing Vertical Peer Effects and Cream Skimming

The case for increasing the role of private schools becomes more problematic, however, in the presence of what I will call vertical peer effects. Such effects arise when students can be hierarchically ordered in such a way that students of type A benefit students of type B but students of type B hurt the achievement of students of type A. Most often, this is modeled as students of high ability benefiting students of low ability and students of low ability hurting the achievement of students with high ability.

The presence of such peer effects now introduces an incentive for private schools to erect barriers to “low peer quality” students. Such barriers are not needed in the absence of peer effects since separation of types in such a case arises from the decentralized decisions that individuals make as they choose schools. In the presence of such peer effects, however, parents with low-ability children may find private schools aimed at high-ability children attractive because of the positive peer effects from high peer quality in those schools. Thus, schools have an incentive to deliberately “skim the cream” off the public schools. While the concern that voucher policies might lead to a decline in resources for public schools is often raised, it is not always made explicit that perhaps the most important of these “resources” in fact have little to do with financing and much more to do with the types of students and parents that are attracted away from public schools.

3.4.3 Different Means of Cream Skimming

Private schools then have two types of approaches at their disposal. First, they can design tuition policies with the aim of forcing parents of lower peer quality children to face the costs they are imposing on the school by placing their children there (Epple and Romano 1998; Cautt 2001). Under this approach, we would expect private schools to

price-discriminate based on student types, potentially offering scholarships to high-ability children and high tuition to low-ability children. In equilibrium, this would imply that the only low-ability children that end up in high peer quality private schools will be those whose parents have high incomes and can afford the higher tuition—leaving the public school with a mix of different student types with parents that are disproportionately poor. The private sector would then be characterized by a hierarchy of schools ordered on the peer quality they offer, with each of the schools being of higher quality than the public school. And private school pricing would “internalize” the peer externalities in the private sector, thus enhancing efficiency (at the expense of raising genuine equity concerns).

Alternatively, private schools can simply choose to screen students and admit only those that satisfy some minimum peer quality level (Nechyba 1999, 2000, 2003a,b,c; Ferreyra 2007). A similar hierarchy of schools would be expected to emerge, but the composition of students within any given school would be more homogeneous because pricing is not used to compensate for the presence of high-cost students.

3.4.4 Ability Tracking as a Response by Public Schools

In the absence of peer effects, the public school may be concerned about losing students to the private sector and may thus attempt to use resources more efficiently to minimize such exits. In the presence of horizontal peer effects (such as those discussed in section 3.3), this may cause public schools to increase the types of pedagogical approaches offered. But in the presence of vertical peer effects, a much stronger incentive emerges for public schools to respond to private school cream skimming since the exit of high-ability students and households carries with it a negative externality for the remaining students.

A possible response by the public sector is then to target resources more directly on those students that are most likely to exit—that is, students of high ability and high-income parents. For instance, one might expect an equilibrium response to result in increased ability tracking combined with high-income parents exerting disproportional influence on which track their children are assigned to. This, in essence, could result in “schools within schools” where public schools respond to the private school advantage by selecting peer quality within the public school tracks (Epple, Newlon, and Romano 2002; McHugh 2005).

In the absence of such tracking, we have said that one would expect an equilibrium hierarchy of school quality, with private schools differentiated by peer quality, and the public schools offering lower quality than all private schools. With the emergence of tracking, on the other hand, this hierarchy of school quality may take on a different form, with the lowest track in the public schools offering the lowest quality, but with some private schools offering school quality below the higher public school tracks. This is worrisome from an equity perspective since the logic again predicts that those who end up with the lowest school quality will be poor households with relatively low-ability children. And, with the introduction of vertical peer effects, school quality for such children may well fall with the mobilization of private schools.

As before, however, such concerns can, in principle be addressed by the way in which vouchers are designed (Epple and Romano 2002; Hoxby 2001). For instance, one can design vouchers to be inversely related to household income and vary depending on student type—thus offering increased school resources to those who find it disproportionately difficult to afford private school tuition and those whose children are disproportionately costly.

3.5 Unbundling of Schooling and Housing Choices

In everything we have discussed thus far, we have explicitly assumed away any geographical considerations—and this in turn has permitted us to treat the public sector as if it consisted of a single public school and has allowed us to focus on three types of private school advantages: increased resource efficiency, targeted (horizontal) pedagogical targeting, and (vertical) cream skimming. As is abundantly clear to even the most casual observer of school policy debates, however, a model in which all public schools are treated as if they are the same does not match empirical reality in contexts such as the United States, where the public sector is characterized by vastly different schools in different geographically defined neighborhoods and districts. The presence of substantial (vertical) differences in public school quality then suggests the presence of important frictions that result in an equilibrium sorting of parents and students into different public schools. And the main such friction undoubtedly arises from the addition of geographical constraints that impact the choice set from which parents of different types can choose.

3.5.1 Sorting into Heterogeneous Public Schools through Housing Markets

Even if parent A places less value on school quality than parent B, he would choose a higher-quality school over a low-quality school if both are equally costly just as consumers will always choose higher-quality cars over lower-quality cars if all cars are equally priced (even if they differ in terms of how much value they place on car quality). Thus, even when parental tastes for school quality differ, some sorting mechanism must be in place that results in some children ending up in better public schools and others in worse public schools. This sorting mechanism, at least in the United States, is closely related to how parents gain access to different public schools.³ The right to attend a particular public school is typically given to those who reside within some geographically defined region that is served by that public school. In some states, school districts are small and contain a small number of schools to choose from. In other states, school districts are larger, with each district divided into neighborhoods that are served by particular schools.⁴ But in each of these cases, the choice of attending a particular public school is *bundled* with the choice of residential location and thus linked to housing markets that price access to schools. As a result, public schools are priced.

3.5.2 Quasi-Public School Markets and Residential Segregation

Public schools exist in part because of a collective desire to provide access to educational opportunities that are unrelated to the economic circumstances of parents and partly because of a sense that schools should internalize larger externalities (such as those discussed in section 3.3.3). In practice, however, the bundling of public school access to private housing markets results in a *quasi-public* system that, while maintained through taxpayer contributions and shaped by political processes, contains elements of a private system in that access is priced—resulting in strong correlations of educational opportunities for children with economic circumstances of parents as well as considerably less mixing of different types of students than one would expect if school assignments were random.

Since pricing of public school access is through residential housing markets, however, the quasi-pricing of public schools has an additional effect that differs from explicit pricing in private school markets in that it introduces an explicit economic rationale for *residentially segregating households* along income lines. Empirically based simulations of hous-

ing and school markets suggest that this force may be quite powerful, resulting in levels of income segregation that are substantially greater than one would expect in the absence of school considerations (Nechyba 2003b). To the extent that peer externalities operate not only within schools but also within residential neighborhoods, this raises additional concerns related to persistent achievement differences.

3.5.3 The Role of Private Schools in Quasi-Public School Markets

Quasi-pricing of school access through housing markets then offers the final of our four potential competitive advantages for private schools. Consider, for instance, a middle-income family struggling to pay inflated housing prices in a good public school district for the sole reason of gaining access to that public school. A private school entrepreneur may then open a school in a neighboring district with low public school quality in order to permit this household to divorce its housing choice from its school choice. While the household would now have to pay school tuition, it is also free to take advantage of bargains in the housing market of the worse public school district. Thus, the advantage that emerges for private schools arises precisely because of the quasi-public nature of public schools.

Even in the absence of explicit policies aimed at mobilizing the private sector, we would therefore expect to find private schools in lower-income districts in part to allow some households to reside in larger houses within that district while not being affected by the public school quality offered. Empirically based simulations in fact suggest that private school markets may be playing a substantial role in moderating the levels of income segregation we observe—while at the same time reducing the housing price differences that would persist in a purely quasi-public system (Nechyba 2003b). Thus, while the quasi-public nature of public schools in residence-based systems gives rise to residential segregation, the presence of a simultaneous private sector tends to ameliorate such residential segregation.

While our previous discussions suggested that an equilibrium can typically be characterized by a hierarchy of school quality in which the public school offers the lowest level of school quality, the addition of the quasi-public nature of public schools now suggests a somewhat more complicated equilibrium hierarchy. The public school in the lowest quality school district must still offer the lowest quality in the system overall, with all private schools attracting parents through higher quality. However, it is now quite plausible (and empirically likely)

that an equilibrium will contain some public school districts that offer school quality higher than what is offered by some private schools located in lower-quality public school districts, with quasi-prices in those public schools higher than explicit tuition in lower-quality private schools elsewhere. The previous hierarchy of private schools dominating public schools thus continues *within a school district* but not necessarily *across* school districts.

3.5.4 Mobilizing the Private Sector in a Quasi-Public School Environment

None of this, of course, lessens the importance of issues raised within a framework that treats the public school sector as a single public school. Rather, it adds an additional layer of complexity in which those forces now interact with the additional considerations raised by the bundling (and unbundling) of school and housing choices. It furthermore focuses attention on the role of school financing on residential segregation.

Consider a general voucher policy aimed at mobilizing the private sector in a quasi-public school. In the absence of residential mobility, we are left with precisely the same forces to consider as we did in the previous sections—except that these forces would now play out *within* each district. In addition, however, one would expect *inter jurisdictional* effects to emerge as parents of public school attending students in better school districts reevaluate their decision to pay high housing prices in order to access good public schools. While it might be unrealistic to assume that a voucher policy will cause households to immediately move, over time, as households move for reasons related to job location or family expansion, we would expect them to make housing and schooling choices differently than before the introduction of the voucher policy.

While private schools might therefore initially attract families within districts in which they form, the theory predicts that increasingly such private schools would market themselves across districts—causing inflows of households that, on average, will have higher income than those currently in the district. Local public school spending may then rise (because a larger tax base and shrinking public school population combine to make it easier to raise per-pupil spending, or it may fall if private-school-attending students' parents are sufficiently powerful in the political process (Nechyba 2003a). In addition, local public schools may suffer from the exit of good peer quality students, but they may

benefit from reduced resource inefficiency due to competitive pressures. In short, a variety of competing effects may cause local public schools to improve or become worse.

Empirically based simulations suggest that the long-run impact of the partial unbundling of housing and schooling choices through general voucher policies will be more *inter-* rather than *intra-*jurisdictional (Nechyba 1999, 2000, 2003a,b,c,d). This suggests that, while private schools would emerge disproportionately in lower-income districts, their clientele will be drawn disproportionately from higher-income districts. To the extent to which cream skimming by private schools is an important factor in the emergence of private schools, this furthermore suggests that public schools in higher-income districts may suffer disproportionately.

3.5.5 Implications for Targeting Vouchers

I have argued in previous sections that equity concerns that emerge as we think about mobilizing the private sector can be addressed by *differentially targeting vouchers to households of different types* (and, in some instances, to schools exhibiting different characteristics). The introduction of the quasi-public nature of public schools now introduces the possibility that policy can be aimed at encouraging unbundling of school and housing decisions by *targeting geographically rather than targeting households*. If a voucher is targeted to residents who reside in low-performing (or poor) districts, any household that moves to the district qualifies for the voucher. Thus, a district-targeted voucher differs dramatically from a household-targeted voucher in that it can spread the impact of increased school competition to non-targeted districts (Nechyba 2000). In fact, general equilibrium simulations in previous work suggest that over two thirds of the impact of geographically targeted vouchers arises from migration—with middle-income households moving to lower-income (targeted) districts to take advantage of the vouchers. Such effects cannot arise when targeting is toward low-income families.

3.5.6 The Political Economy of Voucher Design

The realistic modeling of public schools within the context of housing markets also has potentially dramatic implications for the political economy of voucher design. In the absence of modeling the public sector as quasi-public and linked to housing markets, political economy considerations are squarely focused on the impact that vouchers would

have on the costs and benefits of accessing quality schools for parents. But once the link to housing markets is taken into account, these considerations may ultimately be outweighed by considerations related to capital gains and losses that homeowners are likely to experience in an environment in which the private sector has been mobilized by unbundling housing and schooling choices. The desire of policy makers to mobilize private schools to enhance educational opportunities therefore runs into a political constraint due to the effects of such policies for the distribution of homeowner wealth (Brunner, Sonstelie, and Thayer 2001).

This suggests that, as different methods of targeting vouchers funded by higher-level governments are considered, there is an inherent bias toward targeting vouchers to low-income households if politics is disproportionately influenced by resources of higher-income households. Such targeting in essence isolates the competitive effect from a more active private sector to low-income areas—thus reducing the impact on homeowner wealth through changes in housing prices. While the most effective way of spreading a competitive effect throughout the public school system may therefore involve geographic targeting, it seems unlikely that such targeting by higher-level governments is politically feasible without other offsetting public policies. At the same time, such targeting could emerge “from the bottom up”—with districts such as inner cities providing vouchers to residents of the district in order to draw residents from suburbs back into cities.

3.6 Predicting the Impact of Mobilizing Private Schools

Our preceding discussion suggests a number of competing effects as the private school sector increases its activity—with the effects depending on what assumptions we make about the competitive advantages of private school and the particulars of policies employed to mobilize the private sector. The question whether competition is good or bad is therefore much too coarse. The real question is what kinds of competition are likely to lead to the types of policy outcomes aimed for by policy makers, and what kind of policy support for private initiative leads to outcomes in line with policy goals.

Structural economic modeling linked to empirical data can give us some sense of which predictions regarding vouchers are relatively robust to changing assumptions and which are sensitive to what we assume about private school formation and public school responses. In

work that takes as its benchmark the quasi-public sector operating alongside a private sector in New Jersey, I have simulated (in previous work) different types of private school sectors with competitive advantages analogous to the four types discussed in this chapter. With the quasi-public sector operating in poor, middle-income, and wealthy districts, the model can then simulate the impact of various policies.

While results on different types of vouchers (and other school finance policies) are available elsewhere, I report here only one set of simulations in an attempt to illustrate how disagreements regarding the desirability of vouchers can emerge directly from different assumptions about the private and public sector. The table that follows reports simulated school quality indexes for different voucher amounts (not targeted in any way) on public school quality in the three different districts. The possibility of families unbundling their school and housing choices is maintained throughout as is a level of peer externality consistent with empirical observations. "School quality" refers to the subjective evaluation of schools by parents (as inferred from house price differences for identical houses across districts).

In the first third of the table, the only private school advantage (aside from allowing households to unbundle their housing and schooling choices) derives from their ability to engage in vertical cream

Table 3.1
Public School Quality as (Nontargeted) Vouchers Are Introduced

	Voucher amount				
	\$0	\$1,000	\$2,500	\$4,000	\$5,000
<i>Cream skimming only</i>					
Poor district	69.97	68.05	65.82	39.83	***
Middle district	100.00	98.80	89.43	78.93	44.59
Wealthy district	126.31	120.22	112.96	93.19	80.27
<i>Cream skimming and pedagogical targeting</i>					
Poor district	70.36	76.46	80.55	81.61	76.85
Middle district	100.00	101.52	104.96	105.99	101.55
Wealthy district	131.05	130.11	129.67	131.74	127.02
<i>Cream skimming and competitive resource efficiency</i>					
Poor district	65.72	67.42	69.81	71.08	71.74
Middle district	100.00	101.83	104.90	107.68	109.75
Wealthy district	124.64	126.96	128.23	131.24	132.59

Source: Adapted from tables 5c and 6a in Nechyba (2003a). School quality is normalized to be equal to 100 in the middle-income district in the absence of vouchers.

skimming. As private schools are fostered through vouchers, the public schools therefore lose high peer quality students, and public school quality for those who remain in public schools drops (at an increasing rate as voucher amounts increase).⁵ To the extent to which one believes that vertical cream skimming is the primary competitive advantage of private schools, one might therefore be concerned about the impact that an increasingly active private school market has on public school quality.

The middle portion of the table then introduces horizontal (pedagogical) targeting, the private school advantage discussed in section 3.3. With empirically plausible levels of this advantage, the simulations suggest that it is plausible for public school quality to increase with a more active private school market (as public schools can more effectively target their resources on the student types that remain in the public system). Similarly, the lower portion of the table introduces resource efficiency on the part of private schools and competition-induced increases in public school efficiency. Again, plausible levels of such effects can result in the prediction that public school quality will increase with greater competition. Altering our assumption about what private schools do and how public schools respond within empirically plausible ranges therefore can alter dramatically how we think private school competition will affect the public sector.

The only prediction of the model that appears to be completely robust to changing assumptions about private and public schools is the residential desegregating effect of increased private school competition. To the extent that larger externalities from diversity are present and operate both within schools *and* neighborhoods, this may ameliorate concerns raised by greater segregation in the school sector.

3.7 Conclusion

This paper suggests that private schools must operate with some competitive advantages relative to public schools in order to attract households—and that the nature of these advantages is likely to shape our view of how the private sector can be most effectively mobilized to advance academic achievement and other social goals. Rather than asking whether competition is desirable, the discussion suggests more nuanced policy questions asking what kinds of policies are most likely to advance the aims of policy makers depending on the underlying economic realities. Throughout, it is important to realize that, at least

in the United States, there really is no such thing as a “public school,” given the private school characteristics of public schools that emerge when access is rationed through housing markets. It is similarly unlikely that there will ever be such a thing as a fully “private school,” given that private schools are subject to government oversight and given that explicit government support for private schools will almost certainly be conditional on certain public aims being met.

In the context of private school vouchers, policy makers can choose from a variety of methods of targeting vouchers in order to address potential concerns. Broadly speaking, such targeting can be done along four different dimensions: (1) by parental characteristics (such as income); (2) by student characteristics (such as learning disabilities, aptitude, etc.); (3) by school characteristics (such as the demographic composition of the voucher-accepting private school); or (4) by the characteristics of the neighborhood in which the household lives (such as the level of underperformance of the local public school).

While different assumptions about private schools and public school responses to competition give rise to a number of concerns, it is unclear at this point to what extent these concerns ought not apply equally to public schools given the quasi-public nature of schools in which other prices (such as property values) substitute for explicit tuition. Furthermore, it appears plausible that such concerns can be addressed through voucher design (along the four dimensions previously discussed), perhaps even more effectively than they could be in the absence of vouchers within the context of a quasi-public school system. Put differently, policies aimed at mobilizing the private sector can come in many shapes and flavors, leaving much room for policy makers to design with an aim of meeting specific policy goals.

Notes

1. Other policies aimed at mobilizing the private sector include elements of the charter school and home schooling movement, support for privately funded enrichment programs, Saturday and Sunday programs, Internet supplements to traditional schooling, industry partnerships, etc.
2. Yet another component of the overall equilibrium that is not emphasized in this chapter involves equilibrium in the teacher labor market. See, for instance, Loeb and Page (2000).
3. In other contexts, such as some of the European systems, access to different types of public schools is based on academic achievement—making the “ability tracking” model of section 3 a more relevant model than the quasi-public school model discussed here.

4. Sometimes some degree of choice within a district exists, but even that is often subject to capacity constraints that cause those living close to a school within the district to have the right to attend and those that live closer to another school excluded by those constraints or by transportation costs involved in getting to the alternative school.
5. The public school in the poor district actually ceases to exist when the voucher level reaches \$5,000, the minimum per pupil spending level assumed for a school to exist. The more dramatic drops in quality in each district take place when private school attendance in the district increases sufficiently to “tip” the political support for public schools.

References

- Bayer, P., F. Ferreira, and R. McMillan. Forthcoming. A unified framework for measuring preferences for schools and neighborhoods. *Journal of Political Economy*.
- Brunner, E., J. Sonstelie, and M. Thayer. 2001. Capitalization and the voucher: An analysis of precinct returns from California’s Proposition 174. *Journal of Urban Economics* 50, no. 3: 517–536.
- Caucutt, E. 2001. Peer group effects in applied general equilibrium. *Economic Theory* 17: 25–51.
- Chubb, J., and T. Moe. 1990. *Politics, Markets and America’s Schools*. Washington, D.C.: Brookings Institution.
- Cohen-Zada, D., and M. Justman. 2005. The religious factor in private education. *Journal of Urban Economics* 57, no. 3: 391–418.
- Cooley, J. 2005. Desegregation and the achievement gap: Do diverse peers help? Duke University working paper, Durham, N.C.
- Epple, D., E. Newlon, and R. Romano. 2002. Ability tracking, school competition, and the distribution of educational benefits. *Journal of Public Economics* 83: 1–48.
- Epple, D., and R. Romano. 1998. Competition between public and private schools, vouchers and peer group effects. *American Economic Review* 88, no. 1: 33–62.
- Epple, D., and R. Romano. 2002. Educational vouchers and cream skimming. Working Paper No. 9354. National Bureau of Economic Research, Cambridge, Mass.
- Ferreira, M. 2007. Estimating the effects of private school vouchers in multi-district economies. *American Economic Review* 97: 789–817.
- Hanushek, E. 1999. Some findings from an independent investigation of the Tennessee STAR experiment and from other investigations of class size effects. In *Earning and Learning: How Schools Matter*, ed. S. Mayer, and P. Peterson. Washington, D.C.: Brookings Institution.
- Harris, J. 1998. *The Nurture Assumption*. New York: The Free Press.
- Hoxby, C. 1996. How teachers’ unions affect education production. *Quarterly Journal of Economics* 111, no. 3.
- Hoxby, C. 1999. The effects of school choice on curriculum and atmosphere. In *Earning and Learning: How Schools Matter*, ed. S. Mayer, and P. Peterson. Washington, D.C.: Brookings Institution.

- Hoxby, C. 2000a. Does competition among public schools benefit students and taxpayers? *American Economic Review* 90, no. 5.
- Hoxby, C. 2000b. Do private schools provide competition for public schools? Working paper. Harvard University, Cambridge, Mass.
- Hoxby, C. 2001. Ideal vouchers. Working paper. Harvard University, Cambridge, Mass.
- Krueger, A. 1999. Experimental estimates of education production functions. *Quarterly Journal of Economics* 114, no. 2: 497–532.
- Loeb, Susanna, and Marianne Page. 2000. Examining the link between teacher wages and student outcomes: The importance of alternative labor market opportunities and non-pecuniary variation. *Review of Economics and Statistics* 82, no. 3: 393–408.
- Manski, C. 1992. Education choice (vouchers) and social mobility. *Economics of Education Review* 11, no. 4: 351–369.
- McHugh, C. 2005. School competition and empirical evidence on the strategic behavior of schools. Ph.D. dissertation, Duke University.
- McMillan, R. 2004. Competition, incentives, and public school productivity. *Journal of Public Economics* 88: 1871–1892.
- Nechyba, T. 1999. School finance induced migration patterns: The impact of private school vouchers. *Journal of Public Economic Theory* 1, no. 1: 5–50.
- Nechyba, T. 2000. Mobility, targeting and private school vouchers. *American Economic Review* 90, no. 1: 130–146.
- Nechyba, T. 2003a. Introducing school choice into multi-district public school systems. In *The Economics of School Choice*, ed. C. Hoxby, 145–194. Chicago: University of Chicago Press.
- Nechyba, T. 2003b. School finance, spatial income segregation and the nature of communities. *Journal of Urban Economics* 54, no. 1: 61–88.
- Nechyba, T. 2003c. Centralization, fiscal federalism and private school attendance. *International Economic Review* 44, no. 1: 179–204.
- Nechyba, T. 2003d. Public school finance and urban school policy: General vs. partial equilibrium analysis. *Brookings-Wharton Papers on Urban Affairs*, 139–170.
- Oates, Wallace. 1969. The effects of property taxes and local public spending on property values: An empirical study of tax capitalization and the tiebout hypothesis. *Journal of Political Economy* 77, no. 6: 957–971.

4 The Practice of Public-Private Partnerships

Norman LaRocque

Education sectors the world over are facing a number of social, educational, and economic challenges. Many governments have responded to these challenges by introducing market-based education policies emphasizing choice, managerial autonomy, and accountability for results. This chapter provides an overview of international examples of government agencies contracting for the delivery of education services, including contract schools, charter schools, voucher-type programs, and infrastructure public-private partnerships. It concludes by drawing some tentative lessons for the design and implementation of contracting in the education sector.

Contracting has been widely used by government agencies to procure a range of services such as transportation, refuse collection, and fire protection. While contracting for social services is less common, private organizations (and particularly not-for-profit organizations) have long played a role in the delivery of services such as child care, employment counseling, and welfare support. In the education sector, governments have made use of contracting with the private sector for the delivery of auxiliary services such as school transport, food services, and cleaning. Contracting for the delivery of core education services is at a much earlier stage of development. While such contracting is not widespread, there are a number of examples from around the world.

Contracting can be defined as a purchasing mechanism used to acquire a specified service, of a defined quantity and quality, at an agreed-on price, from a specific provider, for a specified period.¹ In practical terms, contracting involves a government agency entering into an agreement with a private provider to procure an education service or bundle of services in exchange for payment.

4.1 Potential Benefits of Contracting

Proponents argue that contracting out the delivery of education services to the private sector may have a number of benefits over traditional procurement methods. These include improved efficiency in service delivery, greater transparency in government spending, and increased access to services, especially for those who were not well served under traditional procurement methods. Contracting may also allow government agencies to secure specialized skills, focus on functions where they have a comparative advantage, overcome operating restrictions such as inflexible salary scales and work rules, and facilitate the adoption of service delivery innovations.

On the other hand, opponents argue that contracting can have a number of drawbacks, including that it is more expensive than traditional procurement methods (for example, because of the cost of awarding and managing contracts and a lack of competition), fosters corruption, and results in a loss of government accountability and control.²

4.2 Typology of Contracting Models in Education

Education sector contracting can take several different forms, as outlined in table 4.1. Under the *management contract model*, a government agency contracts with a private provider to manage an existing government service or set of services using government infrastructure. For example, a local school district in the United States could contract out the management of a failing school to a private operator. Such models typically involve the government paying a fixed amount per student to the private sector provider. Management contracts can be structured differently. Under one variant, staff remain employed by the school district (i.e., the *pure management model*). Under a second variant, the private contractor employs its own staff (i.e., the *operational contract model*).

Under the *service delivery model*, a government agency contracts with a private provider to deliver a specified service or set of services using privately owned infrastructure. Service delivery contracts can be used either for “core” education activities (e.g., supplementary tuition, schooling improvement, school review) or “non-core” activities (e.g., school transport, food services).

Table 4.1
 Typology of Arrangements for Service Delivery in Education

Delivery arrangement	Who chooses service?	Who manages service?	Who provides infrastructure?	Who employs staff?
Government provision	Government	Government	Government	Government
Management model:				
▪ Pure management contract	Government	Private sector	Government	Government
▪ Operational contract	Government	Private sector	Government	Private sector
Service delivery model:				
▪ Core services	Government	Private sector	Private sector	Private sector
▪ Non-core services	Government	Private sector	Private sector	Private sector
Infrastructure PPPs model	Government	Private sector	Private sector	Core staff = public sector Non-core staff = private sector
Private sector provision	Consumer	Private sector	Private sector	Private sector

Under an *infrastructure public-private partnership (PPP) model*, a government agency contracts with the private sector for the provision of educational infrastructure such as schools, IT laboratories, or hostels. The exact nature of infrastructure PPPs can differ. Under the most common variant—build-operate-transfer (BOT)—the private sector finances, constructs, and operates a school or other infrastructural asset for a fixed period (e.g., twenty-five or thirty years). During that period, the private partner effectively “leases” the school to the government for a specified rental. At the end of the contract period, the school or other infrastructural asset is turned over to the public sector. Under this model, teaching staff are employed by the government, but non-core staff (e.g., janitors, food service, and maintenance workers) are employed by the private contractor.

Contracting models differ from both pure government provision and pure private sector provision in that they involve both the government and the private sector in some form. For example, under the management model, the government contracts out the provision of the service to private operators, but retains ownership of the facilities (and in some cases continues to employ staff). Similarly, both the service delivery model and the management model involve government financing of the service, although the private sector actually delivers the service.

Finally, infrastructure PPP models involve private sector financing and operation, but ownership reverts to the public sector at the end of the concession or contract period.

4.3 International Examples of Contracting in Education

There are an increasing number of examples of contracting in education, in both developed and developing countries. These include charter schools in the United States; privately managed public schools in the United States, Colombia, and South America; government contracting with the private sector for the delivery of education in the Philippines, Uganda, and Côte d'Ivoire, and the provision of educational infrastructure in the United Kingdom, Australia, and Egypt. Several examples are outlined as follows and summarized in table 4.2.

4.3.1 Private Management of Public Schools

One area of increasing private participation is the private management of public schools. There are various models of private management of public schools employed by government agencies in several developed and developing countries. Four examples are highlighted as follows:

Contract Schools, United States The private management of public schools in the United States can take either of two forms. The first involves direct contracting, under which a local school board contracts directly with an Education Management Organization (EMO) to manage a public school. The second involves indirect contracting under which EMOs manage charter schools either as the holder of the school charter or under contract to the organization that holds the school charter.

Although contract schools are privately managed, they remain publicly owned and funded. Students usually do not pay fees to attend these schools. Typically, private sector operators are brought in to operate the worst-performing schools in a given school district. Private sector school managers may operate under either management contracts or operational contracts. Under the former, the management of a public school is turned over to a private sector operator, but teaching staff remain employed by the local school board and are subject to the teacher union contract. Under the latter, teaching staff are employed by the private operator and their terms and conditions of employment may differ from the teacher union contract. The private management

company is paid either a fixed amount per student (usually equal to the unit cost of schooling in the public sector) or a management fee and must meet performance benchmarks.

In 2005–06, 521 public schools—with enrollments of 237,000—were under private management by fifty-one EMOs in twenty-nine states and the District of Columbia (D.C.). The largest EMO was Edison Schools, with 101 schools and 60,000 students. Approximately 84 percent of EMO-managed schools are charter schools, while the remaining 16 percent are under direct contracts with the local school board. Both the number of privately managed public schools and enrollments have grown since the late 1990s, with a small decline in the most recent year (figure 4.1).³

In Philadelphia, a state takeover of the city's schools saw seventy of the worst-performing schools contracted out to for-profit and not-for-profit private contractors, including Edison Schools, which was awarded contracts to manage twenty schools in 2002 (increased to twenty-two in 2005). The Philadelphia experience remains controversial.⁴ Chicago Public Schools (CPS) is using contract schools as part of its Renaissance 2010 initiative. Contract schools are managed by independent not-for-profit organizations subject to a performance agreement between the organization and the CPS and are freed from many CPS regulatory requirements, but not from state school laws. Teachers and staff of contract schools are employed by the private operator.

Charter Schools, United States Charter schools are secular public schools of choice that operate with freedom from many of the regulations that apply to traditional public schools, such as geographic enrollment restrictions and teacher union contracts. The *quid pro quo* for charter schools' increased autonomy is strengthened accountability. The charter that establishes a school is a performance contract that details the school's mission, program, goals, students served, methods of assessment, and ways in which success will be measured. Charter schools may be managed by the community or by a for-profit or not-for-profit school manager.

School charters may be granted by a district school board, a university, or other authorizing agency. The term of a charter can vary, but most are granted for three to five years. Charter schools are accountable to their sponsor or authorizing agency to produce positive academic results and adhere to the charter contract. A school's charter can be revoked if guidelines on curriculum and management are not

Table 4.2
Summary of International Examples of Contracting for Education Services

Program	Jurisdiction	Program size	Key elements
<i>Private Management of Public Schools</i>			
Contract schools	United States	521 contract schools with 237,000 students operated by EMOs in 2005–06	School districts or charter school boards contract with private providers to manage public schools.
Charter schools	United States	More than 4,000 schools with over 1 million students in 40 states and D.C.	Charter schools operate with fewer regulations than standard state schools, but must meet increased accountability requirements.
Bogotá concession schools	Colombia	25 schools with 26,000 students	Private schools and/or education organizations bid in competitive process for management contracts of newly built schools in poor neighborhoods.
<i>Contracting with Private Schools for the Delivery of Education Services</i>			
Government sponsorship of students in private schools	Côte d'Ivoire	162,000 students in mid-1990s	Government purchases secondary school places in private schools.
Educational Service Contracting/Education Voucher System	Philippines	380,000 students in 1,800 schools in ESC in 2005–06 100,000 students assisted under EVS	Schools must maintain academic standards in order to retain contracts with government. Under both ESC and EVS, the government purchases places for students in private schools where public schools cannot meet demand.
Fe y Alegría	Latin America/ Spain	Over 1.2 million students in FyA programs and over 500,000 students in formal education in 2005	Schools operated by NGO in poorest communities in Latin America. Community provides land, construction, and maintenance of schools, while Ministry of Education typically pays teacher salaries.

<i>Public-private partnerships for educational infrastructure</i>	
Private finance initiative	166 education projects valued at approximately £5.8 billion
United Kingdom	
New Schools private finance project	9 new public schools built between 2002 and 2005 and an additional 10 from 2006
New South Wales, Australia	
PPP for educational infrastructure	39 schools built under P3 program in late 1990s
Nova Scotia	
Offenbach Schools/ Cologne Schools Project	92 schools in Offenbach County. Capital value of over EUR780 million 7 schools in Cologne with value of EUR125 million
Germany	
Proyectos para Prestación de Servicios	28 PPP projects being developed in health, education, and transport sectors
Mexico	
New schools project	Construction of 2,210 new schools
Egypt	

Educational infrastructure designed, built, financed, and managed by a private sector consortium, under a contract that typically lasts for 30 years.

Private sector financing, design, and construction of public schools, as well as provision of cleaning, maintenance, repair, security, safety, utility, and related services for school buildings, furniture, fittings, equipment, and grounds

Schools are financed, built, and operated by the private sector and leased to the government for 20 years.

Government contracting for the finance, renovation, and operation of public schools in Offenbach County. Private sector partners will operate schools for 15 years.

Refurbishment and operation of schools in Cologne. Private sector will operate the schools for 25 years.

Government contracts with private providers to design, finance, build, operate, and maintain assets and services.

Government is piloting the program to build a new campus for the University of San Luis Potosi.

Government provides land, while private sector designs, constructs, finances, and furnishes schools and provides noneducational services under 15–20 year agreements.

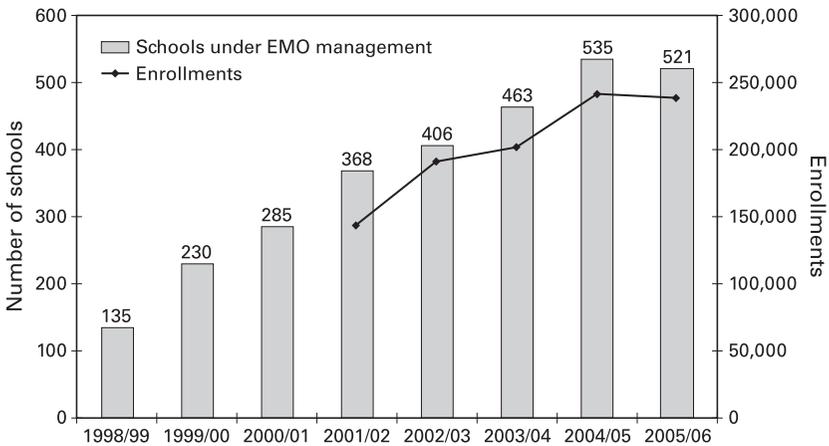


Figure 4.1

EMO-managed Schools and Enrollments, United States, 1998–99 to 2005–06

Source: Molnar et al. (2006, 3)

followed or standards are not met. At the end of the charter term, the authorizing agency may renew the school's contract.

The first charter school law was passed in 1991 in Minnesota, with the first charter school opening the following year. The number of charter schools has increased steadily since the early 1990s. There are currently about 4,000 charter schools serving over one million students in forty states and Washington, D.C. State charter school laws differ significantly in terms of their support for charter schools. Charter laws vary considerably by state and about one-fifth of states do not have any charter school law. Not all charter school laws are created equal and the regulatory framework is critical to the role and effect of charter schools. Approximately one-half of states with charter school laws have laws that are considered "strong" or "medium" in that they provide charter schools with more management freedom, limit red tape, allow community and for-profit providers to operate, and provide multiple avenues for charter authorization.⁵

Colegios en Concesión Program in Bogotá, Colombia In Colombia, the City of Bogotá has introduced the *Colegios en Concesión* (Concession Schools) program, under which the management of some public schools is turned over to high-quality private schools. The first concession schools began operating in 2000. In 2004, there were twenty-five

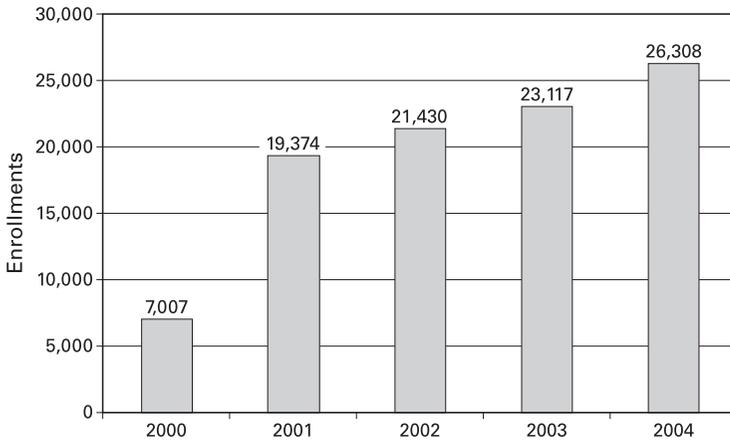


Figure 4.2

Enrollments in Concession Schools, Bogotá, 2000–04

Source: Secretary of Education, Bogotá

schools serving over 26,000 students under private management (see figure 4.2). The program was expected to grow to approximately 45,000 students in fifty-one schools (about 5 percent of public school coverage in Bogotá), but this has apparently been put on hold due to a change in the city's mayoralty. Other examples of school contracting also exist elsewhere in Colombia, including Medellín and Cali.

Under the concession schools model, private schools and/or education organizations bid in competitive process for management contracts of newly built schools in poor neighborhoods of Bogotá. Contractors may manage a single school or a group of schools. Schools must provide educational services to poor children and are paid Col\$1,114,500 per full-time student per year—well below public school unit costs for half-day schooling. Management contracts are for fifteen years. Contracts with providers are performance-based and establish clear standards that must be met. The provider has full autonomy over school management and is evaluated on results. Failure to meet performance targets (e.g., standardized test scores and dropout rates) for two consecutive years can result in the cancellation of the contract.

Schools are monitored through an inspection carried out by a private firm to monitor the maintenance of the school facilities and property. In addition, the Ministry of Education carries out reviews of pedagogical standards and finances an independent evaluation to determine whether academic objectives have been met.

The concession schools program is designed to overcome many of the traditional problems faced by public schools. These include weak leadership, inability of schools to select their own personnel, lack of labor flexibility, lack of equipment and supplies, bureaucratic red-tape, and the politicization/unionization of the education sector. Initial results show it has led to management improvements. There is a high community demand for more concession schools and educators have expressed satisfaction with the increased autonomy that schools enjoy.⁶

Fe y Alegría, Latin America Fe y Alegría (FyA) is a nongovernmental organization controlled by the Jesuit Order of the Catholic Church that operates formal preschool, primary, secondary, and technical education programs in the poorest communities in Latin America and Spain. The program began in 1955 and operates in fifteen countries. FyA's primary mission is to provide quality education to the poor, ensure that students complete at least the basic cycle of schooling, and establish schools that contribute to community development. Under the FyA model, the salaries of teachers and the principal are paid by ministries of education, while the land and school infrastructure is provided by foundations, international agencies, and voluntary fees from the local community. FyA trains and supervises teachers, manages the school, and assists it in its operation as a community development center.

A national office coordinates the network of FyA schools in each country, while overall coordination is provided by headquarters in Venezuela. Most FyA schools are located in rural areas, although some are found in or near urban slums. FyA schools can be public or private, although a majority are public. Schools generally enjoy considerable operational autonomy, including the ability to appoint school directors and teachers. The country's central curriculum is supplemented with locally developed materials. FyA schools do not charge compulsory fees. In 2005, there were over 1.2 million students in the FyA network, 40 percent of whom were in formal education programs.

4.3.2 Contracting with Private Schools for the Delivery of Education Services

A second form of private involvement in education is where the government purchases places at nongovernment schools for public school students, rather than providing the places itself in a government-owned school. Examples from two countries are highlighted here.

Government Sponsorship of Students in Private Schools, Côte d'Ivoire In Côte d'Ivoire, the government has addressed a lack of public school places by sponsoring students to attend private religious or secular secondary schools and training institutions. Under the sponsorship program, private schools receive a payment for each public student they enroll. The government sponsors students in lower and upper secondary education and in professional and technical training.

The payment amount varies with the student's educational level. Only schools that are chartered can participate in the program. Participation is contingent on the school achieving good academic results. The number of students in the sponsorship program grew from 116,000 in 1993 to 223,000 in 2001, an increase of 92 percent. In 1997 the government paid out some U.S.\$10 million to sponsor over 160,000 students at the school level (approximately 40 percent of private school enrollments in that year).

Educational Service Contracting and Education Voucher System, the Philippines The Educational Service Contracting (ESC) scheme in the Philippines was introduced in the 1980s as part of a range of programs known as Government Assistance to Students and Teachers in Private Education (GASTPE). Under the ESC scheme, the government contracts with private schools to enroll students in areas where there is a shortage of places in public high schools. The per-student payment to private schools can be up to PhP5,000 and cannot exceed the unit cost of delivery in public high schools. To be eligible for ESC, students must generally attend schools that charge very low tuition fees.

The program is targeted at students from low-income families. ESC is administered by the Fund for Assistance to Private Education (FAPE), a private not-for-profit organization. Participating schools must be certified by the Department of Education. Institutions that fail to meet certification requirements can either be put on probation or disqualified from the ESC program. In 2005–06, over 380,000 students in some 1,800 private schools were subsidized under ESC (figure 4.3). In 2007, the government was expected to spend some P2.44 billion (U.S.\$54 million) on GASTPE programs.

More recently the Philippine government has introduced the Education Voucher System (EVS), which provides a PhP5,000 subsidy to grantees. The EVS, which took effect in the 2006–07 school year, provides a more flexible and less targeted form of student assistance. Under the EVS, students are allowed to use their voucher to enroll in

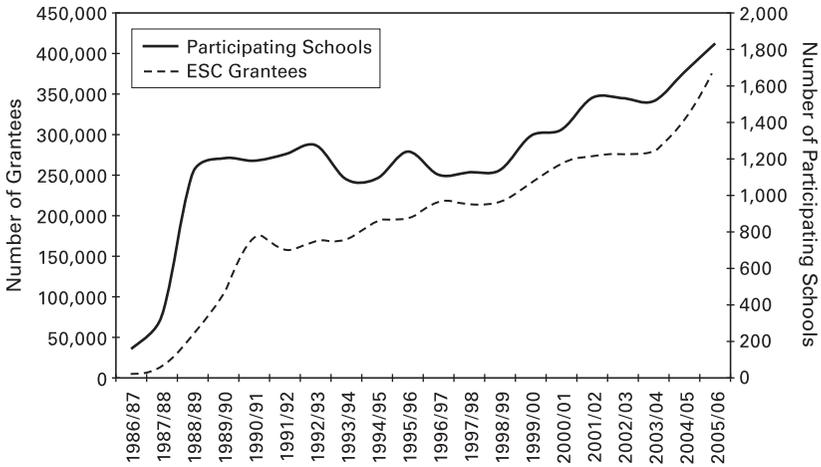


Figure 4.3

Number of ESC Grantees and Participating Schools, 1986–87 to 2005–06

Source: Fund for Assistance to Private Education and Department of Education

any private school, irrespective of whether it is in an area where public schools are overcrowded. Schools can charge fees above the voucher amount and need not be accredited. In 2007, there were some 100,000 vouchers being distributed under the EVS.

4.3.3 Public-Private Partnerships for Educational Infrastructure

Public-private partnerships are an increasingly common form of procurement for large infrastructure projects in the education sector. Infrastructure PPPs can be structured in a variety of ways. As previously discussed, under the most common type of PPP arrangement—BOT—a private operator is granted a franchise (concession) to finance, build, and operate an educational facility such as a public school, university building, or hostel. The government in effect leases the facility from the private sector for a specified period, after which the facility is transferred to the government.

Infrastructure PPPs can be structured in a variety of ways, although they do have a number of common characteristics:

- the government retains responsibility for the delivery of core services such as teaching and teaching staff continue to be employed by the government. Non-teaching staff are employed by the private operator;

- the private sector invests in school infrastructure and provides related non-core services (e.g., building maintenance);
- arrangements between the government and the private sector are governed by long-term contracts—usually twenty-five to thirty years. Contracts specify the services the private sector has to deliver and the standards that must be met;
- service contracts are often bundled, with the provider taking on several functions such as design, construction, and maintenance; and
- contract payments are contingent upon the private operator delivering services to an agreed performance standard.

Infrastructure PPPs differ from traditional procurement methods in several ways. First, the private sector provides the capital required to finance the project. Second, the government specifies the contract in terms of *outputs* or service level requirements, rather than in terms of *inputs* such as the number and size of classrooms. Third, the newly constructed facility is not turned over to the government upon completion. Rather, it is operated by the private sector until the end of the contract period. Several examples are outlined as follows.

Private Finance Initiative, United Kingdom The Private Finance Initiative (PFI) program was introduced under the Conservative government in 1992 as part of a broader policy of public sector modernization, and has been strongly supported by the Labor government since it came to power in 1997. The government uses PFI only where it is appropriate and where it expects it to deliver value for money. PFI uptake in the education sector was slow in the early years, but grew considerably following the introduction of a number of program improvements since the late 1990s. To date, the Department for Education and Skills (DfES) has signed some 166 education PFI deals, with a value of approximately £5.8 billion.

New Schools Private Finance Project, Australia Under the New Schools Project in the Australian state of New South Wales, the private sector is financing, designing, and constructing nineteen public schools. The project began with nine schools in 2002 and was expanded with a further ten schools in 2006. These new schools are being built to standards that must meet or exceed Department of Education and Training (DET) school design standards. The private sector is also providing cleaning, maintenance, repair, security, safety, utility, and

related services for school buildings, furniture, fittings, and equipment over a twenty-five- to thirty-year period. In return, the private sector receives performance-related monthly payments from the DET during the operational phase of the project.

The New Schools Project in New South Wales is part of a broader move toward PPPs in Australia. PPPs have been used by various governments to procure infrastructure across a range of sectors, including transport, health, and prisons. They have also been used in higher education, with the University of Southern Queensland and Swinburne University of Technology both using PFIs to construct educational infrastructure.

New Schools Project, Egypt The government of Egypt has recently embarked on an extensive school infrastructure PPP involving the construction of 2,210 new primary and secondary schools in an attempt to meet the president's target of 3,500 new schools by 2011. The project started in late 2006 with 300 schools in twenty-three governorates. The positive response of the private sector led to the program's expansion in early 2007 to include a further 1,910 schools. Under the PPP, the government provides land, while the private sector designs, constructs, finances and furnishes schools and provides non-educational services under fifteen- to twenty-year agreements. The value of the PPP is estimated at LE11 billion (approximately U.S.\$2 billion).

Other examples of education infrastructure PPPs include schools in Nova Scotia, Canada, the Offenbach Schools, and Cologne School Projects in Germany, the Montaigne Lyceum in the Netherlands, and the Proyectos para Prestación de Servicios in Mexico.

4.4 Lessons for Policy Design and Implementation

Contracting for the delivery of education services, although growing, remains in its infancy. The school sector in all countries is dominated by a mix of "traditional" private and public schools. To date, there is little rigorous evidence on the effectiveness of contracting as a tool for improving educational outcomes. Similarly, there are few rigorous studies examining how best to design and implement programs that involve contracting for the delivery of education services. However, a small number of studies have examined the experience with particular education-specific contracting initiatives or contracting in the public sector more generally.⁷

These studies provide some tentative lessons on the design and implementation of education contracting programs. In particular, they highlight the importance of several success factors in contracting, including the existence of an enabling policy and regulatory environment and a strong legal framework. The government's role should be to spell out the desired outputs and performance standards, set penalties for failure to achieve and rewards for success, and then leave providers to decide the best way of organizing themselves to deliver the required outputs to the specified standard.

The establishment of appropriate performance measures is a critical element of contract design.⁸ Performance indicators may be quantitative (e.g., test scores) or qualitative (e.g., parental satisfaction) in nature and provide an objective basis for determining whether the service provider has met the agreed terms and conditions of the contract. They may also be linked to provider compensation, with providers who meet the required standard rewarded through higher payments, while those who fail to do so are penalized—either through reduced payments or contract termination.

The contracting approach to government procurement of education services places much more significant demands on government agencies than do traditional methods of government procurement. The need to specify, monitor, and enforce complex contracts means that contracting agencies must have the information, skills, and capability required to manage such programs. Splitting the purchaser and provider roles within the relevant regulatory authority can help to minimize conflicts between the government's role as purchaser of education services and its role as provider of education through the public school system. Use of an independent organization to evaluate the contractor's performance can ensure further neutrality in the monitoring and enforcement of contracts.

A transparent and competitive bidding process is most likely to build community acceptance for the use of contracting, and is most likely to deliver better value for money, reduce the scope for corruption, and encourage growth in the private education services market. A staged process ensures good specification of desired services and expected outcomes and a more rigorous assessment of provider capability.⁹ Contract length can be tailored to the particular service being contracted for. A range of factors must be considered in determining appropriate contract length, including the appropriate period for assessing performance, the maturity of the contracting regime, and the

transaction costs of negotiating contracts. Contracts should be long enough to generate interest and encourage private investment in the education sector, but not so long as to blunt incentives for performance and limit potential contracting gains.¹⁰

4.5 Conclusion

This chapter has reviewed a number of examples of contracting for the delivery of education services. Although contracting for the delivery of education services remains in its infancy in many countries, it is a growing phenomenon. It is not a panacea, but does offer governments an additional mechanism for improving educational outcomes and increasing the efficiency of educational provision. Educational contracting has been, and will continue to be, controversial. Its beneficiaries are often politically weak and unorganized, while its opponents—for example, teacher unions—are well financed and organized.

The success of educational contracting requires good policy design, well-managed implementation, effective political management, well-designed evaluations, and a fundamental redefinition of the role of public education authorities.

Notes

Revised version of paper presented at the Harvard University/World Bank Conference “Mobilizing the Private Sector for Public Education,” Cambridge, Massachusetts, October 5–6, 2005. Comments and input from Harry Anthony Patrinos, April Harding, Raji Chakrabarti, and anonymous referees are gratefully acknowledged.

1. Taylor (2003), 158.
2. Savas (2000), 76–77 and Brook and Petrie (2001), 4.
3. Molnar et al. (2006), 3 and 29.
4. Gill et al. (2007) and Peterson (2007).
5. Center for Education Reform (2006).
6. Rodriguez (2002), 8–9.
7. See Rhim (2005); Hentschke et al. (2003); Bulkeley et al. (2004); Center for Comprehensive School Reform and Improvement (2005); and OECD (1999).
8. New South Wales Treasury (2005).
9. For a comprehensive discussion of a competitive process for contracting out the delivery of public services, see Savas (2000), 174–210.
10. OECD (1999), 32.

References

- Brook, P. J., and M. Petrie. 2001. Output-based aid: Precedents, promises, and challenges. In *Contracting for public services: Output-based Aid and Its Applications*, ed. P. J. Brook and S. Smith, 4. Washington, D.C.: World Bank.
- Bulkley, K., L. Mundell, and R. Morgan. 2004. *Contracting Out Schools: The First Year of the Philadelphia Diverse Provider Model*. Philadelphia: Research for Action.
- Center for Comprehensive School Reform and Improvement. 2005. *Contracting With External Education Management Providers*. Washington, D.C.
- Center for Education Reform. 2006. *Charter Schools Today: Changing the Face of American Education Part 2: Raising the Bar On Charter School Law, 2006 Ranking & Scorecard, 9th Edition*. Washington, D.C.
- Gill, B. et al. 2007. *State Takeover, School Restructuring, Private Management, and Student Achievement in Philadelphia*. Santa Monica: RAND Corporation.
- Hentschke, G. C., S. Oschman, and L. Snell. 2003. *Trends and Best Practices for Education Management Organizations*. San Francisco: WestEd.
- Molnar, A. et al. 2006. *Profiles of For-Profit Education Management Companies 2005–2006*. Eighth Annual Report. Tempe: Arizona State University.
- New South Wales Treasury. 2005. *New Schools Privately Financed Project: Post Implementation Review*. Sydney: Office of Financial Management.
- OECD. 1999. *Performance Contracting: Lessons from Performance Contracting Case Studies, A Framework for Public Sector Performance Contracting*. Paris.
- Patrinos, H. A., and N. LaRocque. 2007. *Enhancing Accountability in Schools: What Can Choice and Contracting Contribute*. Washington, D.C.: World Bank.
- Rhim, L. M. 2005. *School Restructuring in Philadelphia: Management Lessons from 2002 to 2005*. ECS policy brief. Denver: Education Commission of the States.
- Rodriguez, A. 2002. Executive summary. In *Case Study: Public School Concession Model of Bogotá Colombia*. Washington, D.C.: World Bank.
- Savas, E. S. 2000. *Privatization and Public-Private Partnerships*. New York: Chatham House Publishers/Seven Bridges Press.
- Swope, J., and M. Latorre. 2000. *Fe y Alegría Schools in Latin America: Educational Communities Where the Pavement Ends*. Santiago: Centro de Investigación y Desarrollo de la Educación, Santiago.
- Taylor, R. J. 2003. Contracting for health services. In *Private Participation in Health Services Handbook*, ed. A. L. Harding and A. S. Preker, 157–219. Washington, D.C.: World Bank.
- World Bank. 2005. *Colombia: Contracting Education Services*. Report No. 31841-CO. Washington, D.C.: World Bank.

II **Traditional Forms of School Choice**

5 Public-Private Schools in Rural India

Karthik Muralidharan and Michael Kremer

While the focus of primary education policy in developing countries such as India has largely centered on increasing the resource base and the number of government-run schools, the role of private fee-charging schools in the primary education sector has not been appreciated as much. However, as several recent papers point out (Kingdon 1996; PROBE Team 1999; De, Noronha, and Samson 2001; Tooley and Dixon 2003; and Mehta 2005), there is reason to believe that private fee-charging schools increasingly cater to a substantial fraction of the primary-school-going population in India. Most research on this subject to date comes from small-sample studies at the state or district levels.¹

This chapter presents results from a nationally representative survey of *rural* private primary schools in India that the authors conducted in 2003. Twenty-eight percent of the population of rural India has access to fee-charging private schools in the same village. Richer states have fewer rural private schools. States, districts, and villages with poor public school performance are each more likely to have private schools. Nearly 50% of the rural private schools in our sample were established five or fewer years before the survey, and nearly 40% of private school enrollment is in these schools. This suggests rapid expansion of private schooling, although it could also in part reflect turnover among schools in the sector.

Private-school teacher salaries are typically one-fifth of the salary of regular public school teachers (and are often as low as one-tenth of these salaries). This enables the private schools to hire more teachers, have lower pupil-teacher ratios, and reduce multigrade teaching. Private school teachers are significantly younger and more likely to be from the same area as their counterparts in the public schools. They are 2–8 percentage points less absent than teachers in public schools

and 6–9 percentage points more likely to be engaged in teaching activity at any given point in time. They are more likely to hold a college degree than public school teachers, but are much less likely to have a formal teacher-training certificate. Children in private school have higher attendance rates and superior test-score performance, the latter true even after controlling for observed family and school characteristics.

The first section outlines the sampling methodology and how the data was collected. The second section presents results on the extent of private school prevalence and correlates of private school existence. The chapter then discusses the economics of private unaided schools and their sources of competitive advantage by comparing them with public schools on various measures including infrastructure, teacher characteristics, student characteristics, and student performance.

5.1 Sampling Methodology and Data

The data used in this chapter was collected as part of a multicountry study conducted by us and coauthors on provider absence in schools and health clinics where India was one of the countries studied (the detailed results from the cross-country study are presented in Chaudhury et al. 2006).² Within India, 20 states were selected, representing 98 percent of the population, or roughly one billion people. Using geographically stratified random sampling, 10 districts were selected within each state and 10 primary sampling units (PSUs) were selected in each district. The PSUs were allocated to rural and urban sectors in accordance with the population distribution within each sampled district.³ Rural PSUs (villages) within a sampled district were selected randomly without replacement with probability proportional to size (PPS).⁴

The survey focused on government-run primary⁵ schools but also covered rural private schools in villages where they existed. The definitions of school categories that we use are similar to those detailed in chapter 6 by Geeta G. Kingdon. The term government school refers to government-funded schools that are *run* by the government but does not include the government-aided schools that are privately managed. The terms public schools and government schools are used interchangeably in this chapter. The private schools referred to in the rest of this chapter are those that charge user fees and do not receive any financial support from the government. This includes both recognized

and unrecognized private schools, but does not include “private-aided schools” which are privately managed schools that receive funding from the government, and are typically forbidden from charging user fees.

Recognized private schools are required to conform to various government norms; the main benefit of recognition is that only recognized schools are eligible to issue “transfer certificates” (TCs) to their students (see chapter 6 for more details on the requirements for recognition). These TCs in turn are required for students to move across schools with credit granted for academic work done in the previous school. In practice, however, many of the recognized schools do not meet the stipulated norms (Kingdon, chapter 6 in this volume), and Tooley and Dixon (2003) argue that it is not uncommon for operators of private schools to have to pay bribes to obtain recognition status.

One response to the obstacles to obtaining recognition has been an increasing prevalence of unrecognized private schools that charge fees but have not obtained recognition and are not authorized to issue TCs. Unrecognized private schools circumvent this practice in several ways, the most common of which is double enrollment, whereby children are enrolled in both the government-run school (which is recognized by default) and in the unrecognized private school. Note that private unrecognized schools are more than just supplemental tuition centers and should be thought of as schools, because they usually run during the same hours of the regular school, and children typically do not attend both kinds of schools although they may be enrolled in both. Double enrollment is a convenient arrangement for all parties because the government school gets to show high levels of enrollment, parents and children get textbooks and other free supplies from the government school, and new private schools can operate without the burden of seeking recognition since TCs will be issued by the government school. However, this does lead to systematic underestimation of the relative size of the government and fee-charging private school systems in India, as discussed in Kingdon (chapter 6 in this volume).

In the rural sample, the survey covered all the primary schools in the village subject to a maximum of three (the maximum number of schools that could be covered during one day in the field). When the investigators reached the village, they listed all the schools present within a radius of two kilometers from the village center. In villages with fewer than three schools, all the schools were covered. In villages with more than three schools, three schools were surveyed; one

school was randomly selected in each of the three main categories of rural schools (government schools, private schools, and nonformal education centers). In cases where there was no nonformal school, but more than three schools in the village, enumerators selected two government schools and one private school or one government school and two private schools (the latter was the case only if there was only one government primary school but more than two private schools in the village).

Thus in addition to being representative of government-run primary schools, the dataset is also representative of the universe of private unaided primary schools in rural India because at least one private school was surveyed in any village that had at least one private school. Fifty-three percent of the private schools in our sample are unrecognized, suggesting that official sources of data on private schools significantly understate the extent of private school prevalence.⁶ While government surveys only include the recognized private schools, the random selection method is indifferent to the recognition status of the school and the sample here therefore includes both types of schools. Furthermore, the random selection of the schools within a village ensures that the distribution of school types in the sample is a reflection of the distribution of school types in the population. The remainder of this chapter does not distinguish between private recognized and unrecognized schools because they are both fee-charging schools that do not receive funds from the government, and this is the school category we focus on here.

Enumerators made three unannounced visits to each selected school over a three- to four-month time period from December 2002 to March 2003. Teacher absence was measured in all surveyed schools by physically verifying the presence of teachers on the school roster. In addition to recording teacher attendance, data was also collected on student attendance, school facilities, and teacher characteristics. Finally, the enumerators also administered a short test⁷ to 10 randomly selected fourth-grade children and collected basic demographic information on these children in all the schools that we surveyed.

5.2 Private School Prevalence and Its Correlates

Twenty-eight percent of the villages in our sample have a private school. Since the villages were sampled on a probability proportional to size (PPS) basis, this implies that 28% of the population of rural

Table 5.1
Private School Prevalence by State

State	% of villages with a private school	State	% of villages with a private school
Gujarat	0	Andhra Pradesh	30
Maharashtra	1	Uttaranchal	30
Orissa	4	Tamil Nadu	31
Kerala	6	Assam	33
Karnataka	12	Rajasthan	52
Chhatisgarh	15	Bihar	54
Himachal Pradesh	15	Uttar Pradesh	57
West Bengal	16	Punjab	65
Jharkhand	17	Haryana	68
Madhya Pradesh	23	<i>All India</i>	28

India has access to a private school in the same village in which they live. But there is sharp variation in the prevalence of private schools across states, with Gujarat and Maharashtra having almost no rural private schools, while over 50% of the sampled villages in Rajasthan, Bihar, Uttar Pradesh, Punjab, and Haryana have a private school in the same village (table 5.1). Recent household-survey-based evidence presented in the Annual Status of Education Report (2005) confirms the increasing role of private schooling in rural India by showing that 15.5% of children aged 6–10 in rural India attend a private school and that over 20% of the children in this group attend a private school in several states.⁸

Table 5.2 presents results from ordinary least squares (OLS) regressions where the binary variable of private-school existence (at the village level) is regressed on potential predictors of private school existence. The first column includes the log of the village population, the log of the mean pupil-teacher ratio in the public schools in the village, and the mean level of teacher absence⁹ in the public schools in the village. The second column includes state fixed effects. The third column replaces the state dummies with the log of state per capita GDP. The fourth column includes district-level estimates of mean per capita consumption calculated from the fifty-fifth round of the National Sample Survey,¹⁰ and the fifth column includes district-level consumption as well as state fixed effects.¹¹

Table 5.2
Correlates of Private School Existence at the Village Level

Dependent variable = 1 if village has a private school, 0 if it does not					
	(1)	(2)	(3)	(4)	(5)
Log village population	0.114 [0.012]***	0.157 [0.014]***	0.125 [0.037]***	0.11 [0.018]***	0.159 [0.017]***
Log pupil teacher ratio	0.089 [0.022]***	0.042 [0.026]	0.034 [0.051]	0.1 [0.031]***	0.037 [0.027]
Mean public school Absence in village	0.292 [0.065]***	0.114 [0.060]*	0.214 [0.103]*	0.303 [0.074]***	0.108 [0.053]**
Log state GDP/Capita			-0.298 [0.157]*		
Log district Consumption/Capita				0.07 [0.076]	-0.121 [0.059]**
Constant	-0.962 [0.101]***	-1.065 [0.117]***	0.851 [0.975]	-1.39 [0.480]***	-0.352 [0.366]
State fixed effects	No	Yes	No	No	Yes
Observations	1523	1523	1450	1523	1523
R-squared	0.1	0.33	0.12	0.1	0.33

Notes: Robust standard errors in brackets

*** significant at 1%; ** significant at 5%; * significant at 10%

Villages with larger populations are significantly more likely to have a private school in all specifications. The most noteworthy result is that private schools are significantly more likely to exist in villages with a high rate of teacher absence in public schools. While the relation is very strong across Indian states, it is still significant at the 10% level after controlling for state fixed effects, and remains significant in all specifications. The surprising result is that states with a higher per capita income are *less* likely to have private schools in their villages. While a high pupil-teacher ratio (PTR) in the public schools in the same village is a predictor of private school existence across India, the correlation is not significant with either state income controls or state fixed effects, suggesting that the PTR in public schools is negatively correlated with the per capita GDP of the states. The final column shows that when we include state-fixed effects, richer districts are less likely to have a private school, though villages with high public-school teacher absence are more likely to have a private school.

Chaudhury et al. (2006) shows that higher-income countries and richer Indian states have significantly lower rates of teacher absence in

schools. Thus if private schools arise as a response to public school failure, we might expect richer states to have fewer private schools. On the other hand, since private schooling is likely to be a normal good we might expect the prevalence of private schools to be higher in the richer states.

The correlation between public school failure (as measured by teacher absence and nonteaching activity) and the likelihood of the existence of private schools can be seen clearly in figures 5.1a and 5.1b. While the two states with the highest incidence of private schools (Punjab and Haryana) happen to be among the richer states of India, it is quite striking that the two states with the lowest level of teacher absence in public schools (Gujarat and Maharashtra) have almost no rural private schools, even though these are two of the richest states in India.

Table 5.3 shows more related evidence by comparing teacher absence rates across different kinds of schools in India. The first column of table 5.3 shows the weighted average teacher absence by school type across the full sample of schools. Columns 3–5 show the difference in teacher absence relative to the government-run schools. While the weighted average all-India teacher absence in private schools of 22.8% is slightly lower than that of the 25.2% in government schools, this difference is not significant. However, with the addition of village/town fixed effects, the teacher absence rate is 3.8% lower in private schools relative to government schools and this is significant at the 1% level. The addition of school, teacher demographics, and visit-level controls increases this difference to 7.8%, which is over 30% of the observed absence rate in government schools (25.2%). This suggests that private schools are disproportionately located in areas with poorly performing public schools and that the efficiency of the private school (at least as measured by teacher absence) is even higher after controlling for school facilities (which are negatively correlated with teacher absence) and teacher demographics.

The higher prevalence of private schools in villages with high absence among public school teachers could be interpreted as suggesting that private schools enter where public schools are failing or as evidence that the establishment of private schools reduces political pressure for teacher attendance in public schools. However, to the extent that one might expect higher-income states to have more private schools, the finding that richer areas have fewer private schools suggests that poorly performing public schools rather than increasing incomes are the more important source of demand for private schools.

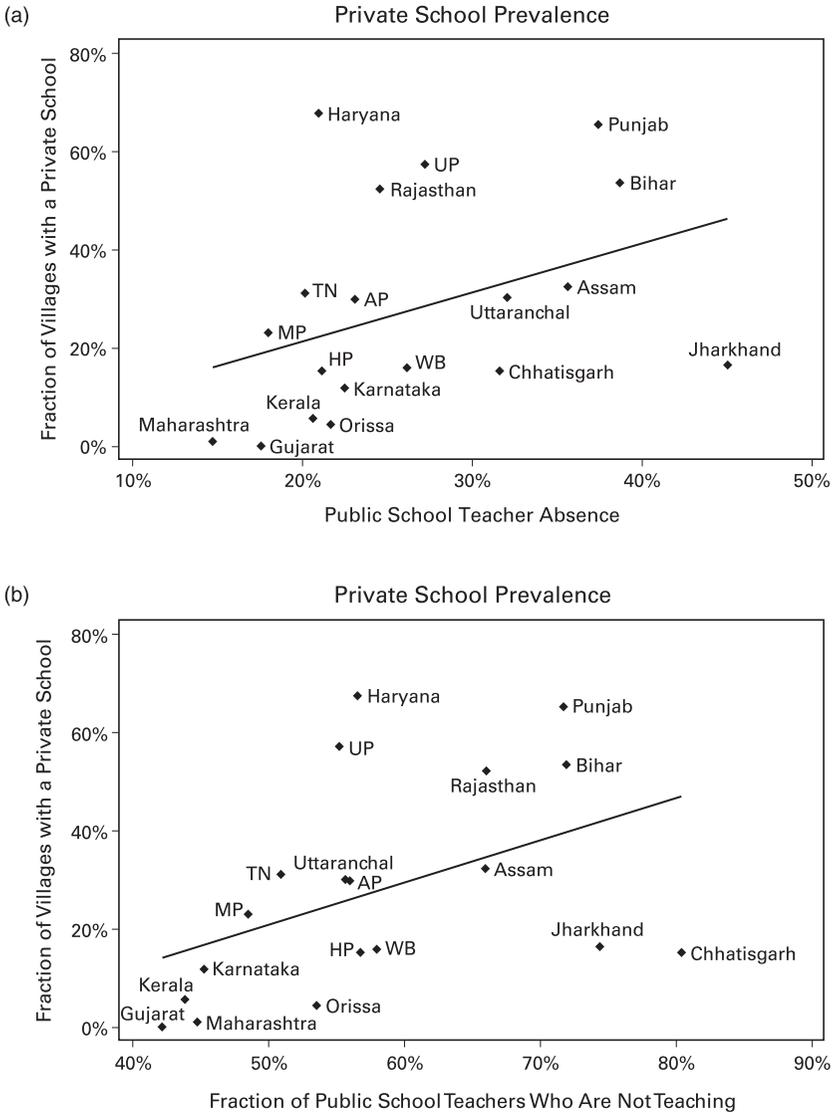


Figure 5.1

Table 5.3
Absence Rate by School Type

	(1)	(2)	Difference relative to government-run schools		
			(3)	(4)	(5)
	Teacher absence	Number of observations	No fixed effects	Village/town fixed effects	Village/town fixed effects + controls*
Government-Run Schools	25.2%	34,493	—	—	—
Non-formal Schools	26.9%	393	1.7%	-2.7%	-2.4%
Private Aided Schools	20.1%	3,371	-5.1%	-1.3%	-0.4%
Private Schools	22.8%	9,075	-2.4%	-3.8%	-7.8%

Notes: * Controls include a full set of visit-level, teacher-level, and school-level controls
Bold numbers indicate significant differences at the 1% level

Finally, it is noteworthy that there is some evidence that large-scale prevalence of rural private schools is a recent phenomenon. This is suggested in previous studies of specific states such as De, Noronha, and Samson (2001), and Mehta (2005), but we are able to confirm this on a nationwide basis. Figure 5.2 plots the cumulative distribution function (CDF) of private school formation and enrollment over time, and we see that nearly 50% of the private schools in the sample have been established in the five years before the survey. Nearly 40% of the total private school enrollment is in schools that were less than 5 years old and over 60% of total enrollment is in schools that were less than 10 years old in 2003. Of course, these numbers will exceed the net increase in private school enrollment to the extent that other private schools exited over the period.

5.3 Economics of Rural Private Schools

5.3.1 School Infrastructure

Table 5.4 presents summary statistics on school infrastructure in public and private schools. While private schools are more likely to have an electricity connection and toilets for teachers, they are less likely to have libraries (book banks) and classrooms without mud floors. On aggregate there doesn't appear to be a significant difference in the

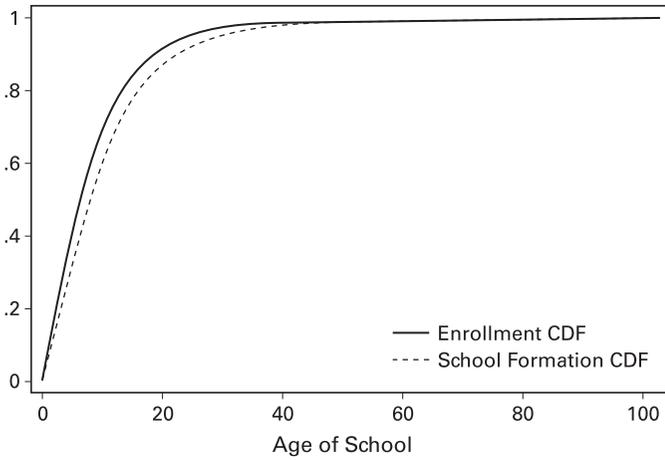


Figure 5.2
Private School Formation/Enrollment over Time (Cumulative distribution function)

Table 5.4
Private versus Public School Facilities

	Public	Private	Difference	Difference with state fixed effects	Difference with village fixed effects
Fraction of schools with electric connection available	0.26	0.414	-0.154***	-0.198***	-0.191***
Fraction of schools with library available	0.541	0.273	0.269***	0.236***	0.238***
Fraction of schools with covered classrooms available	0.943	0.939	0.004	0.030**	0.029
Fraction of schools with non-mud floors available	0.816	0.674	0.142***	0.184***	0.197***
Fraction of schools with teacher toilet available	0.326	0.447	-0.121**	-0.052**	-0.027
Average school infrastructure index (0-5 scale)	2.885	2.745	0.14	0.199***	0.247***

Notes: Significance level: *** 1%; ** 5%; * 1%

infrastructure index between private and public schools, but the results with state and with village fixed effects suggest that conditional on being in the same village, private schools have poorer facilities and infrastructure than the public schools.

5.3.2 Sources of Competitive Advantage of Private Schools

Probably the single most distinguishing feature of the private schools in rural India is the fact that they pay much lower salaries to teachers than the government schools. While we don't directly collect data on teacher salaries, we have data on the various fees charged by each school in our sample along with the total enrollment, which allows us to estimate the monthly revenue for the private schools (since they typically don't receive any funding beyond what they raise in school fees). Median monthly revenue of a private school in our sample is around Rs4,000 per month,¹² with the median fee being Rs63 per month and the median private school having an enrollment of 72 students.

We can calculate an upper bound for teacher salaries in private schools assuming that all the revenues of the private schools are used to pay teacher salaries. We calculate the upper bound on median teacher salary to be less than Rs1,000 per month and the upper bound on the mean teacher salary to be less than Rs1,750 per month. The mean salary for a regular government school teacher in a typical state like Andhra Pradesh (where we have actual salary data¹³) is around Rs7,500 per month. We can see that the typical total monthly revenue of a private school is often less than the monthly salary of *one* government school teacher. Even conservatively, rural private school teacher salaries are typically around one-fifth of that of regular government teacher salaries and they are often as low as one-tenth of the salaries of regular government teachers. The differences are even more pronounced when benefits are included because government teachers are guaranteed a pension after retirement, while private school teachers rarely have such provisions. This allows the private schools to hire more teachers, reduce multigrade teaching, and have significantly lower pupil-teacher ratios.

Table 5.5 clearly demonstrates these points. The average PTR in the private schools of 19.2 is less than half the ratio of 43.4 in public schools. This gap of 24.3 widens to 29.6 with state fixed effects, and to 34.4 with village fixed effects. Thus conditional on being in the same village, the private school has nearly 35 fewer pupils per teacher than the government school in the same village. Doing the calculation using

Table 5.5
Sources of Private School Competitive Advantage

	Public	Private	Difference	Difference with state FEs	Difference with village FEs
Mean total enrollment	141.9	98.3	43.6***	49.6***	80.7***
Mean number of teachers	3.6	5.2	-1.6***	-1.48***	-0.87***
Pupil-teacher ratio	43.43	19.16	24.3***	29.6***	34.43***
Log pupil-teacher ratio	3.583	2.783	0.800	0.931***	1.045***
Multigrade teaching	71%	51%	0.20***	0.20***	0.11***
Average grade of starting teaching English	2.62	1.67	0.95***	1.27***	1.35***
Fraction of teachers engaged in teaching activity	44%	50%	-5.7%***	-8.6%***	-9.3%***
Average student attendance	64.4%	75.7%	-11.3%***	-12.1%***	-13.4%***

Notes: Significance level: *** 1%; ** 5%; * 1%

logs, we find that the PTR of a public school is 2.85 times higher than the PTR of a private school in the same village. The lower PTR in the private schools also translates into lower levels of multigrade teaching (the practice of one teacher simultaneously teaching multiple grades in the same room).

Field interviews with parents of children attending rural private schools suggest that two of the major attractions of private schools are the fact that they start teaching English early and that there is more teaching activity in these schools. The last two rows of table 5.5 confirm that these differences do exist. Private schools on average start to teach English a whole grade earlier, with the effect being even more pronounced with state and village fixed effects. Private schools also have significantly more teaching activity going on, and again the magnitude of the difference increases with state and village fixed effects.

One reason for this is likely to be that head teachers in private school are much more likely (and able) to take disciplinary action against shirking teachers than their counterparts in the public schools. We found that only one head teacher in the nearly 3,000 public schools we surveyed reported ever dismissing a teacher for repeated absence.¹⁴ On the other hand, 35 head teachers in a sample of around 600 private schools reported having at some point dismissed a teacher for repeated absence, and therefore shirking teachers in the private sector are around 175 times more likely to have disciplinary action taken against them!

If we consider the cases with village fixed effects (which is the relevant case when considering the choice faced by a parent with regard to choosing between a private and public school in the same village), we see that combining the effects of a lower pupil-teacher ratio and a higher level of teaching activity leads to a child in the private school having three to four times more “teacher contact” time than in the public school.

The better performance of the private schools is also reflected in the fact that student attendance rates are also substantially higher in private schools (as seen in the last row of table 5.5). Pupil attendance is 11.3% higher in the all-India sample, and 13.4% higher with village fixed effects. If we think that the true measure of the relative role of the private and public sectors is attendance as opposed to enrollment, then the true share of rural children taught in the private sector will be even higher after adjusting for the differential attendance rates.

5.3.3 Teacher Characteristics

A key issue that follows the discussion on teacher pay in private schools is to understand who the private school teachers are and the reasons for their willingness to work at such low salaries. Field visits suggest that the availability of these inexpensive teachers in the villages is being driven by local educated young people who are typically unable to find jobs, unwilling (and usually not needed) to work in agriculture, and not looking at teaching as a long-term career. Teaching suits these young people well because the short working day of four to six hours allows them the time for further study via correspondence (distance-education) courses or in colleges that follow a different shift. The short working days also allow them to look for other longer-term jobs on the side. And finally, teaching provides them with both income and respectability while they look at other long-term options.

Table 5.6 provides summary statistics consistent with this view. The private school teachers are on average over ten years younger than their counterparts in the public sector and are twice as likely to be from the same village where the school is located. They are more likely to have a college degree but also much less likely to have a professional teaching certificate, which suggests that even though they are more educated, they are not looking at teaching as a long-term career option.

This probably helps to explain why teacher absence is not even lower than it is in the private schools given the high likelihood of action being taken for repeated absence. Since the private school

Table 5.6
Teacher Characteristics

	Public	Private	Difference	Difference with state FEs	Difference with village FEs
Average age of teachers	40.28	29.61	10.67***	11.92***	12.35***
Fraction of college graduates among teachers	39%	49%	-0.10***	-0.03*	-0.01
Fraction of teaching certificate holders among teachers	80%	28%	0.52***	0.61***	0.64***
Fraction of female teachers	36%	41%	-0.05	0	0.02
Fraction of local teachers	23%	46%	-0.23***	-0.26***	-0.24***

Notes: Significance level: *** 1%; ** 5%; * 1%

teachers are being paid a much lower wage and are often looking at other long-term options, there is little “efficiency wage” cost of being fired. Thus, if pursuing other opportunities requires a certain level of absence (and an accompanying probability of action being taken), this is a tradeoff that the private school teachers probably are willing to make. However, despite the low wages, we see that private schools have lower teacher absence and higher teaching activity than the public schools—especially in the same village.

5.3.4 Parent Characteristics

Given that public schools are free and private schools charge fees, we would expect that the students attending the private schools come from more socioeconomically privileged backgrounds. Based on the random sample of children in the fourth grade whom we test and collect demographic information on, we can compare the family backgrounds of children in both types of schools. Table 5.7 provides these comparisons, and as we would expect, the children attending private schools come from more advantaged family backgrounds. They have more educated parents and indicate possessing a higher level of assets. However, it is worth noting that the absolute level of education of the parents of the children attending private schools is actually quite low. For instance, 20% of the private school students are first-generation learners, which while lower than the 30% finding in public schools, is still quite significant. Thus while private schools cater to the more affluent in the rural areas, many of their students come from disadvantaged backgrounds. This is consistent with the results of Tooley and

Table 5.7
Household Characteristics

	Public	Private	Difference	Difference with state FEs	Difference with village FEs
Average number of rooms in house	2.423	2.914	-0.742***	-0.574***	-0.560***
Average fraction of children taking tuition	0.169	0.212	-0.043***	-0.041***	-0.066***
% of literate fathers	0.71	0.804	-9.4%***	-0.118***	-0.146***
% of literate mothers	0.445	0.542	-9.7%***	-0.122***	-0.163***
% of fathers with education 10 grades or higher	0.242	0.432	-19%***	-0.208***	-0.236***
% of mothers with education 10 grades or higher	0.087	0.197	-11%***	-0.117***	-0.129***

Notes: Significance level: *** 1%; ** 5%; * 1%

Dixon (2003), who mention that the majority of private schools in India cater to the poor (though their observation is based on an urban study) and the findings reported by Andrabi, Das, and Khwaja (2002) that private schools in rural Pakistan are affordable to middle- and even low-income groups.

5.3.5 Performance of Private Schools

As discussed earlier, private schools have lower teacher absence and higher levels of teaching activity. They also exhibit significantly superior performance on the test that was administered. Table 5.8 shows the test score performance advantage of private schools (in standard deviations). While controlling for family and other characteristics reduces the size of the private school effect, it is still strongly significant and of considerable magnitude (0.4 standard deviations on the test). Of course, we cannot rule out that some of these results are being driven by unobserved heterogeneity among the students. Similarly, as discussed earlier, student attendance is around 11 percentage points higher in the private schools (75%) relative to the public schools (64%). This could partly be due to artificially inflated enrollment figures in the government schools.

5.4 Conclusions

We find that private unaided fee-charging schools are widespread in rural India, particularly in areas where the public system is

Table 5.8
Performance Differentials of Private Schools

Regression of mean student test score (in std. deviations) on school type and controls					
	(1)	(2)	(3)	(4)	(5)
Private School	0.57***	0.50***	0.40***	0.38***	0.41***
<i>Controls</i>					
Family demographics and private tuition	no	yes	yes	yes	yes
School facilities	no	no	yes	yes	yes
State fixed effects	no	no	no	yes	no
Village fixed effects	no	no	no	no	yes
Observations	29462	27242	25561	25571	25571
R-squared	0.05	0.09	0.1	0.14	0.43

Notes: Significance level: *** 1%; ** 5%; * 1%

dysfunctional. The number of such schools appears to be growing rapidly with both demand-side variables (desire for English-medium education, less multigrade teaching, smaller classes, more accountable teachers) and supply-side variables (availability of educated unemployed young people) playing an important role in this rapid growth. Salaries paid by these schools are only about one-fifth of those paid by public schools, but these schools have many more teachers relative to the number of pupils, and the private school teachers are more likely to be teaching than public school teachers.

Our results have a number of implications. First, efforts to improve the quality of education in India should consider the private as well as the public sector—especially since private schools are disproportionately located where the public system is failing. For example, policy makers might consider the possibility of offering short training courses to raise skills among private school teachers.

Second, the disparities between private and public schools highlight some potential areas for reform in the public sector. The huge salary differential suggests that many public school teachers may be receiving enormous rents.

Finally, there may be scope for public-private partnerships in education, whether in the form of voucher programs or otherwise. One issue with voucher programs is whether there will be an adequate supply response, but the evidence suggests that private schools are already widespread in rural areas and that new schools can be created rapidly.

There is substantial scope for carefully designed policy experiments aimed at leveraging the private sector for universal quality education, and it is important to follow these experiments with rigorous evaluation to provide systematic evidence for future policy decisions in this regard. The recent draft of the “Right to Education Bill” that is expected to be introduced in Parliament mandates that 25% of seats in private educational institutions be reserved for “weaker sections” of society. It also goes on to say that for each such admitted child, the “government shall reimburse to the school at a rate equal to the per-child expenditure in state schools/fully aided schools, or the actual amount charged per student by such school, whichever is less.” The discussion around this legislation would be an opportune moment to think about the most efficient institutional forms for delivery of primary education in India.

Acknowledgments

We thank Nazmul Chaudhury, Jeffrey Hammer, and Halsey Rogers for their collaboration and insights on the global study that generated the data that this chapter is based on, and Konstantin Styrin for valuable research assistance. We offer thanks to the staff of the Social and Rural Research Institute, New Delhi—and especially to Chhavi Bhargava, Navendu Shekhar, A. V. Surya, and Aditi Varma—for conducting and overseeing the fieldwork for the primary surveys. We also thank participants at the PEPG conference, two anonymous referees, Rajashri Chakrabarti, and Paul Peterson for comments and suggestions. All errors are our own.

Notes

Karthik Muralidharan is Assistant Professor of Economics at the University of California–San Diego. Michael Kremer is Gates Professor of Developing Societies in the Department of Economics at Harvard University.

1. Notable among these are Bashir (1994) in Tamilnadu; Kingdon (1996b) in Lucknow (Uttar Pradesh); Govinda and Varghese (1993) in Madhya Pradesh; Tooley and Dixon (2003) in Hyderabad (Andhra Pradesh); and Mehta (2005) in Punjab. As Kingdon (1996a) mentions, “given inter-state variations in the structure and organization of education in India, evidence from a single state will be illustrative but not necessarily representative.”
2. See Chaudhury et al. (2006) for detailed results from the cross-country study.
3. Thus a district with 90% of its population in rural areas would have 9 rural PSUs and 1 urban PSU, whereas a completely urban district (as is the case when the randomly picked district is the state capital, for example) would have 10 urban PSUs.

4. See appendix A of Kremer et al. (2004) for a detailed description of the sampling procedure.
5. Covering grades one to five in most states, and grades one to four in some states, depending on the classification of primary schools in the concerned state. The focus of the study was completely on primary schools, and so the usage of the term school should be understood to mean primary school unless stated otherwise.
6. Unrecognized schools are also more recently established, with an average age of 7.6 years as opposed to recognized private schools with an average age of 9.9 years. The fraction of schools in this sample that report being run by a religiously oriented group is quite small (15 out of 592 or 2.5% of schools). Schools run by religiously oriented groups form a larger share of the private-aided schools that get government grants and are not allowed to charge tuition fees (33 out of 152 or over 20%).
7. Since the survey was done across several states with different languages, the test was weighted towards math as opposed to language. The test was short but the items used had been pretested for validity. The test consisted of 12 arithmetic questions and 2 verbal questions (that asked the students names in the local language and English respectively). See appendix B of Kremer et al. (2004) for a detailed description of the test as well as the procedure by which it was administered, graded, and coded.
8. These states include Andhra Pradesh, Haryana, Kerala (including private aided schools), Punjab, Rajasthan, and Uttar Pradesh.
9. A teacher was considered to be absent if, at the time of a random visit during school hours, he or she could not be found anywhere in the school premises. See Chaudhury et al. (2006) and Kremer et al. (2005) for details on how absence and teaching activity were measured and on the various steps we took to measure these accurately.
10. We thank Petia Topalova for making her calculations of district-level consumption estimates available to us. See Topalova (2005) for details on these calculations.
11. Robust standard errors clustered at the state level are reported for specifications with state-level right-hand-side variables and likewise for district-level variables, where the standard errors are clustered at the district level.
12. The approximate exchange rate at the time of publication is $\text{Rs}45 = \text{U.S.}\1 .
13. Direct data on teacher salaries in Andhra Pradesh has been collected in a different ongoing study by one of the authors. The salary figures would be even higher if we included benefits, the largest portion of which is the present value of a defined benefits retirement pension. Private school teachers typically receive no benefits.
14. See Kingdon and Muzammil (2001) for more details on the power of public-school teacher unions and how it has evolved over the years (based on a case study of the state of Uttar Pradesh).

References

Andrabi, Tahir, Jishnu Das, and Asim Khwaja. 2002. The rise of private schooling in Pakistan: Catering to the urban elite or educating the rural poor? Mimeo. Kennedy School of Government, Harvard University.

Annual Status of Education Report (ASER). 2005. Mumbai: Pratham Resource Center.

- Bashir, Sajitha. 1994. Public versus private in primary education: Comparison of school effectiveness and costs in tamilnadu. PhD dissertation, London School of Economics.
- Chaudhury, Nazmul, Jeffrey Hammer, Michael Kremer, Karthik Muralidharan, and F. Halsey Rogers. 2006. Missing in action: Teacher and health worker absence in developing countries. *Journal of Economic Perspectives* (winter): 91–116.
- De, Anuradha, Claire Noronha, and Meera Samson. 2001. India: Private schools and universal elementary education. South Asia Education Sector, Technical Working Paper No. 3. World Bank, Washington, D.C.
- De, Anuradha, Manabi Majumdar, Claire Noronha, and Meera Samson. 2002. Private schools and universal elementary education. In *India Education Report—A Profile of Basic Education*, ed. R. Govinda. New Delhi: Oxford University Press.
- Govinda, R., and Varghese, N. V. 1993. Quality of primary schooling in India: A case study of Madhya Pradesh, International Institute for Educational Planning, National Institute of Educational Planning and Administration. New Delhi: NIEPA.
- Kingdon, Geeta. 1996a. The quality and efficiency of private and public education: A case study of urban India. *Oxford Bulletin of Economics and Statistics* 58, no. 1: 57–81.
- Kingdon, Geeta. 1996b. Private schooling in India: Size, nature and equity effects. *Economic and Political Weekly* 31, no. 51 (December).
- Kingdon, Geeta Gandhi, and Mohd Muzammil. 2001. A political economy of education in India- I: The case of UP. *Economic and Political Weekly* 36, no. 32 (August: 11–18).
- Kremer, Michael, Karthik Muralidharan, Nazmul Chaudhury, Jeffrey Hammer, and F. Halsey Rogers. 2004. Teacher absence in India. World Bank: Washington, D.C.
- Kremer, Michael, Karthik Muralidharan, Nazmul Chaudhury, Jeffrey Hammer, and F. Halsey Rogers. 2005. Teacher absence in India: A snapshot. *Journal of the European Economic Association* 3: 658–667.
- Mehta, Arun. 2005. Elementary education in unrecognized schools in India: A study of Punjab based on DISE 2005 data. NIEPA, New Delhi.
- PROBE Team. 1999. *Public Report on Basic Education in India*. New Delhi: Oxford University Press.
- Shah, Parth. 2005. Equity in education. *Business Standard*, July 13.
- Tooley, James, and Pauline Dixon. 2003. Private schools for the poor: A case study from India. Reading, U.K.: CfBT Research and Development. Available at <<http://www.cfbt.com/PDF/91001.pdf>>.
- Topalova, Petia. 2005. Trade liberalization, poverty, and inequality: Evidence from Indian districts. NBER Working Paper 11614, Cambridge, Mass.

6 School-Sector Effects on Student Achievement in India

Geeta G. Kingdon

Analysis of education in India in general and of private and public schools in particular is hampered by the lack of available data. Despite recent improvements, there is a serious dearth of reliable educational data in India. First, the official data collection exercise on schools (both annually and in the periodic All India Education Survey) collects information only on the so-called “recognized” schools. Thus, large numbers of private schools are not included in the official data since they are “unrecognized” (Kingdon 1996a). Second, coverage of even the recognized schools is incomplete. For instance, coverage of various types of special schools is patchy across different states, such as central schools, army schools, education guarantee schools, schools registered with national examination boards, and so on (Mehta 2005). Third, enrollment figures in school-returns data are unreliable because failing publicly funded schools exaggerate their student numbers to justify their existence (Drèze and Kingdon 1998). Fourth, no national-, state-, or district-level data are collected on student learning achievement in primary and junior education in private and public schools; while exam boards do have achievement data for the *secondary* school level, these are not publicly available to researchers and, in any case, they are not linked to student, teacher, and school characteristics. The Annual Status of Education Report (Pratham 2007) collects national household data on over 300,000 primary-age children’s learning achievements but does not collect much information on home background or on schools and teachers.

Partly reflecting this lack of data, there is a paucity of good research on educational issues in India. Most of the existing research based on small surveys and using achievement production functions merely establishes correlations rather than causation between student achievement and particular school inputs. The inability to deal convincingly

with issues of the potential endogeneity of school inputs has been due to the ubiquitous problems of lack of credible instruments and lack of panel or experimental data, though some recent studies have used randomized experiments to study the impact of particular educational interventions (Banerjee et al. 2005; Duflo and Hanna 2005; Muralidharan and Sundararaman 2006; Pandey, Goyal, and Levine 2006) and others have used statistical techniques such as propensity-score matching methods (Jalan and Glinskaya 2002), instrumental variable methods (Kingdon and Teal 2007), pupil fixed-effects approaches (Kingdon 2006), and treatment effect models (Schmid 2006).

The first section of this chapter presents evidence on the relative sizes of private, aided, and government schooling sectors in India. The second section examines the relative effectiveness and per pupil costs of private and public schools in India and the final section discusses India's experience with public-private partnerships in education.

6.1 The Relative Sizes of the Private and Public Schooling Sectors

The very first fact about the private and public schools in India is that even their relative enrollment shares are not known with a degree of accuracy. This is mainly due to a failure to include all types of schools in official data collections but also partly due to exaggeration of enrollments in publicly funded schools in these data (Kingdon 1996a; Drèze and Kingdon 1998).

6.1.1 Typology of School Types in India

There are three main school types in India: government, aided, and private. Schools run by the central, state, or local governments are referred to as government schools. Schools run by private managements but funded largely by government grant-in-aid are known as private aided or just aided schools. They charge the same fee levels as government schools (which is now mandated to be nil) and pay the same salary rates to teachers as in government schools. From the early 1970s onward, their teachers have been paid directly from the state government treasury and are recruited by a government-appointed Education Service Commission rather than by the school. Thus, government and aided schools are now quite similar in their mode of operation. Schools run by private managements without state aid are known as "private unaided" schools. These run entirely on fee revenues and have virtu-

ally no government involvement in matters such as teacher recruitment. These are thus the genuinely private schools and we refer to these simply as “private” schools rather than using their full name “private unaided.”

Private schools in turn divide into two types: recognized schools and unrecognized schools. Government recognition is an official stamp of approval. To be eligible for government recognition, a private school is by law required to fulfill a number of conditions.¹ However, hardly any private schools that get recognition actually fulfill all the conditions. For instance, many recognized private schools in Uttar Pradesh run in rented buildings when having an owned building is a mandated condition of recognition (Kingdon 1994). Indeed, some of the conditions are or have over time become mutually inconsistent.² The main benefit of recognition used to be that with recognition a school became entitled to issue valid transfer certificates (TCs), which are a mandated requirement for admission into upper primary and secondary schools. However, the emergence of large numbers of unrecognized primary schools (as shown later) suggests this requirement is no longer strictly applied and that, *de facto*, recognized and unrecognized schools may not be too different in terms of their physical facilities and *modus operandi*.

6.1.2 Private Schooling Share According to Official and Household Data

Despite the data deficiencies listed above, it is clear that the fee-charging private schooling sector in India is much larger than thought in the past. Kingdon (1996a) challenged the prevailing notion in Indian writings, based on official published data, that the size of the private sector in primary education was “infinitesimally small” or “negligibly small.”

Table 6.1 shows the enrollment share of private schools in rural and urban India, according to both official school returns data in 1993 and 2002 and household survey data from 1993 and 2006. The bottom half of the table shows corresponding figures for Uttar Pradesh, a state with high levels of private school participation. The latest figures for the year 2005–06 from the District Information System for Education (DISE) are not shown because of its incomplete coverage.

Table 6.1 shows that according to official statistics, in 1993, only 2.8% of all rural primary school students in India were studying in private

Table 6.1
Enrollment Share of Private Schools, 1993–2006

Area	School level	Official published data 1993	Household survey data 1993	Official published data 2002	Household survey data 2006
<i>All India</i>					
Rural	Primary	2.8	10.1	5.8	19.5
	Junior/middle	6.5	7.9	11.1	20.4
	Secondary	6.8	10.1	14.3	22.8
Urban	Primary	25.7	26.2*	28.9	NA
	Junior/middle	18.8	15.4*	39.1	NA
	Secondary	11.5	11.2*	32.4	NA
<i>Uttar Pradesh</i>					
Rural	Primary	8.8	30.7	15.6	30.5
	Junior/middle	28.3	23.3	31.0	35.0
	Secondary	10.9	14.4	41.0	37.8
Urban	Primary	53.3	49.7*	64.1	NA
	Junior/middle	29.6	25.1*	48.2	NA
	Secondary	5.3	11.3*	29.7	NA

Source: 1993 official data computed from *Sixth All India Education Survey* (NCERT 1998). 2002 official data computed from *Seventh All India Education Survey*, available at <http://gov.ua.nic.in/NScheduleData/main3.aspx>. Rural household survey figures for 1993 are based on the author's calculations from 1993–94 NCAER survey. The urban household survey figures marked * are taken from 1995–96 *National Sample Survey* published in NSSO (1998, A69–82). Household survey figures for 2006 for rural India taken from ASER2006 (Pratham 2007).

Note: In official data I have taken grades 9–12 as secondary school, i.e., corresponding to students aged about 15–18 years old. ASER household survey collected data only on children up to age 16, so children aged 7–10, 11–14, and 15–16 are assumed to be in primary, middle, and secondary school respectively. In ASER, 18.6% of all children aged 7–10 were in private school and 4.6% were not in school, thus the private school share of total school enrollment is taken to be $(18.6/(100 - 4.6) * 100 = 19.5\%)$ and similar calculations were performed for middle and secondary school ages.

schools but that, according to household survey data for the same year, 10.1% of all rural Indian 6–10-year-old school attendees went to a private school, a figure more than three times as high as the official estimate.³ In rural Uttar Pradesh, official estimates for primary education put the 1993 enrollment share of private schools at 8.8% but according to the 1993–94 National Council of Applied Economic Research (NCAER) household survey, the actual share was 30.7%, again more than three times as high as the official estimate. By the time of the Public Report on Education (PROBE) survey in 1996, 36% of all primary-age students (6–11-year-olds) in rural Uttar Pradesh attended private

schools (PROBE Team 1999). Table 6.1 also shows that the enrollment share of private schools at the primary level rose from 2.8% in 1993 to 5.8% in 2002. If the extent of underestimation of private enrollment in 2002 is the same as in 1993, then the true private school share of total primary enrollments in rural India is three times as high as 5.8%, that is, about 17%. This is close to the only recent national estimate available: the ASER-2006 national sample survey of over 330,000 households across 15,800 villages finds that 19.5% of school-going rural 7–10-year-olds attended private schools in 2006.⁴ Table 6.1 shows that in *urban* India, private schools' share of total enrolment in 2002 was between about 30 and 40% at different levels of education, though being an official figure, this ignores the numerous enrollments in private unrecognized schools.

Some reasons for the large discrepancy between household survey estimates and official estimates of the size of the private schooling sector in India are discussed in Kingdon (1996a) and Drèze and Kingdon (1998): First, government and aided school teachers have an incentive to over-report their enrollments when there is low demand for such schools (since a school with falling rolls would lose teachers), and this reduces the apparent enrollment share of private schools; second, as previously stated, all official school "censuses" are carried out only in the government-recognized schools, and in most Indian states there is no requirement on private primary schools to be registered, let alone government-recognized. It seems that rural private schools in particular do not easily get government recognition, for which many conditions need to be satisfied. As Kingdon (1996a) says, given the exacting conditions for and scant rewards of recognition, it is not surprising that many private primary schools remain unrecognized.

The true size of the private schooling sector is greatly underestimated in official data due to enumerating only the recognized schools. Household survey data give a much more accurate picture since parents have no incentives to over-report enrollment in publicly funded schools or to report enrollment in recognized schools only. Household survey data in table 6.1 suggest the extent to which the enrollment share of private schools in primary education is underestimated in official data—namely by about 67% in rural areas. Muralidharan and Kremer (2006) find that in their national survey of 20 states, 51% of all private primary schools were unrecognized. This accords with evidence from individual states in other studies.⁵

Private schooling is utilized even among the poor in India. Findings from the Micro Impacts of Macroeconomic Policies (MIMAP) survey show that, of all enrolled children aged 5–10-years-old living below the poverty line, 14.8% attended private schools (8% in rural and 36% in urban India). The corresponding figures for ages 11–14 (junior school age) and 15–17 (secondary school age) were 13.8% and 7.0% respectively (Pradhan and Subramaniam 2000). That private schools are used by poor families is also found in five north Indian states (PROBE Team 1999) and by Tooley and Dixon (2003) in Andhra Pradesh.

6.1.3 Growth in Private Schooling

The most telling statistic, however, is not the share of private schooling in the *stock* of total school enrollment, but rather the share of private schooling in the total recent *increase* in school enrollment at different levels. This shows the relative growth of private schooling in India (i.e., relative to the growth of government and aided schooling). Table 6.2 presents the proportion of the total enrollment increase (over time) that is absorbed by private schools. It is constructed from underlying numbers as shown in table 6.A.1 for urban India.⁶ Although information in these official statistics excludes the numerous unrecog-

Table 6.2

Share of Recognized Private Schools in Total Enrollment Increase, by Region, Level of Education, and Time Period

	1978–86	1986–93	1993–2002
<i>Rural</i>			
Primary	2.8	18.5	24.4
Middle	7.2	12.8	23.2
Secondary	5.8	15.8	30.9
<i>Urban</i>			
Primary	56.8	60.5	95.7
Middle	35.7	31.8	71.7
Secondary	17.7	17.7	46.7
<i>Rural & Urban</i>			
Primary	13.5	35.3	38.9
Middle	15.0	21.4	37.8
Secondary	10.7	16.8	38.4

Source: Author's own calculations based on enrollment by school management type in the All India Education Surveys for various years (NCERT 1982, 1992, 1998, 2006). See table 6.A.1 for the underlying urban data.

nized schools, even recognized private school growth numbers are telling.

We learn two things from table 6.2: first, that growth of private schooling has accelerated over time; second, that in urban areas the growth of private schooling has consistently been the greatest at the primary level and progressively smaller at the middle and secondary school levels, which is perverse from the equity point of view since children of the poor are most well-represented at the primary schooling level.

Table 6.2 shows that in *urban* India, 56.8% of all the *increase* in total primary school enrollment in the period 1978–86 was absorbed by private schools; the corresponding figure for 1986–93 was 60.5% and for the period 1993–2002 was 95.7%. Clearly, the pace of “privatization” increased greatly in the 1993–2002 period. In this nine-year period, government and aided primary schools together absorbed only 4.3% of the total net increase in primary school enrollments, that is, their numbers or enrollments grew very slowly. Nearly 96% of the total increase in urban primary enrollment was due to the growth of private schooling! It bears emphasizing that even this dramatic statistic is an underestimate since it takes no account of enrollment growth in the numerous unrecognized private schools that are excluded from the official statistics. The recent growth of private primary schooling in urban India has been nothing short of massive. In *rural* India the rate of expansion of private primary schooling has been much slower but even here the pace of privatization picked up over time: only 2.8% of total rural growth in primary enrollment in the 1978–86 period was absorbed by private schools, but the corresponding figure for the 1986–93 period was 18.5% and for 1993–2002, 24.4%. Again, these figures are all underestimates since they do not include growth in enrollments in the *unrecognized* private primary schools. It is also worth stating that any increase in aided school enrollments—shown in table 6.A.1—(if it comes from the establishment of new aided schools rather than merely from expansion in enrollment size in existing aided schools) represents in fact an increase in private schools since aided schools are private schools that start receiving government grant-in-aid.

In some states, acceleration in the growth of private schooling was spectacular even in the 1986–93 period. For instance, in urban Uttar Pradesh (not shown in table 6.2), 94% of all new primary school

enrollment over the period 1986–93 occurred in private schools. The growth of private schooling, particularly at primary and middle levels of education, signals growing inequality of educational opportunity.

The growth of private schooling offers a possible explanation for the fact that despite falling or virtually static per-capita public education expenditure in several Indian states and falling share of elementary education expenditure in state domestic product (Drèze and Sen 2002), these states have improved their educational outcome indicators in the 1990s (Kingdon et al. 2004).

In the next section I examine evidence on the relative effectiveness of private, aided, and government schools in India. This may help to explain—at least in part—the relative popularity and growth of different school types.

6.2 Internal Efficiency of Private and Public Schools

6.2.1 Relative Effectiveness of Private and Public Schools

Until recently, due to the lack of achievement data linked to school and teacher characteristics, studies of the relative effectiveness of public and private schools in India have had to rely on achievement tests carried out by the researchers themselves in small samples of schools (Bashir 1994, 1997; Govinda and Varghese 1993; Kingdon 1994, 1996b; Tooley and Dixon 2003). These studies have been carried out in different parts of India (Tamil Nadu, Madhya Pradesh, Uttar Pradesh, and Andhra Pradesh respectively) and differ in several respects⁷ but they share the common conclusion that private school students generally outperform their public school counterparts in learning achievement even after controlling for schools' student intakes. Recently, Muralidharan and Kremer (2006) corroborate the findings in earlier studies with nationally representative data on rural primary schools.

Bashir (1994, 1997) found that in the southern Indian state of Tamil Nadu, private primary school students performed significantly better in mathematics than government school students, though this was not true in Tamil language achievement (although many of the private schools were English-medium schools, unlike government schools, which were Tamil-medium). She also found aided schools to be more effective than government schools. Govinda and Varghese (1993) found that in the central Indian state of Madhya Pradesh, achievement levels of primary school students in private unaided schools were considerably higher—in both mathematics and language—than those of

pupils in either aided or government schools. A private school effect remained even after controlling for differences in home background and school inputs. Kingdon (1994) found that in the northern Indian state of Uttar Pradesh, private school students outperformed their aided and government school counterparts and that aided and government schools were similar in terms of their effectiveness in imparting learning. Muralidharan and Kremer (2006) bring national data to bear on this issue. They find that in rural India, private school students outperform public school students.

As is well known, even in studies that have information on measurable student characteristics, a major problem in studying the impact of school type on student achievement is that students may choose school type on the basis of unobserved traits such as ability and motivation. If so, then any private school achievement advantage over public schools—after controlling for observed student characteristics—cannot simply be attributed to school type. To have a clean impact evaluation, one needs either an experiment with students randomly assigned to private and public schools, or a convincing way of dealing with endogenous sample selection into private and public schools. There are no randomized experiments available in India to study the relative effectiveness of private and public schools. Kingdon 1996 is the only peer-reviewed journal study for India that attempts to control for potential endogenous selection into different school types on the basis of unobserved characteristics using the Heckman procedure.

As an illustration, table 6.3 summarizes this study's findings from Uttar Pradesh. The method of comparing the relative effectiveness of the different school types is as follows: Choose a pupil at random from the entire student population in the district and give her the average characteristics of the full sample of pupils, say \bar{X} . Then, using the fitted selectivity-corrected achievement (*ACH*) equations for government (*G*), private aided (*PA*) and private unaided (*PUA*) schools, predict a score for this representative student if she were to attend a *G* school, another score if it were a *PA* school, and a third score if it were a *PUA* school. That is, predict an achievement score in each school type as:

$$ACH_G = \hat{b}_G \bar{X} \quad (6.1)$$

$$ACH_{PA} = \hat{b}_{PA} \bar{X} \quad (6.2)$$

$$ACH_{PUA} = \hat{b}_{PUA} \bar{X} \quad (6.3)$$

Table 6.3

Raw and Standardized Achievement Scores and Relative Advantage Points by Sector and Subject: *G*, *PA*, and *PUA* Schools

	(A) Achievement points			(B) Achievement advantage points		
	<i>G</i> (a)	<i>PA</i> (b)	<i>PUA</i> (c)	<i>PUA-G</i> (c – a)	<i>PUA-PA</i> (c – b)	<i>PA-G</i> (b – a)
<i>Mathematics</i>						
Raw	8.97	8.36	17.09	8.12	8.73	–0.61
Standardized (d)	11.38	10.09	12.80	1.42 [18]	2.71 [31]	–1.29 [–211]
<i>Reading</i>						
Raw	9.77	10.86	16.85	7.08	5.99	1.09
Standardized (e)	13.78	13.73	13.82	0.04 [1]	0.09 [2]	–0.05 [–5]
<i>Achievement</i>						
Raw	18.74	19.22	33.94	15.20	14.72	0.48
Standardized (d + e)	25.16	23.82	26.62	1.46 [10]	2.80 [19]	–1.34 [–279]
OLS standardized achievement points	20.57	22.60	27.56	6.99	4.96	2.03

Note: The maximum marks possible in the math and reading tests were 36 and 29 respectively. Thus, the maximum achievement mark was the total of the two, i.e., 65. The figures in brackets are the standardized achievement advantages as a percentage of the raw achievement advantages. The negative signs imply achievement disadvantages.

where the \hat{b} s are the estimated coefficient vectors in the three sectors and \bar{X} is a vector of mean values of the explanatory variables, averaged over the entire sample. Now *PUA* schools' achievement advantage over *G* schools, for example, can be calculated as (6.3) – (6.1), *PA* schools' relative advantage over *G* schools as (6.2) – (6.1), and so on. The achievement scores thus calculated and the relative achievement advantages of different school types are presented in table 6.3.

Table 6.3, column B, shows that the unadjusted (raw) mean achievement advantage of private unaided schools over government and aided schools in all subjects falls greatly when personal endowments and sample selectivity of pupils are controlled for. For example, *PUA* schools' raw mathematics-score premium over *G* schools of 8.12 points falls to 1.42 points (still a large achievement advantage of 0.21 standard deviations). This implies that, of the *PUA* schools' mathematics advantage of 8.12 points vis à vis *G* schools, 82% is explained by student in-

take and only 18% can be attributed to school influences. The *PUA* schools' raw mathematics advantage over *PA* schools falls from 8.73 points to 2.71 points, so that 31% of the observed *PUA* math advantage is due to school-related factors and 69% due to student intake. The predicted mathematics score of a child in a *PUA* school (12.80 points) is 27% higher than her predicted math score in a *PA* school, where it would be 10.09 points. In other words, *PUA* schools are 27% more effective than *PA* schools in their math teaching.⁸

G schools' tiny mathematics advantage over *PA* schools increases after controls, suggesting that *G* schools are more effective in imparting numeracy skills than *PA* schools. It is notable that all three school types are roughly equally effective in imparting reading skills. The raw reading-score premiums virtually disappear when student background and selectivity are controlled.

The finding in econometric studies—that private schools are generally more effective than public schools in India—is broadly corroborated by the qualitative findings of the PROBE report, based on a survey of 242 villages in 5 north Indian states (PROBE Team 1999). The authors emphasize low teaching activity in public schools. The report states that the extreme cases of teacher negligence were “less devastating than the quiet inertia of the majority of teachers. . . . In half of the sample schools, there was no teaching activity at the time of the investigators' visit. . . . Inactive teachers were found engaged in a variety of pastimes such as sipping tea, reading comics, or eating peanuts, when they were not just sitting idle. Generally speaking, teaching activity has been reduced to a minimum in terms of both time and effort. And this pattern is not confined to a minority of irresponsible teachers—it has become a way of life in the profession” (PROBE Team 1999, 63). While it does not aim to make a case for private schools, the PROBE report contrasts such teacher behavior in government schools with that in private schools. It notes (p. 64) “the high level of teaching activity in private schools, even makeshift ones where the work environment is no better than in government schools.” Again on page 102 the report notes, “In most of the private schools we visited, there was feverish classroom activity.” Also: “This feature of private schools brings out the key role of accountability in the schooling system. . . . In a government school the chain of accountability is much weaker as teachers have a permanent job with salaries and promotions unrelated to performance. This contrast is perceived with crystal clarity by the vast majority of parents” (p. 64). Other authors

Table 6.4
Salary Expenditure as a Proportion of Total Education Expenditure

Year	Recurrent as a percentage of total educational expenditure	Salary as a percentage of total recurrent educational expenditure (%)		
		Primary	Junior	Secondary
1960–61	74.7	87.9	85.1	72.3
1965–66	79.4	90.7	89.2	75.3
1969–70	85.0	92.3	90.4	85.6
1974–75	87.1	96.6	94.3	87.1
1981–82	94.8	96.7	93.8	89.9
1987–88	97.3	NA	NA	90.7

Source: Table 13.13 from Kingdon and Muzammil (2003).

Note: The system of reporting changed after 1988.

too have noted lax attitudes and low teacher accountability (Weiner 1990). This, in turn, seems to have its roots, at least partly, in teachers' own demands for a centralized education system (Kingdon and Muzammil 2003).

It is thought that in explaining the increased popularity of private education, the breakdown of government schools is often more decisive than parental ability to pay. "In rural Himachal Pradesh, for instance, there is a good deal of purchasing power but the government schools function well, so that there are few private schools. In central Bihar, by contrast, poverty is endemic, yet private schools can be found in many villages due to the dysfunctional state of government schools" (PROBE Team 1999, 102).

6.2.2 Relative Costs of Private and Public Schools

Next I turn to the relative unit costs of private and public schools, that is, the monthly cost of teaching each student. School expenditures in India are dominated by salaries. For example, in government-funded primary schools, salary expenditure as a proportion of total recurrent expenditure was 96.7% in 1981–82 (table 6.4). Comparable expenditure breakdowns are not available for private schools since official statistics do not collect financial data on private schools.

However, table 6.5 shows a comparison of per-pupil expenditures in public and private schools in the Kingdon (1996) microstudy for Uttar Pradesh, showing that in private schools, salaries account for a much

Table 6.5
Annual Per-Pupil Expenditures by School Type (Rupees)

School type	Recurrent expenditure per pupil			Salary as a percentage of total expenditure
	Salary	Non-salary	Total	
Government (G)	1958.40	50.00	2008.40	97.5
Aided (PA)	1780.93	46.87	1827.80	97.4
Private (PUA)	735.94	262.96	998.90	73.7

Source: Kingdon (1994), chapter 6.

Table 6.6
Average Monthly Salary of Teachers by School Type

School type (junior schools)	Average gross salary of sample teachers (rupees per month)
Government (G)	2449.04
Aided (PA)	2429.48
Private (PUA)	1036.73

Source: Kingdon (1994), chapter 6.

lower proportion of total spending (74%) than in government and aided schools (97%). Table 6.5 also shows that recurrent per-pupil expenditure in private schools was only 50% of that in government schools and 55% of that in aided schools. The relatively low per-pupil expenditure in private schools is due largely to the fact that teacher salary rates are far lower in private than government schools. Table 6.6 shows that the average teacher salary in private junior schools was only 42% of that in government schools and 43% of that in aided schools. This is consistent with findings from different parts of India in the early- to mid-1990s (table 6.7). More recent figures in the last two columns of table 6.7 show that the private-public salary gap has increased greatly since the early- to mid-1990s. Private schools pay teachers market-clearing wages that have grown only slowly, whereas government and aided schools pay teachers prescribed minimum wages that have risen inexorably and contain large economic rents.

Table 6.8 presents cost per unit of output by school type. The first row shows that, on average, PUA schools are about twice as cost-advantageous as G and PA schools. It also shows that there is in mathematics (but not in reading) an *achievement* advantage associated with

Table 6.7
Evidence from Indian Studies on Private Unaided and Government School Teachers' Average Monthly Salaries

School level	PUA pay as a percentage of	Kingdon's study 1994	Kansal's study 1990	Govinda/Varghese 1993	Jain's study 1988	Bashir's study 1994	Singh/Sridhar 2002	Muralidharan & Kremer
		Lucknow district of Uttar Pradesh	City of New Delhi	5 districts of Madhya Pradesh	Baroda district of Gujarat	Many districts of Tamil Nadu	2 districts of Uttar Pradesh	20 states of India
<i>Primary/junior level</i>	G pay	42	39	49	47	47	20	20
	PA pay	43	39	66	—	50	—	—
<i>Secondary level</i>	G pay	74	76	—	—	—	—	—
	PA pay	79	76	—	—	—	—	—

Note: The Kingdon study sampled 182 teachers, Kansal 233 teachers, Govinda and Varghese 111 teachers, Bashir 419 teachers, and Singh and Sridhar 467 teachers. We do not know the number of teachers sampled in Jain.

Sources: Jain (1988); Kansal (1990); Govinda and Varghese (1993); Bashir (1994); Kingdon (1994); Singh and Sridhar (2002); Muralidharan and Kremer (2006).

Table 6.8Unit Costs, Achievement, and Cost per Achievement Point (*G*, *PA*, and *PUA* Schools)

	<i>G</i> (a)	<i>PA</i> (b)	<i>PUA</i> (c)	<i>PUA</i> : <i>G</i> (c/a)	<i>PUA</i> : <i>PA</i> (c/b)	<i>PA</i> : <i>G</i> (b/a)
Cost per student (<i>C</i>)	2008.00	1827.00	998.00	0.50	0.55	0.91
Predicted mathematics score (<i>M</i>)	11.38	10.09	12.80	1.13	1.27	0.89
Cost per mathematics point (<i>C</i> / <i>M</i>)	176.00	181.00	78.00	0.44	0.43	1.03
Predicted reading score (<i>R</i>)	13.78	13.73	13.82	1.00	1.00	1.00
Cost per reading point (<i>C</i> / <i>R</i>)	146.00	133.00	72.00	0.50	0.55	0.91
Predicted total score (<i>T</i> = <i>M</i> + <i>R</i>)	25.16	23.82	26.62	1.06	1.12	0.95
Cost per score point (<i>C</i> / <i>T</i>)	80.00	77.00	38.00	0.47	0.49	0.96

Source: Kingdon (1996).

attending a *PUA* school. Combining *PUA* schools' 100% unit cost advantage over *G* schools with their 13% mathematics advantage leads to the conclusion that *PUA* schools are much more cost-effective than *G* schools in their mathematics teaching. Another way of saying this is that they produce the same level of numeracy skills as *G* schools at a mere 44% of the cost of *G* schools. They produce the same level of reading achievement as in *G* schools at half the cost. The comparison of *PUA* schools with *PA* schools is of similar magnitudes.

To summarize, the results show that *PUA* schools' ability to pay market-clearing wages and, thus, their far more thrifty use of teachers implies a large unit cost advantage over government-funded (*G* and *PA*) schools. This reinforces their achievement advantage over the other school types so that they are unambiguously and substantially more cost-effective or internally efficient than both *G* and *PA* schools, which are roughly equally efficient.

However, teachers' objections to private school salary levels is that market wages are not commensurate with the cost of (decent) living. Whether one favors low market wages to achieve cost efficiency in education, or high minimum wages that protect teachers at the expense of cost-efficiency, is not an ideologically neutral question. However, it seems that in India, teacher salaries relative to per-capita income are higher than in many other countries⁹ and that government-paid teachers' salaries have increased impressively in real terms: Drèze and

Saran (1993, 32a) report that in 1993 a teacher's monthly salary in Palanpur (Uttar Pradesh) could buy very nearly twice the amount of wheat that his monthly salary could buy in 1983. Kingdon and Muzammil (2003, chapter 13) calculate that in the 22-year period from 1974 to 1996, teacher salaries in Uttar Pradesh grew by about 5% per annum in *real*—that is, inflation-adjusted—terms. This is significantly higher than growth of per-capita real GDP in India over this period which, according to Penn World Tables, was on average 3% per annum.

6.3 Public-Private Partnership in Education in India

6.3.1 Historical Experience of PPPs

If private schools attract households, it suggests that parents perceive them to be more advantageous relative to public schools. As Nechyba (2005) states, “the nature of these advantages is likely to shape our view of how the private sector can be most effectively mobilized to advance academic achievement and other social goals.” The main avowed advantage of public-private partnerships (PPPs)—publicly funded but privately produced/delivered education—is that they harness the energy, expertise, financial acumen, management skills, and (sometimes) resources of the private sector to create better value for money for taxpayers (LaRocque 2004). It is thought that PPPs provide a more flexible way of producing education, since the private entity running the school has more discretion about the running of the school than is possible in public schools. Decentralized decision making at the level of the school is thought to be more responsive to parents and to foster local accountability.

In recent years there has been increased advocacy in favor of PPPs in education. Any collaboration between public bodies such as local or state government and private operators is referred to as PPP and there are a wide variety of different types of PPPs in education in different countries.

A substantial PPP system does operate in India, at least at the secondary and higher levels of education. This is the system of government grant-in-aid to privately managed schools. According to the Ministry of Human Resource Development (MHRD) cited in Bashir (2005), in 1995–96 the percentage share of aided schools in total schools was 34.0% and 44.3% respectively at the secondary and higher secondary levels, though at the primary and middle levels, it was only

3.4% and 10.1% respectively. According to University Grants Council data in 2000–01, 42% of all higher education institutions in India were aided, which closely match the MHRD figures.

There is great interstate variation within India, in the extent to which aided schools are utilized at different levels of education. For instance, in 2000–01, in Kerala 59.7% but in Uttar Pradesh only 1.6% of all primary schools were aided, although at the higher secondary level the picture was very different: 42.6% of all Kerala but 74.7% of all Uttar Pradesh higher secondary schools were aided (MHRD, quoted in Bashir 2005). Grants to aided schools account for a substantial proportion of the education budget, though again there is large interstate variation, for example, in elementary education from 0% in Gujarat to 84.4% in West Bengal; in secondary education from 1.1% in Himachal to 94.2% in West Bengal; and in higher education from 0% in Bihar to 87.2% in Maharashtra (Bashir 2005).

When India inherited this PPP system from the British in 1948, aided schools avoided many government regulations and interference. For instance, they had far more autonomy than public schools in determining staff disciplinary policies. Any recognized private school could apply for government grant-in-aid and, once granted aided status, it received a subsidy from the state government. Its teachers were paid out of school revenues and were thus accountable to fee-paying parents and to the school manager. They could be disciplined and hired/fired at the level of the school.

However, teachers of aided schools became increasingly unionized and lobbied hard in the mid- to late 1960s to be paid directly by the state government rather than via their private management which, they claimed, engaged in unfair practices such as not paying fair wages. Their intense lobbying and strikes helped the passage of the momentous Salary Distribution Act (1971) in Uttar Pradesh and similar acts in other states, such as the Direct Payment Agreement (1972) in Kerala. These acts stipulated that aided school teachers' salaries would be paid directly to them rather than first going to school management. The acts represented a massive centralization of school management and they reduced aided school teachers' accountability to their local managers (Kingdon and Muzammil 2003). Thus, over time, aided schools have become increasingly similar to public schools because their modus operandi has become more and more like that of public schools. In addition to their teachers' salaries now being paid directly by the state government, their teacher appointments are made by an

Education Service Commission of the state government, as for public school teacher appointments. Given the similarities in the institutional arrangements and teacher incentives in aided and government schools in Uttar Pradesh, perhaps it is not surprising that, as seen earlier, there is little difference between government and aided schools in terms of either their effectiveness in imparting learning or in terms of their per-pupil salary expenditures and per-pupil education expenditures.

Loss of local-level accountability (via centralizing legislation) is not the only factor behind what is often seen as lax attitudes of public school teachers toward their schools and students. One manifestation of poor attitudes is their significantly higher within-village teacher absenteeism rates than in private schools (Kremer et al. 2005), despite getting salaries on average five times the private teachers' salary rates in the early 2000s (see table 6.7). The National Commission on Teachers (NCT), the only government commission on teachers in post-independence India, in a report written with much sympathy for the teaching profession, blames teacher unions, suggesting that union-backed teachers do not fear adverse repercussions if they are slack in their work. The report of the NCT notes that "some of the Principals deposing before it [i.e. before the Commission] lamented that they had no powers over teachers and were not in a position to enforce order and discipline. Nor did the district inspectors of schools and other officials exercise any authority over them as the erring teachers were often supported by powerful teachers' associations. We were told that there was no assessment of a teacher's academic work and other duties and that teachers were virtually unaccountable to anybody" (National Commission on Teachers 1986, 68).

This type of behavior is possibly further strengthened by the fact that teachers (or rather, mostly their union leaders) are also legislators in the state parliament, both as Members of the Legislative Assembly (MLAs) and as Members of the Legislative Council (MLCs).¹⁰ In other words, teachers have their sympathizers in the corridors of power, who tend to shelter them in case any disciplinary issues arise. Aided school teachers are in a politically particularly advantageous position vis à vis government school teachers: although they are publicly paid workers, they are not debarred from contesting political elections because they are not deemed to hold an "office of profit" under the government (unlike government school teachers). As a result, aided school teachers freely contest elections. The National Commission on Teachers (1986, 68) stated that "the most important factor responsible for viti-

ating the atmosphere in schools, we were told, has been the role of teacher politicians and teachers' organisations."

A further possible reason why aided schools—the Indian form of educational PPP—perform no better than government schools in Uttar Pradesh is that the government grant to aided schools is devoid of any performance incentives. Despite the existence of certain rules and conditions, the system of grants-in-aid in Uttar Pradesh is not linked to the qualitative performance of schools. Even when the school's grant-in-aid was made conditional on satisfactory examination performance of the school's students, the pass rate was fixed at a paltry 45%—that is, it was required that only 45% (or more) of the students pass the high school exam (and a student needs to get a mere 33% average grade across all subjects to pass high school)! Similarly, low standards are required for the minimum number of days the school must be open in order to remain eligible for grants. However, there is little monitoring or verification of compliance with even these undemanding conditions. On the whole, the system still leaves much to be desired and it is not surprising because in practice, political maneuvers often overrule the provisions laid down by the state government to sanction and regulate recurring and nonrecurring grants. The following observation of Rudolph and Rudolph (1972, 105) with regard to the flouting of conditions of grants-in-aid still holds: "these grants in aid are technically conditioned upon the maintenance of certain academic and administrative standards, but in reality an educational entrepreneur who enjoys political favour has little difficulty in establishing his institution's qualification."

While the number of aided schools expanded tremendously in India in the post-independence period, the system of grants-in-aid has remained essentially the same as that introduced by the British 150 years ago. By contrast, the British system of grants itself underwent revolutionary changes and became more objective, particularly from the 1920s onward. What incentives can be built into public grants to private schools is an area that deserves detailed study. A per-student (as opposed to block) grant system may be desirable that relates a PPP grant to various school performance indicators such as percentage of total expenses spent on nonsalary costs (to encourage quality improvements), percentage of total funds raised from nonfee sources such as parental donations (to encourage equitable resource-generation), percentage of parents who are satisfied with the school (to encourage accountability), and average number of students per class (to encourage

cost-consciousness), and so on. A more rational grant structure could be a policy correction that has potentially the biggest payoffs in terms of improved cost-efficiency in Indian education.

In summary, while PPPs are in theory supposed to lead to better quality schooling than publicly produced education, educational PPPs in India—the private aided schools—mostly function no better than public schools, at least at the junior and secondary levels in Uttar Pradesh where the author has done most of her research. An important reason for this appears to be that, over time, in response to their teachers' demands, aided schools have become like public schools, with few performance incentives and a lack of local accountability. Governments have lacked the courage to increase local accountability of teachers, who constitute a well-organized group with powerful political representation and strong unions: Kingdon and Muzammil (2003, ch. 10 and 11) show that teacher unions in Uttar Pradesh have opposed government proposals to introduce local-level accountability.

This experience of PPPs in education in India has important lessons for future education policy in India as well as for other countries. One thing it suggests is that when PPPs in education operate side by side with government schools, political pressure can mount over time for comparable treatment of teachers across the two school types, and any advantages of PPPs over government schools—if real—may not be enduring. However, the experience of PPPs in education in other countries, for example, in the Netherlands and elsewhere, shows that the build-up of such political pressure is not inevitable and that PPPs can work well in education. Why PPPs function well in some countries and apparently not in others is a research question that deserves attention. The devil seems to be in the detail of the PPP scheme—the design features that distinguish one PPP scheme from another.

6.3.2 Proposed New Form of PPP in Education

One of the main provisions of the current draft Right to Education Bill is that the national government will pay private schools for some publicly paid places. This effectively proposes to introduce a new form of PPP involving a per-student public subsidy to private schools, quite different to the way Indian states have financed private (so-called aided) schools thus far, which is by paying block grants in the form of salaries of all teachers of the aided school. The draft bill proposes to oblige all private schools to give 25% of school places to students from

“the weaker sections of society” and the government promises to reimburse the private schools for these places “at a rate equal to the per child expenditure in state schools/fully aided schools and state funded pre-schools, or the actual amount charged per student by such school, whichever is less, in such manner as may be prescribed” (clause 14.2, chapter 4, Right to Education Bill, August 2005).

This is the first time a post-independence Indian government has sought to utilize the private sector to provide publicly funded education (the aided school scheme was inherited from the British). Interestingly, the scheme is championed not by the right wing, the usual advocates of private education, but rather by those concerned with equity in education. Far from being the result of lobbying by the private school sector for government funds, the scheme is rather generally opposed by private schools on the grounds that mixing disadvantaged children with those from well-off homes will be psychologically damaging for disadvantaged children.

The bill and its provisions raise a number of important issues in elementary education that have not been widely aired or seriously debated. First, it has not been clarified how “weaker sections” will be defined and chosen and how all disadvantaged children will get an equal chance of access to private schools. Second, the choice of *this particular way* of providing “education of equitable quality” has not been justified in comparison to other potential designs. Different designs, depending on the alternative incentive structures inherent in them, can address different educational efficiency and equity goals. For instance, the bill proposes to give money directly to *private schools* to accept disadvantaged students rather than giving the same money as vouchers (entitlements of a particular monetary value) to *disadvantaged children*. The efficiency implications of these two ways of setting up the PPP could be very different due to the differing potential for school competition under these two ways of providing the same amount of funding. Whether money is given directly to the school (supply-side funding) or via the students (demand-side funding) also has potentially different *equity* implications because the matching of students to particular schools is likely to be different under these two models. Third, the draft bill could have major implications for the overall number of private schools and their fee levels. It is unclear, for instance, whether private schools’ response to the bill will be to create *new places* to accommodate publicly paid students or to *replace* 25% of existing students, or

a bit of both. Moreover, since per-pupil expenditure in public schools is much larger than fee levels in most private schools (which now pay teachers on average one-fifth the salary level of public schools, as seen in table 6.8), the bill's stipulations could well generally increase private school fee levels.

This raises the question of why recommendations for decentralizing reform in India, including the current draft Right to Education Bill, have never included serious consideration of the possibility of providing school choice to students via vouchers, as a way of addressing accountability of schools and teachers towards parents, unlike in other countries such as Chile, Colombia, New Zealand, the United States, and the United Kingdom, where there has been vigorous debate about and experimentation with vouchers as well as charter and concession schools. There are several potential explanations for this omission, as well as several concerns about school voucher schemes.

First, in India (and other poor countries), the most obvious failure of public schools is their very visible lack of resources, infrastructure, facilities, books, and teaching materials, and the obvious remedy is seen to be for government to fix these physical deficiencies. In many other countries, the focus of school reform has moved to improving incentives rather than inputs. Hanushek (2003) shows that while inputs matter somewhat more in developing than in developed countries, the provision of more resources does not raise student achievement levels in the majority of studies.

A second plausible reason for India's lack of consideration of a radical voucher-type reform is the fear of upsetting powerful vested interests such as teacher unions, which are likely to vehemently oppose such proposals to increase local accountability. Unions have fought hard over decades for legislation that shelters teachers from having to be locally accountable, and successive Indian governments have judged it politically infeasible to upset this powerful group that staffs polling booths at election time.

Third, while the issues are complex and much debated, some authors have raised concerns about adverse equity effects of vouchers (Hsieh and Urquiola 2003; Ladd 2002; LaRocque 2004). They find that voucher schemes can encourage the relatively better-off students to abandon public schools, supplement the voucher with private funds, and take private school places, thus leaving public schools with the less-well-off and often less-motivated students. These are serious con-

cerns worth investigation. However, Nechyba (2005) argues that the equity effects of school choice and PPP schemes can be addressed by the way in which vouchers are designed. "In particular, one can design vouchers to be inversely related to household income and to vary depending on student type thus offering increased school resources to those who find it disproportionately difficult to afford private school tuition and those whose children are disproportionately costly."

Fourth, there would be concerns about implementation of school choice schemes in the Indian context, such as: (1) the need to provide transport to nearby villages in order to offer real school choice/competition in rural (low-population density) areas, which has its attendant administrative and cost implications; and (2) the issue of whether uneducated/illiterate parents are able to make informed school choices. It may be argued that a voucher scheme will also be problematic because of the lack of a strong regulatory system to ensure schools' compliance with standards and the scope for corruption in the presence of weak monitoring and high costs of verification. However, it is well known that the current system also suffers from weak regulation and widespread corruption (e.g., see Dixon 2005) so the question is whether these difficulties would *increase* in the presence of voucher funding of education, and the answer is unclear. The point here is not to make a case for or against vouchers or any particular way of giving funds to private schools but rather to say that all the above concerns and issues are worthy of detailed consideration before the legislation is finalized.

6.4 Summary and Conclusions

Analysis of education issues in India is hampered by the absence of data on student achievement and partial coverage of schools in official data. Nevertheless, it is clear that private schooling has mushroomed in India, particularly at the primary level, where the government does not exert control as much as it does at the higher levels. Private schooling is also popularly utilized by families below the poverty line. According to qualitative accounts, the growth of private schools is greatest in areas where public schools do not function well.

Evidence suggests that private schools are more than twice as cost-effective as government schools in the large northern state of Uttar Pradesh. In other states where this issue has been explored (Tamil Nadu,

Madhya Pradesh, and Andhra Pradesh), private schools have also been found to be generally more effective than government schools in imparting learning, after controlling for student intake.

While aided schools—a form of public-private partnership in education—are no more cost-effective than government schools in Uttar Pradesh, this appears to be because over time they have become more and more like government schools owing to aided school teachers' successful lobbying for comparability of treatment vis à vis government school teachers.

The draft Right to Education Bill proposes to introduce a new form of public-private partnership in the form of a per-student subsidy to private schools, but the implications of this measure have not been vigorously debated yet. Nor have issues of school choice and competition via vouchers to families been considered in terms of their quality and equity effects, as compared with the current PPP proposal in the bill that intends to give funds directly to schools. The drawbacks of voucher schemes including problems of implementation were discussed, noting that some of the same concerns would also apply to the currently proposed form of PPPs in the draft bill and noting that equity concerns may be addressed by making the voucher amount inverse to family income.

It is critical to have a full national debate about the merits and drawbacks of the draft bill's proposed way of giving funds to private schools, in comparison with alternative PPP designs. In such a discussion, it would be useful to learn from the mistakes and successes of other countries that have tried alternative schemes for allocating public funds to private schools. Moreover, there may be a case to make for introducing the proposed measures on a pilot basis in one part of the country—to observe their effects for a specific period, and then to hone and improve what will potentially be a far-reaching and long-standing measure.

6.5 Appendix

See facing page.

Table 6.A.1
Growth in Enrollments by Level and School Type in India, 1978–2002 (Recognized Schools Only) India (Urban Only)

Level	1978–86				1986–93		1993–2002			
	Number of students enrolled		Absolute increase in enrollment	% share of the total increase	Absolute increase in enrollment	% share of the total increase	Absolute increase in enrollment	% share of the total increase		
School type	1978 (a)	1986 (b)	1993 (c)	2002 (d)	(e) = b - a	(f) = e/x1	(g) = c - b	(h) = g/x2	(i) = d - c	(j) = i/x3
<i>Primary</i>										
Government	10,270,760	11,189,956	12,836,933	12,766,950	9,19,196	26.7	1,646,977	37.1	-69,983	-1.3
Aided	4,735,795	5,304,932	5,414,067	5,710,967	5,69,137	16.5	109,135	2.5	296,400	5.6
Private	1,663,969	3,617,791	6,305,253	11,339,424	19,53,822	56.8	2,687,462	60.5	5,034,171	95.7
<i>Total increase in all types</i>					34,42,155	(x1)	4,443,574	(x2)	5,261,088	(x3)
<i>Junior</i>										
Government	3,173,594	4,272,930	5,229,084	5,581,666	10,99,336	43.2	956,154	31.3	352,582	10.3
Aided	3,336,413	3,874,078	4,999,795	5,612,649	5,37,665	21.1	1,125,717	36.9	612,854	18.0
Private	488,266	1,395,610	2,367,067	5,084,580	9,07,344	35.7	971,457	31.8	2,447,513	71.7
<i>Total increase in all types</i>					2,544,345	(x1)	3,053,328	(x2)	3,412,949	(x3)
<i>Secondary</i>										
Government	1,808,870	2,679,760	3,996,181	5,282,214	8,70,890	34.3	1,316,421	44.6	1,286,033	21.6
Aided	2,687,164	3,906,889	5,016,267	6,905,070	12,19,725	48.0	1,109,378	37.6	1,888,803	31.7
Private	195,969	645,442	1,168,160	3,944,952	4,49,473	17.7	522,718	17.7	2,776,792	46.7
<i>Total increase in all types</i>					25,40,088	(x1)	2,948,517	(x2)	5,951,628	(x3)

Source: NCERT (1982) Fourth All India Education Survey of 1978–79; NCERT (1992) Fifth All India Education Survey of 1986–87, p. 1116–1138; NCERT (1998) Sixth All India Education Survey of 1993–94; figures from the Seventh All India Education Survey of 2002–03 obtained from <http://gov.ua.nic.in/NScheduleData/main3.aspx>

Notes

1. In the state of Uttar Pradesh, to gain government recognition a private school must be a registered society, have an owned rather than a rented building, employ only trained teachers, pay salaries according to government prescribed norms, have classrooms of a specified minimum size, and charge only government-set fee rates. It must also instruct in the official language of the state and not be situated within five kilometers of a government school (Kingdon 1994, chapter 2).

2. For instance, the condition to charge only government school-tuition-fee rates is now incompatible with the condition to pay the government-prescribed salary rates to teachers, since government school-fee rates have been cut consistently since the 1960s and were abolished altogether in the early 1990s in all elementary schools, and since government-prescribed minimum salaries to teachers have risen inexorably over time: Kingdon and Muzammil (2003, chapter 13) estimate that average teacher salary rates rose by 5% per annum in *real* terms in the 22-year period between 1974 and 1996.

3. The two sources are not exactly comparable since some school-going 6–10-year-olds may attend preprimary or upper primary grades, i.e., be over- or underaged for their grade.

4. Although ASER merged aided and unaided private schools into a single category, private, at the primary level, there are few aided schools in most states so that the private enrollment rates in ASER can be taken to mean mostly private unaided school enrollments. ASER2006 found that 20.4% of boys and 16.8% of girls enrolled in grades one to eight attended private schools. This 21% gender gap suggests one way in which girls are discriminated against, namely via being substantially less likely to be sent to private schools than boys (see Kingdon 2005).

5. Aggarwal (2000) found that in his four surveyed districts of Haryana in 1999, there were 2,120 private primary schools of which 41% were unrecognized. The PROBE survey of 1996 in five north Indian states did a complete census of all schools in 188 sample villages. It found 41 private schools of which 63% were unrecognized. Mehta (2005) found that in seven districts of Punjab, there were 3,058 private elementary (primary and junior) schools, of which 86% were unrecognized.

6. Take the example of the junior (or upper primary) education level in urban India. Between 1993 and 2002, according to table 6.A.1, junior enrollment increased by 3,412,949. Out of this, the enrollment increase in private schools was 2,447,513, which is 71.7% of the total increase in junior enrollments.

7. While Kingdon's study is based on students in the final year of upper primary education (grade eight), the other studies are based on students in the final year of lower primary schooling (grades four or five). The methods used differed too. Bashir used hierarchical linear modeling, Govinda and Varghese used OLS regression, and Kingdon used sample selectivity correction models. The extent of controls for home background differed across the studies too, as well as whether school and teacher characteristics were included in the achievement equations. Finally the costs of private and public schooling were calculated differently in the different studies. In all three studies, the stratified random samples of private schools consisted of schools of all types—nonprofit, proprietary, faith-based, high-fee and low-fee schools, etc.

8. The correction for sample selectivity reduces the private school achievement advantage over government schools by a very large amount (compared to the OLS results in

the last row of table 6.4). This large reduction is somewhat surprising since one would not expect the unobserved factors (that remain after controlling for the child's score in the Raven's test of ability and for a rich set of home background characteristics) to make such a large difference to a child's predicted achievement score.

9. For example, the ratio of (public primary school) teacher salary to per capita GDP in the late 1990s was 1.15 in OECD countries, 4.4 in Africa, 2.3 in Latin America, and 2.9 in Asia (UNESCO statistics, available at portal.unesco.org/education/en/file_download.php/) but 8.5 in Uttar Pradesh, India (author's own calculation).

10. The constitution of India guarantees representation to teachers in the Upper Houses of state legislatures. Thus, uniquely among all worker groups, the teaching profession has been singled out for this political privilege (see Kingdon and Muzammil 2003), though Upper Houses now exist in only four large states in India.

References

Aggarwal, Yash. 2000. Public and private partnership in primary education in India: A study of unrecognised schools in Haryana. New Delhi: National Institute of Educational Planning and Administration.

Banerjee, A., S. Cole, E. Duflo, and L. Linden. 2005. Remediating education: Evidence from two randomized experiments in India. NBER Working Paper No. 11904, December.

Bashir, Sajitha. 1994. Public versus private in primary education: Comparisons of school effectiveness and costs in Tamil Nadu. Unpublished Ph.D. thesis, London School of Economics.

Bashir, Sajitha. 1997. The cost-effectiveness of public and private schools: Knowledge gaps, new research methodologies and an application in India. In *Marketizing Education and Health in Developing Countries: Miracle or Mirage?*, ed. C. Colclough, chapter 5. Oxford: Clarendon.

Bashir, Sajitha. 2005. Grant-in-aid mechanism in India: Policy note. World Bank.

Dixon, P. 2005. Private aided primary and secondary schools in Karnataka, India: A cautionary tale of a public-private partnership. Mimeo, School of Education, Newcastle University.

Drèze, J., and M. Saran. 1993. Primary education and economic development in China and India: Overview and two case studies. Discussion Paper No. 47, Development Economics Research Programme, London School of Economics.

Drèze, Jean, and Geeta Gandhi Kingdon. 1998. Biases in education statistics. *The Hindu*, March 6.

Drèze, Jean and Geeta Gandhi Kingdon. 2001. Schooling participation in rural India. *Review of Development Economics* 5, no. 1 (February): 1–24.

Drèze, Jean, and Amartya Sen. 2002. *India: Development and Participation*. Oxford and Delhi: Clarendon Press.

Duflo, Esther, and Rema Hanna. 2005. Improving teacher attendance in rural India. Mimeo, Poverty Action Lab, MIT, Cambridge, MA.

- Govinda, R., and N. V. Varghese. 1993. *Quality of Primary Schooling in India: A Case Study of Madhya Pradesh*. Paris: International Institute for Educational Planning, and New Delhi: National Institute of Educational Planning and Administration (NIEPA).
- Hanushek, Eric. 2003. The failure of input-based schooling policies. *Economic Journal* 113, no. 485: F1–F120.
- Hsieh, C. T., and M. Urquiola. 2003. When schools compete: How do they compete? An assessment of Chile's nationwide school voucher program. Working Paper No. 10008. National Bureau of Economic Research.
- Jain, S. C. 1988. Non-official initiatives for catering to the educational needs of the urban poor: A case study of Baroda slums. Unpublished typescript. Baroda: Baroda Citizens Council.
- Jalan, Jyotsna, and Elena Glinskaya. 2002. Small bang for big bucks? An evaluation of a primary school intervention in India. Mimeo, World Bank, August.
- Kansal, S. M. 1990. Disparity in income and levels of living among teachers in Delhi. *Economic and Political Weekly* 25, no. 46 (Nov. 17): 2547–2554.
- Kingdon, Geeta G. 1994. An economic evaluation of school management-types in India: A case study of Uttar Pradesh. Unpublished D.Phil. thesis, Economics Department, Oxford University.
- Kingdon, Geeta G. 1996a. Private schooling in India: Size, nature and equity effects. *Economic and Political Weekly* 31, no. 51: 3306–3314.
- Kingdon, Geeta G. 1996b. The quality and efficiency of public and private schools: A case study of urban India. *Oxford Bulletin of Economics and Statistics* 58, no. 1 (Feb.): 55–80.
- Kingdon, Geeta G. 2005. Where has all the bias gone? Detecting gender bias in the intra-household allocation of educational expenditure in rural India. *Economic Development and Cultural Change* 53, no. 2: 409–452.
- Kingdon, Geeta Gandhi. 2006. Teacher characteristics and student performance in India: A pupil fixed effects approach. GPRG-WPS-059, Global Poverty Research Group, Department of Economics, University of Oxford.
- Kingdon, G., R. Cassen, K. McNay, and L. Visaria. 2004. Education and literacy. In *Twenty-First Century India: Population, Economy, Human Development, and the Environment*, ed. T. Dyson, R. Cassen, and L. Visaria. New Delhi: Oxford University Press.
- Kingdon, Geeta G., and Mohammad Muzammil. 2003. *The Political Economy of Education in India: Teacher Politics in Uttar Pradesh*. Delhi: Oxford University Press.
- Kingdon, Geeta Gandhi, and Francis Teal. 2007. Does performance related pay for teachers improve student achievement? Some evidence from India. *Economics of Education Review* 24, no. 4 (August): 473–486.
- Kremer, Michael, Nazmul Chaudhury, Hasley Rogers, Karthik Muralidharan, and Jeffrey Hammer. 2005. Teacher absence in India: A snapshot. *Journal of the European Economic Association* 3: 658–667.
- Ladd, Helen F. 2002. School vouchers: A critical view. *Journal of Economic Perspectives* 16, no. 4: 3–24.

- LaRocque, Norman. 2004. School choice: Lessons from New Zealand. Paper presented to the conference on "What Americans Can Learn from School Choice in Other Countries." Cato Institute, Washington D.C., May.
- Mehta, Arun. 2005. Elementary education in unrecognized schools in India: A study of Punjab based on DISE 2005 data. New Delhi: NIEPA.
- Muralidharan, Karthik, and M. Kremer. 2006. Private and public schools in rural India. Mimeo, March, Harvard University, Cambridge, MA.
- Muralidharan, Karthik, and V. Sundararaman. 2006. Teacher incentives in developing countries: Experimental evidence from India. Mimeo, Harvard University.
- National Commission on Teachers. 1986. The teacher and society: Volume I. *Report of the National Commission on Teachers, 1983–85*. New Delhi: Government of India Press.
- National Council for Educational Research and Training (NCERT). Various years. *All India education survey*. New Delhi: NCERT.
- National Sample Survey Organisation. 1998. Attending an educational institution in India: Its level, nature, and cost. Report no. 439. New Delhi: NSSO.
- Nechyba, Thomas. 2005. Mobilizing the private sector: A theoretical overview. Working Paper PEPG 05-06, Program on Education Policy and Governance, Kennedy School of Government, Harvard University.
- Pandey, Priyanka, M. Goyal, and D. Levine. 2006. Does information matter for service delivery and governance? Mimeo, Johns Hopkins School of Medicine, Baltimore, MD.
- Pradhan, B., and Subramanian, A. 2000. Education, openness and the poor: Analysis of an all-India survey of households. National Council of Applied Economic Research (NCAER) Discussion Paper, no. DP020015. New Delhi: NCAER.
- Pratham. 2007. Annual status of education report 2006. New Delhi: PRATHAM Resource Centre.
- PROBE Team. 1999. *Public report on basic education in India*. New Delhi: Oxford University Press.
- Right to Education Bill. 2005. Right to Education Bill, draft, August 25, 2005, at <http://www.education.nic.in/htmlweb/RighttoEducationBill2005.pdf>.
- Rudolph, L. I., and S. H. Rudolph. 1972. *Education and politics in India*. Cambridge, MA: Harvard University Press.
- Schmid, Juan Pedro. 2006. Was the District Primary Education Programme in India effective? Draft Ph.D. thesis chapter, Swiss Federal Institute of Technology, Zurich, August.
- Singh, Shailendra, and Kala Seetharam Sridhar. 2002. Government and private schools: Trends in enrollment and retention. *Economic and Political Weekly* 37, no. 41 (October 12): 4229–4238.
- Tooley, James, and Pauline Dixon. 2003. Private schools for the poor: A case study from India. Reading, U.K.: CfBT.
- Weiner, Myron. 1990. *The Child and the State in India: Child Labor and Education Policy in Comparative Perspective*. Princeton: Princeton University Press.

III Public Funding of Privately Managed Schools

7 School Vouchers in Colombia

Eric Bettinger

In the early 1990s, secondary school enrollments among the poorest 20% of Colombia's population were only 55%. By contrast, 89% of the richest 20% of Colombia's population were attending secondary school and 75% of the overall population were enrolled (Sanchez and Mendez 1995). As policy makers grappled with how to increase poor student enrollments and lessen the enrollment gap, they also faced an overburdened and overcrowded public school system. In Colombia, the average school day is four hours, and most public schools hosted multiple sessions per day. Only 2% of public secondary schools were hosting only one session per day, and almost 20% of public secondary schools were hosting three sessions per day. In lieu of these multiple sessions at each school, the World Bank (1993) noted that many schools could not facilitate additional enrollments despite projected enrollment growth.

In 1991, Colombia attempted to improve enrollment rates through a unique partnership between the public and private sectors (King, Orazem, and Wohlgemuth 1998). The program, called the Plan de Ampliación de Cobertura de la Educación Secundaria (PACES), sought to take advantage of excess capacity in the private sector. The Colombian government issued private school vouchers for students entering sixth grade, the start of Colombian secondary school. The vouchers targeted the poorest third of the population and were renewable so long as the recipient made adequate progress towards secondary school graduation.

By 1997, PACES had grown into one of the world's largest private school voucher programs. Over 125,000 PACES vouchers had been awarded. While the program was large relative to other voucher programs, it was small relative to the overall secondary school system. In

1995, approximately 3.1 million students attended secondary schools in Colombia with about 37% of them in private schools.

One of the distinctive elements of PACES is its use of lotteries. From the beginning, the demand for PACES vouchers far exceeded the supply. PACES required the use of lotteries to allocate vouchers when there was excess demand. These lotteries created natural “control” and “treatment” groups similar to a randomized trial. Students who applied unsuccessfully to the voucher lottery form an unbiased comparison group for students who won the voucher lottery. Comparing the academic and nonacademic outcomes of students involved in the voucher lottery can show the effects of the voucher program.

There have been two major studies utilizing these voucher lotteries to measure PACES’ effects. The first study was conducted by Joshua Angrist, Erik Bloom, Elizabeth King, Michael Kremer, and me (Angrist et al. 2002). During 1998 and 1999, we attempted almost 3,000 surveys of students who had applied for PACES vouchers in selected cities throughout Colombia. The data from these surveys showed that after three years, voucher lottery winners scored about 0.2 standard deviations higher on standardized exams, were 15 percentage points more likely to have attended private school, and were about 5 percentage points less likely to have repeated a grade in secondary school. Because of the reduced grade repetition, voucher winners had completed 0.1 more years of schooling. The vouchers, however, did not significantly affect dropout rates.

While the results of the first study were compelling, as I will discuss, there were reasons to doubt whether the voucher program had led to long-term differences in outcomes for voucher students. As a follow-up to the first study, Joshua Angrist, Michael Kremer, and I pursued a longer-run follow-up focusing on high school graduation and the college entrance exam (Angrist, Bettinger, and Kremer 2006). In this study, we matched PACES application data to administrative records from Colombia’s college entrance exam, the ICFES (Instituto Colombiano Para El Fomento De La Educación Superior). Using these data, we again compared outcomes of voucher applicants. The results were striking. Voucher lottery winners were about 20% more likely to take college entrance exams than unsuccessful voucher applicants; and not only were they more likely to take the exam, but they also scored higher on it.

This chapter seeks to review this evidence from Colombia. Section 7.1 provides additional background information on the Colombia

voucher program. Section 7.2 describes the data sources and methodologies used in these evaluations. Section 7.3 provides an overview of evidence on the vouchers' effectiveness after three years. Section 7.4 discusses the impact of the voucher on college entrance exams. Section 7.5 discusses possible mechanisms by which the voucher may have affected student outcomes, including possible puzzles raised in the evaluation of the Colombian voucher project. Section 7.6 concludes.

7.1 PACES Background

The Colombian government established the PACES program in November 1991. The program was part of a larger effort to decentralize public services and to expand private sector provision (King et al. 1997). The Colombian government advertised the program in local newspapers and on the radio, and the program immediately proved popular. In its first year, in Bogotá alone, 14,607 students applied for the program.

In order to improve enrollment rates among the poorest families in Colombia, PACES targeted low-income families (King, Orazem, and Wohlgemuth 1998). To qualify for the voucher, parents had to present a utility bill proving that they lived in one of the two lowest socioeconomic strata (out of six possible strata). Research by Morales-Cobo (1993) suggests that this targeting was effective in Bogotá.

To be eligible for the voucher, children had to be entering sixth grade, the start of Colombian secondary schools, and be under the age of 16. Children were also only eligible if they had been attending public school in the previous year and had already arranged admission at a participating private secondary school. Not all private schools participated in the program. Only about 40% of private schools actually accepted the voucher, and schools that typically participated were not elite schools but rather low-tuition schools serving low-income populations. King, Rawlings, Gutierrez, Pardo, and Torres (1997) investigated differences between public secondary schools and participating private schools. They found that pupil-teacher ratios, test scores, and access to technology were similar across schools. The schools also had similar median scores on the ICFES exam.

Students could use the vouchers at both academic and vocational schools. Vocational schools, including some for-profit schools, were over-represented in the group of participating private schools, although after 1996 for-profit schools were excluded from the voucher

program. Because students were accepted at a private school prior to the lottery, we can actually dichotomize the lottery into two parts: students who had already been accepted at a vocational school and students who had already been accepted at an academic school. As I will discuss, Michael Kremer, Juan Saavedra, and I use this information to shed light on mechanisms by which the voucher may have affected student outcomes.

So long as students were promoted at the end of a grade, they could automatically renew their voucher through eleventh grade, the end of Colombian high school. Students failing a grade were supposed to be dropped from the PACES program. Calderon (1996) shows that about 77% of recipients renewed their vouchers. Additionally, the rules of the voucher program allowed students to transfer to other schools and retain their voucher; however, our data suggests that few students who transferred kept their vouchers.

The voucher initially covered full tuition in a participating private school, but the value did not keep pace with tuition. By 1998, the voucher covered a little over half of tuition fees. The funds for the voucher came from both the municipal (20%) and federal (80%) governments. Municipalities determined the appropriate number of vouchers, and each municipality conducted its own lottery if demand for the vouchers exceeded supply. We obtained computerized or paper copies of lists of lottery winners and losers from local municipalities.

In the applicant lists, we observed the students' names, contact information, national identification number, and school of application. The most important piece of information was students' national identification numbers. An identification number consists of 11 digits, the first 6 indicating date of birth. The eleventh digit in the ID number has a mathematical relationship with the other four digits, which we can check to verify that the ID number is valid. About 9.5% of applicants had invalid birth dates. This was the prevailing reason why IDs were invalid. If students reported valid birth dates, 97% of the time their ID number was valid.

Using the application data, we can verify if the lottery was indeed random. If it was truly random, we should find few differences between the characteristics of voucher lottery winners and losers. Table 7.1 shows data from the applicant lists on age, gender, having a phone, and having a valid ID. We report data for multiple cohorts including applicants from Bogotá who applied in 1992 and 1995. The first column of table 7.1 shows the average characteristic among voucher lot-

Table 7.1
Student Characteristics by Voucher Status

	Losers' mean (1)	Difference by voucher status (2)
<i>A. Bogotá 1995</i>		
Age	12.78 [2.22]	-.137 [.064]
Male	.484	.004 [.016]
Has phone	.874	.013 [.010]
Has valid ID	.882	-.010 [.010]
<i>B. Bogotá 1992</i>		
Age	12.83 [1.23]	.093 [.029]
Male	.533	-.042 [.010]
Has phone	.397	.184 [.009]
Has valid ID	.681	.053 [.009]

Notes: The table reports voucher losers' mean and difference for voucher winners. Standard deviations are in the first column for nonbinary variables. Standard errors are included in the second column.

tery losers and its standard deviation. The second column shows the difference between voucher winners and losers and the corresponding standard error. In terms of gender and having a phone, we find no significant differences between voucher winners and losers in the 1995 cohort. When we look at age, we find that younger students are more likely to win the vouchers. This is significant and may suggest some type of nonrandomness.

Even if the lottery was random, however, there may be some reasons for this finding. First, in the Bogotá 1995 cohort, there are a couple of significant outliers (e.g., a reportedly 92-year old fifth grader) among voucher lottery losers. If we exclude these individuals or compare medians rather than means, the difference in ages is much smaller. Another possible reason for this difference involves the accuracy of the records. In most cases, we received two separate lists—one with all lottery losers and another with lottery winners. One of our worries was that information for lottery winners was updated while lottery losers'

information was not. This could lead to more accurate ages, addresses, and ID numbers. In the Bogotá 1992 lottery, there appears to be some evidence of this. Voucher winners were about 5 percentage points more likely to have a valid ID than voucher losers and about 18 percentage points more likely to have reported a phone number. However, in the Bogotá 1995 cohort, we did not find differences in the likelihood that students had valid ID numbers.

As a final check on the data, we looked at the “win” rate of each of the schools. In theory, schools should have had “win” rates among lottery applicants from their school that were similar to the overall lottery average. For the cohorts represented in table 7.1, there were few outliers, and the existing outliers were typically the result of a low number of overall applicants to that school. However, in one cohort not included in table 7.1, we found significant outliers. In the excluded cohort, we found one school in particular where 100% of applicants had won the voucher. Given the school’s reputation as a politically connected school and the large number of students who had applied, we could not rule out nonrandomness.

7.2 Data and Methodologies

7.2.1 Data Sources

There were three sources of data used in the analyses. First, as I have explained, our studies relied on information from the applicant list. Using contact information from the list, we attempted to interview a random sample of voucher applicants from Bogotá in 1995.¹ Generally, we stratified this sample so that we were contacting equal numbers of lottery winners and losers. The resulting household surveys are the second source of data. The surveys included comprehensive details of students’ schooling including a grade-by-grade summary of schools attended and grade promotion. The surveys also gathered information about students’ parents and siblings. Our response rate in the surveys was 55% among voucher winners and 53% among voucher losers. The difference was not significant.

In conducting our interviews, few applicants actually refused to respond. The most frequent reasons for lack of response were bad addresses or moves. Our response rate is slightly lower than that in other voucher studies (e.g., Mayer et al. 2002). Although we would have liked the response rate to be higher, the symmetric response rates

Table 7.2
Descriptive Statistics by Voucher Status

	Losers' mean (1)	Difference by voucher status (2)	N (3)
<i>A. Bogotá 1995</i>			
Age at time of survey	15.0 [1.4]	-0.013 [0.078]	1,172
Male	0.501	0.004 [0.029]	1,139
Mother's highest grade completed	5.9 [2.7]	-0.079 [0.166]	1,075
Father's highest grade completed	5.9 [2.9]	-0.431 [0.199]	911
Mother's age	40.7 [7.3]	-0.027 [0.426]	1,123
Father's age	44.4 [8.1]	0.567 [0.533]	940
Father's wage (>2 min wage)	0.100	0.005 [0.021]	861

Notes: The table reports voucher losers' mean and difference for voucher winners. Standard deviations are in the first column for nonbinary variables. Standard errors are included in the second column.

across winners and losers suggests that any bias resulting from non-response is likely to be minimal (Angrist 1997). Because response probabilities are uncorrelated with voucher win/loss status, there should be little bias from our failure to interview all applicants.

Table 7.2 shows some basic student-level characteristics used in the analysis. We only report descriptive characteristics in this table and report student outcomes in other tables. As in table 7.1, the first column shows the average characteristic of voucher lottery losers and the corresponding standard deviation. The second column of table 7.2 shows the differences for voucher winners with the corresponding standard error. The third column shows the sample size for the specific variable. As before, we find few significant differences

The typical applicant was about 15 years old. About half of the applicants were male. The average education of both the mothers and fathers in the sample was slightly less than six years. We detected some differences in the education levels of fathers in our data. We find that fathers of voucher winners had about 0.4 years less of schooling completed, although we have a smaller sample size in these regressions.

We also find that about 10% of the fathers in our data were earning more than two minimum wages. This does not vary across voucher status.

Our final source of data came from matching student applications to the ICFES exam, the national college entrance exam. Ninety percent of students graduating from Colombia's secondary school system take the ICFES exam. It is the most common exam used in college admissions and 75% of test takers go on to college (World Bank 1993). Because of the high proportion of high school students who take the exam, it is likely a better proxy for high school graduation than for college entrance.

The primary variables used in the matching were the student's name and identification number. If applicant lists had been updated so that voucher winners had more correct names and ID numbers than voucher losers, then we could detect spurious effects of the voucher solely because winners would have more accurate information. Because our analysis found that voucher winners and losers in the Bogotá 1995 lottery had similar likelihood of having a valid national ID, we focus our matching solely on them. We also matched ICFES records for the 1992 cohort. Similar to the results I show below for the 1995 cohort, we found that voucher winners in the 1992 cohort were more likely to take the college entrance than voucher losers. However, because of the possibility that voucher winners' records for the 1992 cohort had been updated, our finding could be spurious.

ICFES exams are offered twice a year, and for the 1995 cohort, we searched for matches among all test-takers in 1999, 2000, and 2001. Assuming that students had not repeated, they should have taken the ICFES exam in 2000. The ICFES scores used here are from the redesigned scoring system introduced in March 2000. Our scores are for the mathematics and language components of the Common Core of Basic Competence (*Nucleo Comun de Competencias Basicas*), which includes modules in biology, chemistry, physics, mathematics, language, history, geography, and a foreign language test chosen by the student. The ICFES is given over a two-day period with two morning sessions and an afternoon session on the first day. The mathematics and language components of the Common Core each take one hour and have 35 questions. Test scores are reported on a scale of 0–100, with the score distribution highly concentrated in the 30–70 range. The distributions of mathematics and language scores for all those tested in Bogotá in March 2000 appear in figure 7.1 (for 6,868 examinees). We discuss

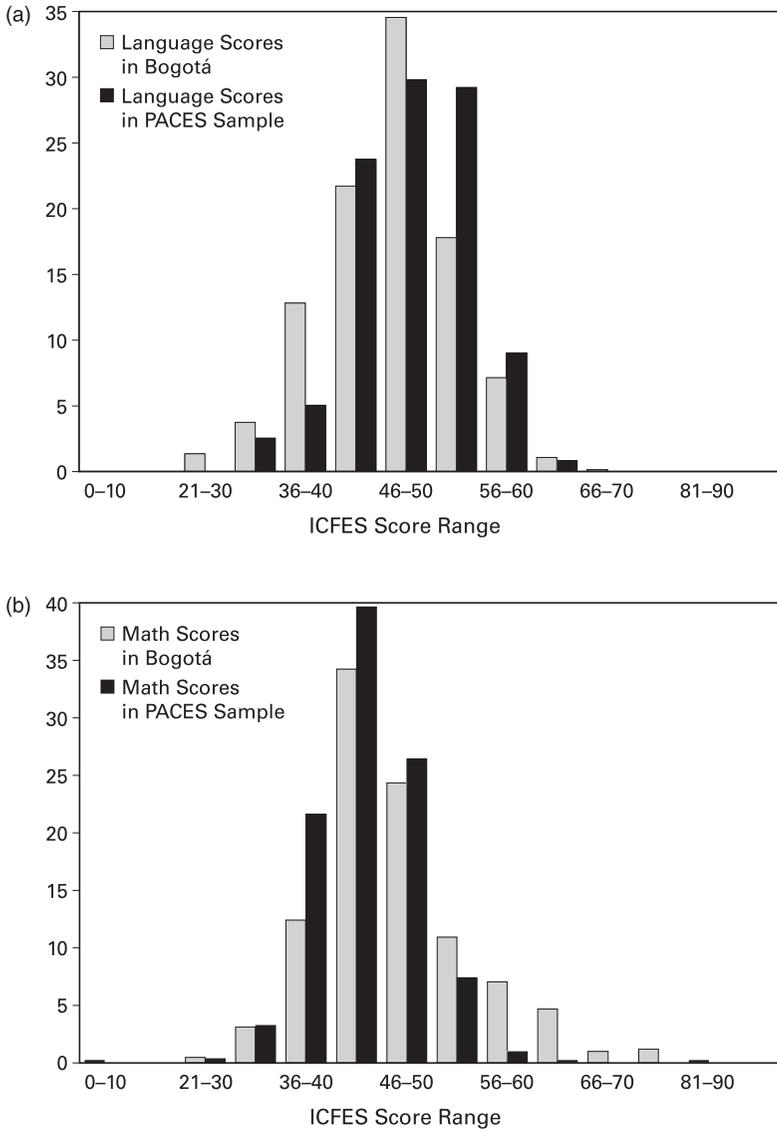


Figure 7.1
 Distribution of Test Scores in Bogotá versus PACES Sample
 (a) Language
 (b) Math

the specific variables from the ICFES and the matching strategy in section 7.4 of this chapter.

7.2.2 Empirical Methodologies

Because of randomization, simple t-tests comparing the outcomes of winners and losers can identify the effects of the voucher (Angrist and Krueger 1999). We also use the following regression model to identify the effects of the voucher:

$$y_i = X_i'\beta_0 + \alpha_0 D_i + \varepsilon_i, \quad (7.1)$$

where y_i is a measure of some type of outcome for student i , D_i is an indicator for whether a student won the voucher lottery, and X_i includes covariates such as age, gender, and controls for neighborhood.

The parameter α shows the effect of winning the voucher lottery on student outcomes. This is often called the “intention to treat” parameter. It shows the effect of offering the voucher. The intention to treat reflects both the “effect of the treatment on the treated” (i.e., the effect of using a voucher) and the probability of being treated. If everyone who is offered the voucher uses it and no one in the control group does, then the intention to treat is equivalent to the effect of the treatment on the treated. The randomization of the vouchers enables us to identify the intention to treat. While we would like to identify the effect of using a voucher, we do not have a way of controlling for selection into using the voucher. While we can identify the people who were offered but declined the voucher, we cannot identify the individuals who were not offered the voucher and would have declined had they been offered it.

Some have suggested that voucher experiments might facilitate identification of the effect of private schools (e.g., Rouse 1998). To be a good instrument for private schooling, the voucher lottery should be correlated with the likelihood that a student attends private school but uncorrelated with student outcomes except through its influence on private schooling. It is the latter restriction that is likely not satisfied in the Colombian voucher experiment. In Colombia, there were a number of reasons why the voucher could have directly influenced test scores besides through private schooling. For example, the voucher could have been an income shock. As I will show, most of the voucher applicants attended private school in the year immediately after the lottery. The voucher could have just been a subsidy to families already com-

mitted to attending private school. Additionally, the voucher program may have changed student incentives. If a student failed a grade, they lost the voucher. This may have influenced voucher winners to try harder in school than they otherwise would have. I discuss possible mechanisms in section 7.5.

For most of the outcomes of interest, we can measure the effect using equation 7.1. However, when we look at test scores of voucher applicants on the ICFES exam, estimates based on equation 7.1 are likely biased. One of the outcomes we evaluate is whether or not students take the ICFES exam. Because the voucher may influence who takes the exams, it likely biases any comparisons of the average test scores of test-takers. This is because we observe students who take the exam because of the voucher while we do not observe students who do not take the exam but would have had they received a voucher. We discuss some ways of dealing with this selection in section 7.4.

7.3 Effects after Three Years

Table 7.3 shows estimates of equation 7.1 for a variety of educational outcomes. The first column shows the average outcome for students who lost the voucher lottery. As we mentioned earlier, almost 90% of students who applied unsuccessfully for the voucher still attended private school in sixth grade. Voucher winners were about 6 percentage points more likely to attend sixth grade in private school. By seventh grade the proportion of voucher lottery losers in private school drops to about 67% and voucher winners are about 17 percentage points more likely to be in private school. This difference in private school attendance rates persists up to the time of our survey. Since most of the students who applied to the program attended private school immediately after the voucher application, the results show the effects of vouchers on students who already had strong interest in private schooling.

When we examine the highest grade completed, we find that voucher winners have completed about 0.1 years of schooling more than voucher losers within three years of the voucher lottery. This difference does not come from differences in dropout rates. Voucher lottery winners and losers are equally likely to be enrolled in school at the time of our survey. The difference arises from grade repetitions. About 22% of voucher lottery losers had ever repeated a grade and

Table 7.3
Descriptive Statistics and Estimates of the Voucher Effect

Dependent variable	Bogotá 1995	
	Losers' means (1)	Coefficient on voucher status Basic controls (2)
Started 6th grade in private	0.877 [0.328]	0.057 [0.017]
Started 7th grade in private	0.673 [0.470]	0.168 [0.025]
Currently in private	0.539 [0.499]	0.153 [0.027]
Highest grade completed	7.5 [0.960]	0.130 [0.051]
Currently in school	0.831 [0.375]	0.007 [0.020]
Finished 6th grade	0.943 [0.232]	0.023 [0.012]
Finished 7th grade	0.847 [0.360]	0.031 [0.019]
Finished 8th grade	0.632 [0.483]	0.100 [0.027]
Ever repeated a grade	0.224 [0.417]	-0.055 [0.023]
Number of repetitions of 6th grade	0.194 [0.454]	-0.059 [0.024]
Math scores [<i>n</i> = 282]	0.178 [0.120]	0.153 [0.114]
Reading scores [<i>n</i> = 283]	0.204 [0.115]	0.203 [0.114]
Writing scores [<i>n</i> = 283]	0.126 [0.116]	0.128 [0.105]
Total test scores [<i>n</i> = 282]	0.217 [0.116]	0.205 [0.108]
Applicant is working	0.1690 [0.3751]	-0.0297 [0.0205]
Married or living with companion	0.0160 [0.1256]	-0.0087 [0.0059]
<i>N</i>	562	1,147

Notes: The table reports voucher losers' means and the estimated effect of winning a voucher. Numbers in brackets are standard deviations in the column of means and standard errors in columns of estimated voucher effects. The regression estimates are from models that include controls for phone access, age, type of survey and instrument, strata of residence, and month of interview.

voucher lottery winners were about 5.5 percentage points less likely to have repeated a grade.

This difference in repetitions is also manifested in looking at the likelihood of completion of the sixth, seventh, and eighth grades respectively. About 94% of lottery losers had finished sixth grade but only 85% and 63% had finished seventh and eighth grades respectively. The difference between voucher winners also increases over time so that by eighth grade, voucher winners are about 10 percentage points more likely to have finished the grade.

While grade repetition is often used a measure of the quality of education in developing countries (e.g., Psacharopolous, Tan, and Jimenez 1986), grade repetition may not fully signal academic achievement in the PACES setting. As part of the PACES program, students' vouchers were only renewed if students passed their grade. One explanation for lower repetition rates is that schools may have had an incentive to promote voucher students in an effort to keep tuition monies flowing to their schools.

To test whether the grade repetition result reflected higher academic achievement, we administered a standardized exam to a sample of ICFES applicants. On average, lottery losers scored about 0.2 standard deviations above the population mean in both math and writing while voucher winners scored about 0.2 standard deviations higher in writing. While voucher winners score higher in math and reading, the results are not statistically significant unless we combine the various test scores. Although the sample we tested was fairly small, the fact that voucher lottery winners scored higher than losers suggests that the voucher had impacted student achievement within three years.

Finally, our results in table 7.3 show that voucher students were less likely to be working at the time of survey. They were also less likely to be married or cohabiting.

7.4 College Entrance Exams

After three years, we found that students had more years of school completed, less repetitions, and higher standardized exam scores, yet it was unclear if these effects could turn into long-term effects. For example, by the third year after the lottery, more than half of the students were no longer using the voucher. Additionally, the group of students who took the exam we administered was small and may not have been fully representative of the population of lottery winners and

Table 7.4
Voucher Status and the Probability of ICFES Match

Matching strategy	Dependent variable mean (1)	Coefficient on voucher status Basic controls (2)
Exact ID match	.354	.059 [.015]
ID and city match	.339	.056 [.014]
ID and seven-letter name match	.331	.059 [.014]
ID, city, and seven-letter match	.318	.056 [.014]

Notes: Robust standard errors are shown in brackets. The sample includes all applicants to the Bogotá 95 voucher lottery with valid ID numbers and valid age data (i.e., ages 9 to 25 at application).

losers since only 60% of the students we invited to the exam actually attended.

To test whether the voucher led to long-term educational differences between voucher winners and losers, we gathered additional data on PACES applicants' ICFES exams. From the ICFES records, we know whether a student took the ICFES exam and their test scores in math and language if they did take the test.

Table 7.4 shows estimates of the effects of vouchers on the likelihood that students take the ICFES exam. We report the coefficient on voucher from equation 7.1 when we include covariates for gender and age. We report estimates based on four different matching strategies. In the first strategy, we matched students' national identification numbers alone. On average we were able to match 35.4% of voucher applicants to their college entrance exam. Voucher winners, however, were 5.9 percentage points more likely to be matched than voucher losers.

We also report estimates based on matching both the identification number and the city of residence. Our match rate drops about 1.5 percentage points, but we still estimate a 5.6 percentage point effect of the voucher. In relative terms, this is about a 20% effect of the voucher on the likelihood of taking the college entrance exam. In the final row of table 7.4, we report estimates based on the identification number, the city of residence, and the first seven letters of a student's last name. Our match rate drops to 31.8% with the more stringent match criteria. We still find a 5.6 percentage point difference between voucher win-

ners and losers. Clearly, the voucher improved recipients' likelihood of taking the exam. Given that taking the exam is a good proxy for high school graduation, receiving the voucher dramatically improves the likelihood that students finish secondary school.

Having established the voucher's effect on test-taking, we now turn to the effect of the voucher on test performance. As mentioned earlier, measuring the effect on test performance is difficult since the vouchers affect who takes the exam. Consider the following example: Suppose that Juan is a student on the margin of dropping out of secondary school. If Juan received a voucher, it might have been enough to help him persist in secondary school and take the college entrance exam. If Juan is on the margin of dropping out, he is likely not the top-achieving student in his grade. Now suppose that the voucher has no effect on a student's ICFES exam scores. The average ICFES score of voucher winners is a weighted average of exam scores of students who would have taken the test in the absence of the voucher, and also students like Juan who would not have taken the ICFES exam without the voucher. Because Juan was a low-achieving student, his score is likely less than the average exam scores of students who would have taken the ICFES even without a voucher, and hence, the average ICFES score of lottery winners will be less than the average ICFES score of lottery losers (which is just the average of exam scores of students who would have taken the ICFES exam without the voucher). If Juan's story is typical, then comparisons of the average test scores of winners and losers will be biased downward.

Rows 1 and 5 of table 7.5 make this comparison. When we compare the average test scores of voucher winners and losers who took the exam, we find that voucher winners score 0.70 percentage points higher in language and 0.40 percentage points higher in math. The estimated effect on language scores is statistically significant. If indeed the comparison of ICFES test scores is biased downward, then the estimated effects are smaller than the true effects of the voucher. In Angrist et al. (2006), we show that assuming that the voucher does not harm students (which seems reasonable given that students could quit using the voucher without penalty), then the estimated effects in rows 1 and 5 of table 7.5 are lower bounds for the true treatment effect.

In table 7.5, we also employ two other strategies to estimate the effect of the voucher. In the remaining rows, we censor the sample by assigning values to students who did not take the exam. The motivation for this specification is simple. Suppose that students' latent (or

Table 7.5
 OLS and Tobit Estimates of Voucher Effect on ICFES Exams

Specification	Dependent variable mean (1)	Coefficient on voucher status Basic controls (2)
<i>Language scores</i>		
OLS with score > 0	47.4 [5.6]	.70 [.33]
OLS censored at 1%	37.3 [8.0]	1.14 [.24]
Tobit censored at 1%	37.3 [8.0]	3.29 [.70]
Tobit censored at 10%	42.7 [4.7]	2.06 [.46]
<i>Math scores</i>		
OLS with score > 0	42.5 [4.9]	.40 [.29]
OLS censored at 1%	35.7 [5.8]	.79 [.18]
Tobit censored at 1%	35.7 [5.8]	2.29 [.51]
Tobit censored at 10%	37.6 [4.6]	1.98 [.45]

Notes: The table reports voucher losers' means and the estimated effect of winning a voucher. Numbers in brackets are standard deviations in the column of means and standard errors in columns of estimated voucher effects. The regression estimates are from models that include controls for age and gender. Censoring point is the indicated percentile of the test score distribution, conditional on taking the exam.

expected) ICFES exam is related to the probability of taking the exam. Students who expect to score low will likely not take the exam. If non-test-takers have low exam scores, we may be able to estimate the effect of the program by assigning them a test score. In rows 2, 3, 6, and 7, we assign non-test-takers the test score of the first percentile of test-takers. In rows 4 and 8, we assign non-test-takers the test score of the tenth percentile. With the censoring, we use both OLS and Tobit models. In the Tobit models, we make the additional assumption that the underlying distribution of test scores is normally distributed.

When we censor, the estimated effects of the voucher on test scores is much larger than the raw comparisons of means. In the censored OLS models, we find estimated effects of 1.14 in language and 0.79 in math. Both estimates are statistically significant. In the Tobit models, we find

estimated effects of about 2 percentage points in both language and math. The estimates are also statistically significant.

It is not surprising that the censoring leads to larger and significant effects of the voucher. We are essentially giving low test scores to non-test-takers who are disproportionately voucher lottery losers. One might wonder how sensitive the results are to the censoring point. In figure 7.2, we show the estimated effects using Tobit when we move the censoring to different percentiles of the test score distribution. Consistently, regardless of the censoring point, we find effects of the voucher near 2 percentage points. The standard error bands show that these estimates remain significant.

One of the surprising results in figure 7.2 is the fact that even at high censoring points (e.g., the 80th percentile) we still find that the voucher led to improvements in students' test scores. This may imply that even among high-achieving voucher applicants, voucher winners' test scores have improved. In Angrist, Bettinger, and Kremer (2006), we explored this in greater detail to test this hypothesis. Using nonparametric strategies, we demonstrated that even at the top of the distribution of test scores voucher lottery winners scored higher than losers.

7.5 Mechanisms for the Voucher Effect

The results thus far suggest that voucher winners had higher academic achievement after three years and through the end of secondary school. The result reflects the effect of winning the voucher and not the effect of using a voucher. As already discussed, the voucher could have improved student outcomes for a variety of reasons. It could have been an income shock. The voucher could have strengthened the incentives for students to work hard. The voucher could have also changed the type of schools and peers that students had.

To shed light on some of the possible mechanisms, Bettinger, Kremer, and Saavedra (2006) considered the effects of the voucher on students who applied to vocational schools. As part of the PACES lottery, students had to be accepted at a participating private school *before* applying for the voucher. Many students applied to vocational schools. These vocational schools were of inferior quality to the other private schools. They had a smaller proportion of students taking the ICFES exam and their students typically scored worse on the ICFES exam than students in non-vocational schools.

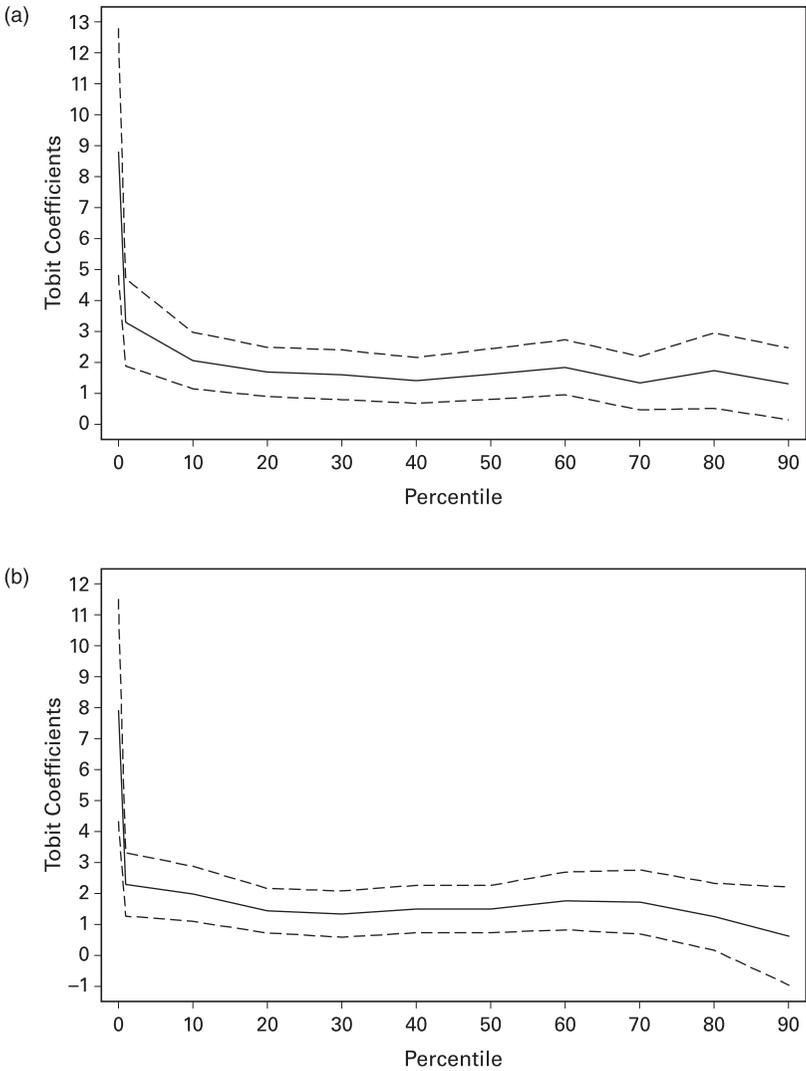


Figure 7.2

Tobit Coefficients by Censoring Percentile in Score Distribution. The figure plots Tobit estimates of the effect of vouchers on test scores, using data censored at the point indicated on the x-axis (i.e., values below the indicated percentile are assigned a value of zero). For the purposes of this exercise, non-test-takers are also coded as having a score of zero.

(a) Language

(b) Math

Table 7.6
OLS Estimates of Voucher Effect on ICFES Exams for Vocational Students

Dependent variable	Coefficient on voucher status			
	Vocational		Nonvocational	
	(1) Losers' means	(2) Basic controls	(3) Losers' means	(4) Basic controls
<i>A. Probability of taking ICFES</i>				
ID match	.274	.056 [.030]	.318 [.466]	.057 [.017]
ID and city match	.265	.052 [.030]	.301 [.459]	.061 [.017]
ID and name match	.202	.048 [.028]	.235 [.424]	.033 [.016]
<i>N</i>	336	802	1077	2578
<i>B. Performance outcomes on the ICFES</i>				
Math score conditional on taking	41.47 [4.811]	.844 [.621]	42.37 [4.655]	.420 [.332]
Reading score conditional on taking	45.73 [5.890]	2.19 [.768]	47.04 [5.373]	.487 [.373]
<i>N</i>	89	254	334	891

Notes: The table reports voucher losers' means and the estimated effect of winning a voucher. Numbers in brackets are standard deviations in the column of means and standard errors in columns of estimated voucher effects. The regression estimates are from models that include controls for phone access, age, type of survey and instrument, strata of residence, and month of interview. Columns 1 and 2 report estimates for students who had applied to and been accepted at a vocational school prior to the voucher lottery.

However, among the students who applied to vocational schools, the voucher seemed to have odd effects on the types of schools that students attended. Voucher winners used their voucher to attend vocational schools. Voucher losers, by contrast, changed schools and went to academic schools instead. After three years, voucher winners were 18 percentage points more likely to be attending a vocational school, and as a result, they were more likely to attend schools of inferior quality as measured by academic performance on the ICFES.

Despite this fact, voucher winners who had initially applied to vocational schools had better academic outcomes than voucher losers who had applied to the same schools. Table 7.6 shows these results. Voucher winners were 4–5 percentage points more likely to take the ICFES exam and had higher reading scores on the exam (which is

likely a lower bound for the true effect on reading scores as discussed in section 7.4).

The fact that voucher winners attended inferior schools and yet had more positive outcomes suggests that the schools and peers may not have been the operative channel by which the voucher affected student outcomes. Bettinger, Kremer, and Saavedra (2006) show that peer effects alone cannot explain the voucher effects.

7.6 Conclusions

The Colombian voucher program was one of the largest voucher programs in the world, and the program seems to have had a positive effect on student outcomes after three years and through the end of secondary school. After three years, students winning the voucher had higher test scores, less grade repetition, and more years of schooling completed than students who had lost the voucher lottery. Additionally, voucher winners were more likely to attend private school, less likely to be working, and less likely to be married or cohabiting. By the end of high school, voucher winners were more likely than voucher lottery losers to have taken the college entrance exam and had higher college entrance exam scores.

The voucher program was a unique partnership between the public and private sectors in Colombia. Thousands of students in Bogotá and about 125,000 students nationwide took advantage of the program. Angrist et al. (2002) shows that public expenditure increased only slightly in funding the program, yet the benefits accrued to voucher winners more than justified the costs.

One remaining puzzle in the Colombian voucher experience is how the voucher program affected the students. If the Colombian program affected students solely through private schools, then it may have different policy implications than a voucher program that affected students by changing their incentives. The preliminary evidence, at least for the subset of voucher winners who applied to vocational schools, suggests that the academic quality of the schools may not have been the mechanism by which the voucher affected students' outcomes. The voucher winners who had applied to vocational schools attended schools with inferior peer quality yet had better academic outcomes than voucher lottery losers. Future research hopefully will identify the specific channel(s) by which vouchers affect students and hence provide a clearer picture of why the private-public partnership in the case

of Colombian vouchers generated such dramatic improvements in students' academic performance.

Notes

This paper is largely based on "Vouchers for Private Schooling in Colombia: Evidence From a Randomized Natural Experiment" by Joshua D. Angrist, Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer (*American Economic Review*, 2002) and "Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Colombia" by Joshua D. Angrist, Eric Bettinger, and Michael Kremer (*American Economic Review*, 2006). Figures 7.1 and 7.2 are reprinted with permission from the *American Economic Review*.

1. In Angrist et al. (2002), we also interviewed cohorts of students who applied for a voucher in Bogotá in 1997 and in Jamundí in 1993. I only focus on the Bogotá 1995 cohort in this paper.

References

- Angrist, Joshua D. 1997. Conditional independence in sample selection models. *Economics Letters* 54, no. 2 (February): 103–112.
- Angrist, Joshua D., Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer. 2002. Vouchers for private schooling in Colombia: Evidence from a randomized natural experiment. *American Economic Review* 92, no. 5 (December): 1535–1558.
- Angrist, Joshua D., Eric Bettinger, and Michael Kremer. 2006. Long-term educational consequences of secondary school vouchers: Evidence from administrative records in Colombia. *American Economic Review* (May).
- Angrist, Joshua D., and Alan Krueger. 1999. Empirical strategies in labor economics. In *Handbook of Labor Economics*, vol. III, ed. Orley Ashenfelter and David Card, 1277–1366. Amsterdam: Elsevier.
- Bettinger, Eric, Michael Kremer, and Juan Saavedra. 2006. Are educational vouchers Redistributive? Evidence from Colombia. Mimeo, Case Western Reserve University, Cleveland, Ohio.
- Calderon, Alberto. 1996. Voucher programs for secondary schools: The Colombian experience. Human Capital Development and Operations Policy Working Paper. Washington, D.C.: World Bank. Available at <http://www.worldbank.org/education/economicssd/finance/demand/related/wp_00066.html>.
- King, Elizabeth, Peter Orazem, and Darin Wohlgemuth. 1998. Central mandates and local incentives: The Colombia education voucher program. Working Paper No. 6, Series on Impact Evaluation of Education Reforms, Development Economics Research Group, the World Bank, February.
- King, Elizabeth, Laura Rawlings, Marybell Gutierrez, Carlos Pardo, and Carlos Torres. 1997. Colombia's targeted education voucher program: Features, coverage and participation. Working Paper No. 3, Series on Impact Evaluation of Education Reforms, Development Economics Research Group, the World Bank, September.

Mayer, Daniel, Paul Peterson, David Myers, Christina C. Tuttle, and William G. Howell. 2002. School choice in New York after three years: An evaluation of the School Choice Scholarships Program. Program on Education Policy and Governance Occasional Paper Series, Harvard University.

Morales-Cobo, Patricia. 1993. Demand subsidies: A case study of the PACES voucher program. Working paper, Universidad de los Andes, Economics Department, Bogotá.

Psacharopolous, George, J. Tan, and E. Jimenez. 1986. *Financing Education in Developing Countries: An Exploration of Policy Options*. Washington, D.C.: World Bank.

Rouse, Cecilia Elena. 1998. Private school vouchers and student achievement: An evaluation of the Milwaukee Parental Choice Program. *Quarterly Journal of Economics* 13, no. 2: 553–602.

Sanchez, Fabio, and Jairo Mendez. 1995. Por que los niños pobres no van a la escuela? (Determinantes de la asistencia escolar en Colombia). Mimeo, Departamento Nacional de Planeacion Republica de Colombia.

World Bank. 1993. Staff appraisal report: Colombia, secondary education project. Latin America and the Caribbean Region, Report 11834-CO.

8 The Public-Private School Controversy in Chile

Cristian Bellei

Market-oriented strategies have increasingly been proposed as an effective and efficient way to increase both quality and equity in education. Academic and political debates have attempted to predict the most probable consequences that market incentives might have on educational systems. A key issue in those analyses has been the comparative study of the public and private schools' effectiveness, in terms of students' academic achievement. In this chapter, I critically review the research about whether Chilean students attending private schools obtain larger learning outcomes than their peers studying at public schools.

Chile constitutes a paradigmatic case in the debate about the relative efficacy of private and public schools, and research on its experience might shed light on such a controversy. Its nationwide school choice system finances both public and private subsidized schools under the same funding system, a type of voucher program. Considering the small scale of most U.S. voucher and school choice programs, Chile is a particularly interesting case to study. Strikingly, previous research on the Chilean case has obtained very contrasting findings.

The chapter begins with (section 8.1) a brief description of the Chilean education; then, section 8.2 reviews the research on systemic effects of school choice and section 8.3 on private versus public schools' effectiveness. Section 8.4 analyzes some key methodological issues that account for the contrasting findings of previous research; section 8.5 describes the data I used, and sections 8.6, 8.7, and 8.8 provide empirical evidence about the consequences of the identified methodological limitations. A final section summarizes the main conclusions of the analysis, elaborates some interpretative hypothesis, and states some educational policy implications.

8.1 School Choice and Market-oriented Institutions in Chilean Public Education

For more than two decades, Chilean education has operated under an institutional design in which fundamental decisions do not rely on national authorities, but on the combination of family preferences (school choice) and (public and private) school competition for attracting such preferences.¹ This system—which is an attempt to make education a self-regulated market—was created during the 1980s as a part of a large economic and institutional neoliberal reform.

The core of the reform was the inception of a common public funding system for all public and private subsidized schools: the educational voucher, which is a monthly payment to the schools, of a fixed fee per each student who is enrolled in and regularly attends the school. Additionally, the reform included several changes oriented to promote competition among public and private schools. Families do not have restrictions on choice of a school (whether public or private, near to or distant from home), and schools must compete to attract families' preferences. The administration of public schools was decentralized at the municipal level, and the management of schools (including the curriculum and human and financial resources) was strongly deregulated. Finally, reformers created a national evaluation system of students' learning (*SIMCE*, Spanish acronym for System of Measurement of Educational Quality), aimed at informing families about school quality.

Since 1990, the Chilean government has attempted to combine the market institutions with stronger state regulations and interventions. Thus, while some educational policies have been designed to strengthen the market-oriented model (e.g., creation of a "price discrimination" system among subsidized private schools, and publication of *SIMCE* results in the newspapers), others have tried to restrict it, through the active promotion of social equity and educational quality (e.g., implementation of compensatory programs, creation of a teacher labor statute, and the universal provision of computers, textbooks, and teacher training).

There are three kinds of schools in Chile: public schools, private voucher schools, and private nonsubsidized schools. All primary and most secondary public schools are free; about 90% of private voucher schools are not free (they have a copay system), and private nonsubsidized schools are elite schools, totally paid for by families.² This

chapter focuses on the comparison between public and private voucher schools (although occasional references will be made to the private nonsubsidized schools). The evolution of enrollment has shown a highly responsive system. The proportion of Chilean students attending a public school has decreased systematically, from 78% in 1981, to 58% in 1991, and 47% in 2006; simultaneously, students attending private voucher schools have increased from 12% in 1981, to 32% in 1991, and 45% in 2006. The enrollment in nonsubsidized private schools has remained a minor part of the Chilean school population.

Finally, the testing system has pointed out a systematic pattern: private voucher students' score—on average—higher than public school students by about 0.3 to 0.4 S.D. Whether or not this observed gap represents a genuinely greater private school effectiveness has been a controversial academic and political question in the Chilean educational debate.

8.2 Systemic Effects of School Choice

There are two competing theories about *systemic effects* (i.e., the impact of the voucher mechanism on the effectiveness of the educational system as a whole) of the market mechanisms of Chilean education. One states that subsidized private schools help to improve public schools through a competition effect, predicting an overall improvement of Chilean education. The other theory proposes that the potential productivity effect may be canceled out by unexpected negative effects of sorting on public schools (private schools "skim" the best public students), with no systemic improvement. Unfortunately, there is very little research on this issue.

Gauri (1998) studied the school choice process using a sample of households from the Santiago metropolitan area. He found that higher socioeconomic status was positively associated with the probability of attending a school in the top third of the students' achievement distribution. Gauri also found that the probability of studying in a high-performing school significantly increased when the student was required to take a cognitive and/or academic test as an admission requirement. Hseih and Urquiola (2003) attempted to evaluate whether the introduction of school choice in Chile improved the productivity of the school system at aggregated levels, and whether it increased the educational and socioeconomic differences between private and public schools. They analyzed fourth-grade mathematics and language test

scores, repetition rates, and years of schooling among 10–15-year-olds, between 1982 and 1988, at school and commune level. After controlling for several socioeconomic school and commune factors, they found that communes with a higher proportion of private enrollment tended to have lower public school test scores, higher private/public test-score and repetition-rate gaps, as well as higher student SES private/public differences at the commune level. Finally, at the commune level, neither the level of 1990 private enrollment nor the 1982–90 increase in private enrollment were associated with improvements in students' outcomes. Gauri and Hseih and Urquiola interpreted those findings as evidence of both negative effects of private school expansion on public schools, and no positive effect on the quality of the system as a whole. Nevertheless, since these studies are mainly based on cross-sectional data and the information prior to the voucher reform is very limited, it is difficult to make causal claims about the hypothesized relationships.

Gallego (2002) defined each commune as a different school market. He used fourth- (1994, 1996) and eighth-grade (1995, 1997) language and mathematics school means as the outcome variables, and controlled for schools' SES composition and other commune variables (level of urbanization, size). Gallego found that the proportion of private enrollment at the commune level was positively associated with school performance, and that this *competition effect* was stronger for private schools. The key limitation of this approach is that the level of private enrollment is not an exogenous variable to students' performance, because private schools tend to serve geographical areas with characteristics positively associated with students' achievement. Gallego (2004) attempted to overcome this limitation: he used "priest per capita" as an instrumental variable to identify exogenous variation in private subsidized enrollment at the commune level. He estimated that positive differences in private enrollment were associated with higher student test scores, and higher educational inequity. Nevertheless, priest per capita might not be a valid instrument for private schools in Chile, because priests are actively involved in the expansion of private schools and they might do that selectively, based on the expected educational outcomes of a given educational market. Additionally, Catholic schools account for only a third of the total private subsidized enrollment, and Catholic schools were precisely those private schools that existed in Chile prior to the introduction of market-oriented reforms.

Finally, Auguste and Valenzuela (2004) also estimated the effect of competition at the commune level; they used SIMCE-2000 eighth-grade test scores and implemented an instrumental variable approach (they used market size and cost of entry as instrumental variables). They found a positive but small effect of competition on test scores; they also concluded that higher levels of school competition were associated with higher school segregation, which harmed public schools.

Overall, the available evidence is not sufficient to evaluate the theories about the systemic effects of school choice in Chile; nevertheless, the evidence strongly suggests that the size of that potential effect has been extremely small at best (in fact, not noticeable at the national level). Additionally, the evidence suggests that school choice and competition are linked to an increase in educational inequity. Future research in this area should combine longitudinal studies, analyses of institutional and educational policy contexts, and a deeper understanding of parental choice and school selection processes.

8.3 Research on Private versus Public Schools' Effectiveness

A common argument to support market-oriented reforms (including public funding of private schools) is that private schools are more effective than public schools because they are more innovative, more sensitive to the demand, and less bureaucratized. In fact, most studies focusing on the case of Chile in this area are comparisons of public and private school effectiveness.

In general terms, this research has evolved following three stages. Rodriguez (1988), Aedo and Larrañaga (1994), and Aedo (1997) are part of the first phase: they studied unrepresentative samples, analyzed exclusively school-level data (from the 1980s or early 1990s), and focused on urban primary schools. Their studies concluded that—after controlling for school characteristics—private schools scored significantly higher than public schools, on average. Because of their lack of representativeness, it is not possible to generalize those findings for the overall Chilean school population.

Bravo, Contreras, and Sanhueza (1999), Mizala and Romaguera (1999), Carnoy and McEwan (2000), Vegas (2002), and Sapelli (2003) also analyzed exclusively school-level data, but they studied large, nationally representative samples.³ This research is also focused on primary education (mainly fourth grade), and all of them applied

ordinary least squares estimates. These five studies constitute the second phase of this kind of research.

Finally, McEwan (2001), Mizala and Romaguera (2003), Sapelli and Vial (2002), Gallego (2002), and Mizala, Romaguera, and Ostoic (2004) constitute a third, more sophisticated stage. These five studies analyzed student-level test scores as the outcome variable, and also included student-level predictors. They used the nation-level database, and included both primary and secondary education. They incorporated more sophisticated research methods, including hierarchical linear models, probabilistic models of choice, and instrumental variables.

Although some studies analyzed more than one year of students' test scores, none of them is a longitudinal analysis but rather a series of cross-sectional estimates. All studies have analyzed mathematics and/or language test scores as the outcome variable. Most studies compared public schools with two categories of private schools—voucher and nonsubsidized schools—although some of them distinguished between Catholic and nonreligious voucher schools.

Surprisingly, there is a noticeable variation in the estimates of the private voucher versus public schools test-score gap: while some authors have found private voucher school advantage (0.05 S.D. to 0.27 S.D.), others have found public school advantage (0.06 S.D. to 0.26 S.D.), and some have found no statistically significant difference between them.⁴ An additional puzzle is that several studies differ in their findings even when they analyze the same database. In order to understand those discrepancies, the following sections deepen into methodological issues of the mentioned second- and third-phase studies.

8.4 Methodological Issues in the Research Comparing Private and Public Schools

Selection bias is the most serious limitation that affects the estimates of the relative efficacy of private and public schools in Chile. As mentioned, the supply of private schools is neither randomly distributed among geographical areas nor among social classes, and finding a good instrument for the supply of private schools has proved to be extremely difficult. Additionally, the unregulated school choice and admission processes are highly complex and there is little information about them.

Based on their preferences and their capacity to pay tuition, parents can select any school. However, schools may also select their students.

According to the nationwide SIMCE-2003 survey of tenth graders' parents, 85% of the private nonsubsidized schools, 73% of the private voucher schools, and 59% of the public schools respondents stated that their child was selected by the school through an admission process that included some kind of examination or minimum academic requirement. Gauri (1998) found that, in Santiago, 82% of private non-subsidized, 37% of private voucher, and 18% of public students had been compelled to take a test to be admitted to their schools. Those tests—focused on basic language, reasoning, psychomotor, and social skills—are applied even to preschool applicants. Finally, student selection is a continuing process, which operates at any time during the students' career. In fact, many schools expel students who have a low academic achievement or behavioral problems; almost all expelled students are subsequently enrolled in a public school. In these cases, student selection is based on demonstrated performance.

Selection bias is a crucial problem because student characteristics related to student performance are also relevant predictors of the type of schools students attend. Thus, cognitive skills, motivation, and discipline are some relevant unobserved student characteristics affecting the estimates of private and public school effectiveness. Unfortunately, there is no information about students' initial characteristics or previous test scores. Nevertheless, the contrasting findings about the relative efficacy of public and private schools in Chile are explained not only by data limitations, but also by methodological divergences among researchers about how to tackle the confounding effect of selection bias. Moreover, the literature has increasingly recognized the potential role of peer effects on student achievement. In highly segregated environments (like the Chilean educational system), peer effect might play an even more influential role in students' performance.

Studies also differ noticeably in the quantity and quality of the covariates. Additionally, researchers measure the same phenomenon in very different ways. Finally, structural or economic variables (e.g., family income) have frequently been included in the analyses, but cultural or social variables (books at home, peer effects, etc.) have been almost absent.

The appropriate level of data aggregation has been a source of divergence among authors too: while some apply commune-level analysis, others prefer school-, classroom-, and student-level analyses. This issue is also linked to the covariates: some authors assume that controlling for student-level variables suffices, but others argue that school

compositional effects are relevant as well, so that school-level controls should be simultaneously included. Notably, little attention has been given to the multilevel nature of the educational data. Finally, potential heterogeneous effectiveness between private and public schools, according to different contextual (e.g., geographical location), educational (e.g., grade level), or student characteristics (e.g., initial ability) are almost absent.

8.5 Data

In the remaining sections, by conducting various regression analyses I will empirically demonstrate the sensitivity of the findings to the identified methodological issues.

With that purpose, I analyzed two datasets: SIMCE-2002 and SIMCE-2003. These databases contain individual mathematics and language test scores of 253,463 fourth-grade and 239,649 tenth-grade students respectively, who are the 95% of the corresponding Chilean student population. The findings in both subject matters were very similar; therefore, I will focus on the mathematics results. The datasets include 6,145 primary schools and 2,117 high schools, respectively. Several student-level (based on a parents' survey) and school-level control variables were also included. Table 8.1 provides a description of every variable used in the analyses.

8.6 The Confounding Role of Student Selection

8.6.1 Student Selection in the Admission Process

Comparisons between public and private schools in Chile are difficult initially because public and private school students differ significantly in almost all variables associated with social-class origin and, accordingly, academic achievement. Table 8.2 shows that students in private voucher schools have—on average—more educated parents, higher family income, and more books at home. The key issue is that those observed differences are almost certainly linked with unobserved differences that also affect student achievement. For example, private schools have a higher proportion of students selected through an admission process than public schools. Through those processes, schools typically evaluate the academic potential of the applicant. In order to account for those differences, researchers normally control for students' SES characteristics; nevertheless, if during the admission process

Table 8.1
Variable Definitions

Variable	Definition
<i>Student-level variables</i>	
Mathematics	Standardized IRT test score
Language	Standardized IRT test score
Mother's education	Years of education of the student's mother
Father's education	Years of education of student's father
Family income	Natural LOG of student's family income
Books	Number of books at student's home, scale ranging from 0 (0 books) to 5 (>200 books)
Gender	Dummy variable for student's gender (omitted category: woman)
Repetition	Dummy variable indicating whether the student has repeated a grade
Selection	Dummy variable indicating whether the student was selected by the school through an admission process (e.g. tests, grades requirements)
Parents' expectation*	Parents' expectation about the future student's educational attainment, scale ranging from 1 (4th grade) to 8 (graduate studies)
<i>School-level variables</i>	
Type of school	Dummy variables indicating whether the school is public (omitted category), private voucher, or private non-subsidized
Mean mothers' education	School average of years of education of students' mothers
S.D. mothers' education	School standard deviation of years of education of students' mothers
Mean parents' education	School average of years of education of both students' parents
Mean books at home	School average of the individual variable "books at home"
Selected students	Proportion of students who were selected by the school through an admission process
School SES level	5 dummy variables that classify schools in Low, Middle-Low, Middle, Middle-High, High students' socioeconomic status (categories are based on parent's education, family income, and proportion of at-risk students in the school)
Quintile income	Quintile classification of schools based on the school average of family income
LOG school families' income	Natural LOG of the school average of student's family income
S.D. families' income	School standard deviation of the students' family income
% repent students in school*	Percentage of students in the school who have repeated at least a grade

Table 8.1
(continued)

Variable	Definition
School expels repentant students*	School that (according to parents) expels students who repeat a grade
Students always in this school*	Proportion of students who have been in the same school since 1st grade
School mean years in this school*	School average of years that students have studied in this school

Note: * Only available in SIMCE-2002, 4th grade.

Table 8.2
Comparing Public and Private Voucher School Students

	Public N = 109,624	Private voucher N = 96,585
Mathematics	230.1 (55.2)	250.3 (57.4)***
Language	241.5 (48.0)	257.4 (48.5)***
Mother's education	9.3 (3.6)	10.8 (3.7)***
Father's education	9.7 (3.8)	11.1 (3.9)***
Books at home	1.7 (1.2)	2.1 (1.2)***
Selected student	59.1% (47.4%)	71.9% (43.4%)***
Log family income (original scale: 1 to 13)	0.5 (0.6)	0.7 (0.7)***
Gender (male)	49.3% (49.9%)	49.8% (49.9%)

Notes: Student-level characteristics: Mean (S.D.).

$\sim p < .10$; $*p < .05$; $**p < .01$; $***p < .001$

Source: Author elaboration, based on SIMCE-2003.

schools have additional information about the academic potential of applicant students, controlling for those covariates may be insufficient.

To explore this issue, I used the information presented in table 8.2 to predict the probability that a student will be enrolled in a private voucher school (versus in a public school). I applied logistic regression to conduct this analysis. The results are presented in table 8.3. According to model 1, the fitted-odds ratio that a student who was admitted through a selection process will attend a voucher school (versus a public school) is 2.07 times the odds for a student who was not selected by an admission process; model 2 shows that, after controlling for SES characteristics, the mentioned fitted odds decreased to 1.78 times, but it remained statistically significant. This finding indicates that, although SES characteristics are associated with the probability of being

Table 8.3

Predicting Private Voucher School Attendance: The Effect of Student Selection through an Admission Process

	Dependent variable: Private voucher school attendance (vs. public school attendance)	
	Model 1	Model 2
Selected student	0.73*** (0.01)	0.58*** (0.01)
Mother's education		0.04*** (0.00)
Father's education		0.02*** (0.00)
Family income		0.04*** (0.01)
Log family income		0.25*** (0.03)
Books at home		0.11*** (0.01)
Constant	-0.47*** (0.01)	-1.28*** (0.02)
Max-Rescaled R^2	0.04	0.09
N (students)	237,492	237,492

Notes: Logistic regression models for the relationship between whether a student attends a private voucher school (vs. public school) as a function of whether he was selected by the school, and some family characteristics.

$\sim p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Source: Author elaboration.

a selected student in a private school, they are not enough to account for the unobserved differences between selected and nonselected students. This strongly suggests that private schools use additional information (plausibly associated with students' ability) to make their admission decisions. In fact, I will later show that, even after controlling for several school, family, and student characteristics, selected students score significantly higher than nonselected students.

8.6.2 Student Selection during the Schooling Process

None of the analyzed studies have considered the student selection that affects some students during their schooling process. In this section, by using the SIMCE-2002 database, I will analyze some recently available information related to this issue.

About 27% of Chilean fourth-graders in public schools and 33% in private voucher schools did not start their primary education in their current school. Additionally, while the proportion of students who have repeated a grade is about 15% in public schools, in private schools it is only 8%.⁵ Since some Chilean schools do not admit students who have previously repeated a grade and others expel their students who are repeating the grade (thus, this practice accounts for some proportion of the students who have moved to a different school since first grade), it would be misleading to infer about school quality based on the current proportion of retained students. In fact, while 31% of private voucher school parents affirm that their school expels retained students, only 14% of the public school parents assert so.

In order to explore whether the higher exclusion of retained students among private schools explains part of their observed advantage, table 8.4 contains the parameter estimates of multiple regression models that relate this information with student test scores. Baseline model 1 shows that the raw difference in mathematics achievement between public school and private voucher school fourth-grade students is about 0.34 S.D.⁶ Model 2 controls for some basic student and school characteristics. As expected, students who have repeated a grade score significantly lower than their nonretained peers; additionally, students who attend a school with a higher proportion of retained students tend to score significantly lower. Unfortunately, we cannot be confident about the causal relationship between both measures of student grade retention and the private-public test-score gap, because they can be either measures of students' previous ability or of school quality. Finally, schools that expel retained students score about 0.19 S.D. higher than schools that do not expel them, which suggests that the selection of the abler students and the rejection of the less-skilled students during the schooling process account for some of the private voucher school advantage, after controlling several student and school characteristics.

Models 3 and 4, and also 5 and 6 in table 8.4 replicate this analysis for the subsample of students who have always studied in the same school and for those students who have moved to a different school, respectively. Although the general pattern is similar in both subsamples, there are some interesting differences. The positive association between attending a selective school that expels retained students and test scores is stronger for students who have changed school than for students who have remained in the same school (0.26 S.D. vs. 0.14 S.D. respectively). Conversely, the negative association between the per-

Table 8.4
Identifying the Effect of Student Selection during the Schooling Process

	Outcome variable: fourth-grade students' mathematics test scores, SIMCE-2002					
	All students		Students who have not changed schools		Students who have changed schools	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Private voucher	18.83*** (0.24)	-0.31 (0.27)	20.55*** (0.29)	0.28 (0.33)	16.34*** (0.45)	-1.75*** (0.49)
Private nonsubsidized	61.11*** (0.45)	7.33*** (0.59)	62.47*** (0.52)	8.22*** (0.72)	55.99*** (0.92)	4.51*** (1.08)
Student repeated at least a grade		-21.66*** (0.38)		-23.77*** (0.52)		-19.30*** (0.63)
% repeating students in school		-0.33*** (0.02)		-0.26*** (0.02)		-0.40*** (0.03)
School expels repeating students		10.54*** (0.72)		7.82*** (0.86)		14.74*** (1.40)
% students always in this school		15.99*** (1.40)		32.11*** (1.93)		0.06 (2.43)
School mean years in this school		1.30*** (0.39)		0.05 (0.48)		2.90*** (0.71)
Constant	238.2*** (0.16)	188.2*** (1.02)	239.9*** (0.19)	180.7*** (1.37)	234.8*** (0.32)	192.6*** (1.82)
Additional control variables	no	yes	no	yes	no	yes
R ²	0.10	0.25	0.11	0.26	0.07	0.25
N (students)	199,112	199,112	137,181	137,181	54,895	54,895

Notes: Relationship between school type and mathematics achievement. Additional control variables include gender, father's and mother's education, LOG family income, books at home, parent's expectation, and school SES level. Omitted category: public schools.

$\sim p < .10$; $*p < .05$; $**p < .01$; $***p < .001$

Source: Author elaboration.

centage of retained students in the school and test scores is stronger for students who have moved to a different school than for students who have remained in the same school. Both results point in the same direction: students who change school seem to be more sensitive to the selective nature of their new school. Note that this can be the result of schools selecting the best students and families choosing more selective schools.

As shown in table 8.4, while there is not a statistically significant difference between public and private school students within the

population who have not changed school, among students who have changed school, students in public schools score slightly higher than their peers in voucher schools (0.03 S.D.). Consequently, part of the private schools' advantage can be based on their capacity to select and attract more skilled students. Finally, although the gap between private-nonsubsidized and public schools is reduced for both groups of students, it remains statistically significant, suggesting that there is little transfer of students between public and private nonsubsidized schools.

8.7 Alternative Ways of Controlling for Differences in Student and School Characteristics

8.7.1 Controlling for Parents' Education Level

Because public and private schools serve students with markedly different levels of parent education, all studies control for this aspect; nevertheless, they diverge noticeably in the way this variable is introduced into the analysis. In order to show how these discrepancies may affect the estimates of the private/public test-score gap, table 8.5 shows six regression models, all of them present in the reviewed literature.

Model 1 is a baseline model: private voucher schools score about 0.36 S.D. higher than public schools. Models 2 and 3 incorporate student-level parents' education covariates. As expected, controlling for mother's education—model 2—reduces the private/public test score gap (to 0.27 S.D. and 1.16 S.D. respectively); but this gap remains statistically significant. Also, when father's education is added—model 3—the private school advantage is reduced slightly and remains statistically significant.

Models 4, 5, and 6 also control for parents' education, but measured at school level. Model 4 estimates the private/public gap by controlling for the school average of mothers' years of education. The results indicate that students in private voucher schools earn lower test scores than students in public schools; although statistically significant, the difference is very small (0.02 S.D.). More recently, some researchers have introduced the heterogeneity of the student population as a different control variable for parents' education. Thus, model 5 controls only for the school standard deviation of mother's years of education: interestingly, compared to model 1, this variable per se has almost no effect on the estimate of the private/public school gap. Nevertheless, model 6 shows that when the school mean of mother's education is also present in the model, the effect of the school standard deviation of

Table 8.5
Regression Models that Relate School Type and Students' Mathematics Achievement, Controlling for Parents' Education Variables

	Dependent variable: 10 th -grade students' mathematics test scores, SIMCE-2003					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Private voucher	20.35*** (0.25)	14.82*** (0.24)	13.66*** (0.24)	-1.21*** (0.24)	20.41*** (0.25)	-1.69*** (0.24)
Private nonsubsidized	86.77*** (0.45)	64.99*** (0.47)	59.11*** (0.47)	-0.30 (0.55)	87.01*** (0.46)	-2.27*** (0.57)
Mother's education		3.82*** (0.03)	2.58*** (0.04)			
Father's education			2.05*** (0.04)			
School mean mother's education				13.49*** (0.06)		13.55*** (0.06)
School S.D. mother's education					0.67* (0.33)	-4.32*** (0.30)
Constant	230.07*** (0.17)	194.56*** (0.33)	186.32*** (0.36)	107.25*** (0.55)	227.92*** (1.06)	120.50*** (1.06)
R ²	0.14	0.20	0.21	0.30	0.14	0.30
N (students)	237,492	237,492	237,492	237,492	237,492	237,492

Notes: Omitted category: public schools.

~*p* < .10; **p* < .05; ***p* < .01; ****p* < .001

Source: Author elaboration.

mother's education changes its sign and increases its effect (i.e., at similar levels of mother's education, more homogeneous schools tend to score higher than more heterogeneous schools). According to model 6, public schools score significantly higher than private voucher schools (0.03 S.D.) when both school-level variables are simultaneously included, and this difference is larger than that estimated in model 4, which only controls for the level, not the variation in mother's education (observe that a similar pattern is identified when comparing public and nonsubsidized private schools).

8.7.2 Controlling for Schools' Socioeconomic Status

There are several hypotheses about how the socioeconomic characteristics of the student population at the aggregated level can affect student academic achievement: the socioeconomic status of the student population might affect teachers' expectations and teaching practices; it might also represent a measure of the available material and symbolic

resources at school level; and, finally, it might be a measure of peer effects (students might benefit from their peers' family resources and personal abilities through their interaction). Since Chilean public and private schools differ in the socioeconomic status of their student populations, researchers have controlled for this aspect in order to reduce the bias of the estimates of the private/public schools gap. Nevertheless, there is huge disparity in the appropriate level of data aggregation, the specific covariates, and the type of measurement of school socioeconomic status. I will illustrate how those divergences affect the results by analyzing alternative regression models, all of them present in the literature.

Table 8.6 shows the estimates of ten regression models containing exclusively school-level measurements of students' SES (models 2 to 11). These models combine six different school-level controls.⁷ Model 1 is the baseline.

Models 2 to 7 were estimated by including a single control variable each time. The introduction of these control variables significantly increases the capacity of the models to predict students' test scores: the proportion of the variation explained for the models ranges from 0.14 in the baseline model to 0.25–0.29 in models with a school SES control variable added. Based on the R^2 statistics, the six controls have similar effects on the regression models; nevertheless, their effects on the estimated test-score gaps are markedly different.

Model 2 controls for schools' SES by using an official classification, which sorts schools in five SES groups (four dummies were incorporated; omitted category: Low SES). This classification has been regularly used by researchers. The introduction of this covariate dramatically reduces the positive difference between private voucher over public schools (to 0.04 S.D.), although it remains statistically significant.

Models 3, 4, and 5 control for family income, but measured in three different school-level indicators: income quintiles, the income natural logarithm, and the income standard deviation. As shown, the size of the estimated gap is noticeably different depending on the covariate: private voucher schools' advantage over public schools ranges from 0.01 S.D. in model 3 to 0.12 S.D. in model 5. Finally, model 8 shows that when the level of family income is taken into account (i.e., log of school mean of family income), the introduction of a variability measure (i.e., S.D. of income) has almost no impact on the private voucher effect estimate (compare models 8 and 4).

Models 6 and 7 introduce control variables referred to as cultural capital (as opposed to economic capital, included in previous models): school mean of parents' years of education, and school mean of books at home. When parents' education is incorporated as a covariate, private voucher schools score lower than public schools, by 0.01 S.D.; in turn, when books at home is the covariate, private voucher students obtain lower test scores than public students (0.03 S.D.). Finally, when both control variables are added simultaneously (model 9), private voucher schools obtain statistically significant lower student achievement than public schools, and—compared to model 6—this difference increases (0.04 S.D.).

Models 10 and 11 evaluate the impact of using simultaneously economic and cultural capital covariates. The estimated negative differences in academic achievement between private voucher schools and public schools in models 10 and 11 are almost the same as estimated by model 9. This suggests that cultural differences between the student populations are the key factors that explain the observed advantage of private voucher over public schools (note that models 9, 10, and 11 also estimate public schools' advantage over private nonsubsidized schools).

In summary, the divergences in the way researchers have attempted to control for parent education and school SES have had decisive effects not only on the size but also on the sign of the estimated test-score gap between private and public schools in Chile.

8.8 Level of Data Aggregation and Data Analysis

8.8.1 Student-level versus School-level Covariates

Although since 1997 student-level data (both test scores and background information) is available in Chile, researchers still disagree on what is the best level of aggregation of control variables: while some use exclusively school-level controls, others use exclusively student-level controls, and some use both. In table 8.7, I present six regression models to demonstrate the consequences that this disagreement has on the estimates of the test-score gap between private and public schools.

Model 1 is the baseline model. A set of student-level covariates was added to model 2; all those control variables significantly predict students' test scores. Student-level control variables noticeably reduce the gap between private and public schools, but this gap remains positive and statistically significant (0.21 S.D. for private voucher schools).

Table 8.6
Regression Models that Relate School Type and Students' Mathematics Achievement
Controlling for School SES Variables

Dependent variable: 10 th -grade students' mathematics test scores, SIMCE-2003											
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Private voucher	20.42*** (0.25)	2.30*** (0.24)	0.53* (0.25)	1.34*** (0.25)	6.79*** (0.24)	-0.52* (0.24)	-1.59*** (0.25)	1.54*** (0.25)	-2.09*** (0.24)	-2.58*** (0.24)	-1.93*** (0.24)
Private nonsubsidized	86.75*** (0.45)	3.95*** (0.79)	41.44*** (0.47)	8.56*** (0.56)	10.70*** (0.59)	-1.95*** (0.56)	3.54*** (0.55)	4.04*** (0.58)	-4.05*** (0.56)	-11.16*** (0.79)	-7.03*** (0.58)
Middle-low SES		10.46*** (0.30)								-14.61*** (0.38)	
Middle SES		49.95*** (0.34)								-9.29*** (0.67)	
Middle-high SES		82.04*** (0.53)								-4.79*** (1.02)	
High SES		105.91*** (0.92)								-6.33*** (1.43)	
Quintile school income			22.33*** (0.11)								-8.01*** (0.52)
Log school family Income.				37.57*** (0.18)				30.13*** (0.33)			7.13*** (0.34)
S.D. school family Income					35.24*** (0.19)			9.27*** (0.34)			7.68*** (0.16)
Mean school parents' education						12.99*** (0.06)			7.80*** (0.13)	7.65*** (0.17)	7.68*** (0.16)
Mean books at home							49.12*** (0.22)		22.15*** (0.51)	24.90*** (0.51)	25.18*** (0.55)

Constant	230.1*** (0.17)	215.1*** (0.25)	186.1***	227.9*** (0.16)	184.1*** (0.30)	109.8*** (0.56)	148.5*** (0.40)	216.2*** (0.46)	121.0*** (0.61)	127.1*** (1.07)	108.3*** (1.30)
R ²	0.14	0.27	0.27	0.27	0.25	0.29	0.29	0.27	0.30	0.31	0.30
N (students)	237,427	237,427	237,427	237,427	237,427	237,427	237,427	237,427	237,427	237,427	237,427

Notes: Omitted category: public schools.

~p < .10; *p < .05; **p < .01; ***p < .001

Source: Author elaboration.

Table 8.7
Regression Models that Relate School Type and Students' Mathematics Achievement, Controlling for Students' and School Variables

	Dependent variable: 10 th -grade students' mathematics test scores, SIMCE-2003					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Private voucher	20.35*** (0.25)	11.89*** (0.24)	10.06*** (0.24)	-2.40*** (0.25)	-3.15*** (0.24)	-3.51*** (0.24)
Private nonsubsidized	86.77*** (0.45)	49.85*** (0.51)	47.64*** (0.50)	-5.45*** (0.58)	1.29* (0.58)	-0.52 (0.59)
Mother's education		1.90*** (0.04)	1.71*** (0.04)			0.74*** (0.04)
Father's education		1.34*** (0.04)	1.24*** (0.04)			0.35*** (0.04)
Log family income		4.81*** (0.20)	4.86*** (0.20)			1.20*** (0.19)
Books at home		6.71*** (0.10)	6.29*** (0.10)			3.65*** (0.10)
Gender (male)		7.66*** (0.22)	7.77*** (0.22)			9.11*** (0.20)
Selected student			18.84*** (0.24)			3.96*** (0.27)
School mean parents' education				7.91*** (0.13)	7.17*** (0.13)	5.97*** (0.13)
School S.D. mother's education				-3.47*** (0.30)	-0.88** (0.30)	-0.48 (0.29)
School mean books at home				21.79*** (0.51)	16.17*** (0.51)	13.93*** (0.51)
% selected students in school					33.44*** (0.46)	29.52*** (0.51)
Constant	230.1*** (0.17)	181.8*** (0.37)	174.0*** (0.38)	131.7*** (1.08)	119.99 (1.08)	112.0*** (1.08)
R ²	0.14	0.23	0.25	0.30	0.32	0.33
N (students)	237,492	237,492	237,492	237,492	237,492	237,492

Notes: Omitted category: public schools.

~*p* < .10; **p* < .05; ***p* < .01; ****p* < .001

Source: Author elaboration.

Model 3 incorporates an additional student-level covariate, which is an indirect measure of student's ability: whether the student was selected through an admission process. I incorporated this variable separately for two reasons: first, to estimate whether it adds information to the traditionally used student-level controls; second, given that better schools can attract abler students, this variable is potentially endogenous and its effect can be confounded with school quality. This indirect measure of student ability has a strong relationship with student achievement, even after controlling for the mentioned student characteristics: on average, selected students score 0.34 S.D. higher than students who were not selected through an admission process. Additionally, the introduction of this covariate slightly reduces the positive test-score difference between private voucher schools and public schools (to 0.18 S.D.).

Model 4 uses exclusively school-level control variables. As noted, those covariates have a huge effect on the estimate of the private/public test-score gap; in fact, after controlling for them, public school students score higher than private voucher students (0.04 S.D.). Correspondingly, the school-level selectivity measure was added to model 5, which slightly increased this estimated public school advantage over private voucher schools to 0.06 S.D.

Finally, model 6 includes covariates at the student and school levels. When both types of controls are simultaneously present, school-level predictors' parameter estimates tend to be more stable than student-level predictors (especially pronounced is the decrease in the *selected student* coefficient). As shown, this full model estimates that—on average—public school students score higher than private voucher students by 0.06 S.D. (similar to the estimate using exclusively school-level covariates). Note that according to this full model, there is no statistically significant difference between private nonsubsidized and public school students. Finally, the R^2 of the full model is slightly larger than the R^2 obtained by using only one-level control variables, suggesting that both kinds of predictors are needed to better explain students' test scores.

8.8.2 Between versus within Schools' Test-Score Variation

The sensitivity of the findings to the choice of covariates at the student versus school level can be further explored by using a multilevel analysis. Multilevel models are recommended to study student achievement because the regression assumption that residuals are independent is

not satisfied in educational settings. There are two hypotheses to explain that: school effectiveness (within their schools, students share common educational experiences that significantly affect their outcomes), and school segregation (students enrolled in the same school share unobserved previous characteristics, which are related to their academic performance). My aim is to propose that the highly segregated nature of Chilean education entails an additional challenge to study the test-score gap between private and public schools.

Table 8.8 contains multilevel regression models for mathematics and language test scores. The multilevel analysis allows me to separate the total variation of students' test scores in between-schools and within-schools variations. As reported, there is a very large between-schools variation in Chilean education: about half of the mathematics test-scores variation and more than a third of the language test-scores variation occur between schools.⁸ This very large between-schools variation explains why school-level predictors are so successful in estimating students' test scores: Chilean students' academic achievement is highly predictable depending on the schools they attend.

Models 1 and 4 incorporate exclusively school-level variables; as shown, they explain 72% of the mathematics and 80% of the language total between-schools variation.⁹ When school-level predictors are taken into account, public schools score higher than private voucher schools in both language and mathematics.

In order to explain some of the within-schools variation, models 2 and 5 use exclusively student-level covariates (note that *type of school* is a school-level variable). According to those models, private voucher schools score higher than public schools in both language and mathematics. Nevertheless, these variables account for an extremely small proportion of the within-schools variation: 3% in mathematics and 2% in language. Thus, once the within-schools variation is distinguished, it becomes apparent that the available standardized information is insufficient to understand individual achievement in a context of highly segregated schools.

Finally, full-models 3 and 6 include both student-level and school-level predictors. The findings indicate that public schools score higher than private voucher schools in language and mathematics. Note that, compared to models 1 and 3, student-level variables do not increase the proportion of between-schools explained variation.

To sum up: the size and the sign of the estimated test-score gap between private and public Chilean schools are highly sensitive to the

Table 8.8

Multilevel Regression Models. Relationship between School Type and Students' Mathematics and Language Achievement, Controlling for Student and School Variables

	Dependent variable: 10 th -grade students' test scores, SIMCE-2003:					
	Mathematics			Language		
Initial between-schools variation	49%			37%		
Initial within-schools variation	51%			63%		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Private voucher	-2.89* (1.42)	24.26*** (1.65)	-3.30* (1.43)	-1.78* (0.89)	18.56*** (1.12)	-1.87* (0.88)
Private nonsubsidized	4.32~ (2.49)	70.25*** (2.09)	3.56 (2.49)	-4.35** (1.58)	47.69*** (1.44)	-3.42* (1.56)
School mean parents' education	4.97*** (0.56)		4.39*** (0.56)	4.23*** (0.36)		3.63*** (0.35)
School mean books at home	17.35*** (2.13)		14.23*** (2.14)	15.00*** (1.37)		10.89*** (1.36)
% selected students in school	39.00*** (2.31)		35.79*** (2.32)	25.25*** (1.46)		22.79*** (1.45)
Mother's education		0.87*** (0.03)	0.84*** (0.03)		1.04*** (0.03)	1.00*** (0.03)
Log family income		-0.69*** (0.17)	-0.78*** (0.17)		-1.06*** (0.16)	-1.20*** (0.16)
Books at home		4.09*** (0.09)	4.02*** (0.09)		4.10*** (0.08)	4.00*** (0.08)
Gender (male)		10.36*** (0.21)	10.39*** (0.21)		-4.29*** (0.19)	-4.28*** (0.19)
Selected student		4.01*** (0.24)	3.63*** (0.24)		2.99*** (0.22)	2.49*** (0.22)
Percentage of explained variation:						
Between schools	71.6%	48.1%	71.6%	79.7%	55.0%	80.2%
Within schools	0%	2.8%	2.8%	0%	2.4%	2.4%
Number of students (schools)	237,629 (2,105)	237,629 (2,105)	237,629 (2,105)	237,629 (2,105)	237,629 (2,105)	237,629 (2,105)

Notes: Omitted category: public schools.

~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Source: Author elaboration.

level of aggregation of covariates included in the analyses. Additionally, the segregated feature of the Chilean educational system causes a very large between-schools variation in students' performance; as a result, Chilean students' academic achievement is highly predictable depending on the schools they attend. This explains the very strong statistical relationship between school-level predictors and students' achievement.

8.9 Conclusions and Discussion

Chile is a paradigmatic case of school choice and a market-oriented educational system: private and public schools openly compete to capture family preferences and public subsidies. Unfortunately, several data limitations and methodological divergences have affected the research on the comparison between private and public school effectiveness and on the systemic effects of school choice; as a result, previous research has obtained noticeably contrasting conclusions. This chapter has identified some threats to the validity of this research. The most important one is selection bias: the parents' school-choice process and the schools' students-selection process introduce severe biases that researchers have not been able to overcome satisfactorily. Researchers also diverge on how to control for the enormous differences in school and student characteristics between private and public schools, what the appropriate level of data aggregation and data analysis should be, and how to tackle the multilevel nature of educational data.

By conducting exemplary data analyses, this chapter demonstrated that the discussed methodological issues can affect not only the size but also the sign of the estimated comparative efficacy of private and public schools in students' academic achievement. For that reason, the answer to the question of whether private or public schools are the most effective in Chile is extremely sensitive to those methodological decisions. Although my analyses were based on OLS estimates of cross-section data, they introduced new measures of the *sorting* processes, the key source of bias in these studies. In fact, as hypothesized, both sorting mechanisms—selective admission processes and rejection of retained students—were significant predictors of student test scores and were more disseminated among private schools, accounting for some proportion of their observed advantage. Based on those analyses, my most precise estimates (see models 3 and 6 in table 8.8) indicate that private schools are not more effective than public schools, and that they may be less effective.

The reasons why private schools are not more effective than public schools in Chile are beyond the scope of this study. One hypothesis is that although in the past voucher schools were more effective, public schools have reacted to the competition by improving their quality, and consequently have closed the previous gap. As explained, there is little—if any—evidence to support this hypothesis. An alternative hypothesis is that the institutional design of the Chilean educational system has structural deficiencies, because schools can improve their *market* position without improving the quality of their educational service.

The theory underlying this last hypothesis is as follows: competition among schools has not improved educational quality, because schools (mainly the private ones) have competed to attract the best students rather than to improve their educational service, creating a “zero-sum game”: improvements of some schools are annulled by deterioration of others. Additionally, because parents’ choices have not necessarily been oriented to educational quality (owing to information deficiencies and parents’ use of nonacademic criteria), schools have not received from their customers signals guiding them toward educational improvement, but rather toward the use of status symbols and social segregation. Finally, deregulation and free competition have tended to increase school segregation through a process of mutual reinforcement between schools and families. From the supply side, schools have responded to the incentives of competence, by distorting the indicators of quality through the rejection of students who are less likely to succeed in school (applying admissions tests), and those who have demonstrated low capacities (expelling them). These sorting and re-sorting mechanisms, massively applied for two decades, have shaped the Chilean school system in its current segregated features. From the demand point of view, middle and high social-class families have found that schools’ social and academic selectivity provide them a large profit of peer effects within schools: given the high correlation between learning outcomes and students’ social background, when Chilean families aim at social selectivity, they obtain academic selectivity by extension.

The current evidence and the main findings of this chapter provide partial support to this theory. Nevertheless, this study also has some limitations. First, although it exploited new data on the student selection processes to eliminate the selection bias, we cannot be completely confident that the regression models overcame this threat to validity. Second, because SIMCE does not evaluate the same students over time, it was not possible to develop longitudinal analyses or create

value-added models that control for previous student achievement. Finally, the lack of data on students' academic achievement prior to the voucher reform severely constrains the analysis about potential effects on the system as a whole.

If my conclusions are correct, they do not imply that private schools cannot be positive partners of Chilean public education, but it does suggest that, in order to contribute to improve educational quality and equity, voucher programs must be carefully designed. In this sense, the Chilean experience provides some relevant lessons from an educational policy perspective.

First, every school that receives public resources should guarantee nondiscrimination to applicant students; thus, admission tests, academic and economic requirements, and other forms of sorting should be prohibited. Second, bad information can be as harmful as no information: if the evaluation system does not estimate the actual effectiveness of the school, it can orient families and policy makers to a wrong direction. Third, funding systems, public policies, and other institutional regulations should recognize that some students (e.g., low-income students, ethnic minorities) are more challenging to educate than others. This implies that schools that serve more disadvantaged students should receive additional resources. Fourth, it is overoptimistic to expect that families' demand will improve educational quality by itself; conversely, some public incentives, pressures, and regulations should also be in place in order to *push* schools toward genuine processes of school improvement. Finally, Chilean private schools include for-profit and nonprofit institutions, but the current system does not make this distinction at all, and parents do not have this information. Legislation and educational policies should differentiate these two kinds of schools, in order to give priority in access to publicly funded school improvement programs and other public resources (texts, computers, teaching materials, teacher training, etc.) to schools serving the public good.

Notes

I would like to thank Paul Peterson, Rajashri Chakrabarti, Marcela Pardo, Brian Jacob, Roland Fryer, and Richard Murnane for their valuable commentaries and suggestions.

1. See Bellei and Mena (2000) for details.
2. The average tuition of the copay system is about half the cost of the public voucher, while the average tuition of the elite schools is about four to five times the cost of the public voucher.

3. Vegas (2002) is an exception: she analyzed 1999 data, and used a unique database on teachers' characteristics.
4. Catholic schools have been estimated to be—on average—more effective than public schools. Unfortunately, in my analysis I cannot distinguish between Catholic and non-Catholic private schools.
5. Note that this repetition rate is at the middle of fourth grade. According to the Chilean rules, students should not repeat first grade; thus at that point, students could have repeated only second and third grades.
6. I will report the test-score gap in S.D. units. I divided the regression coefficients by the population S.D. (mathematics S.D. = 56; language S.D. = 48).
7. I did not include the most used school SES index, which is the percentage of students "at risk." This index is an administrative tool used by the Ministry of Education to distribute free lunches among schools. The index is based mainly on physical health indicators; it uses only information from the first-grade students, and is self-reported by the schools. All private nonsubsidized and many private voucher schools have no information on this index (researchers assign 0% to these schools). Thus, I do not consider this index a good measure for research purposes.
8. As a point of reference, consider that the PISA (OECD/UNESCO 2003)—an international survey of students' performance in language, mathematics, and science—found a negative relationship between the level of student achievement and the level of between-schools variation. For example, the three countries with the highest student performance—Finland, Canada, and New Zealand—had between-schools variations of 12%, 18%, and 16% respectively; the United States had 30% between-schools variation, and Chile had one of the highest levels of between-schools variation: 57%.
9. It is important to note that the proportion of explained variation is relative to the respective proportion of explainable between- and within-schools variations.

References

- Aedo, Cristian. 1997. Organización industrial de la prestación de servicios sociales. Working Paper Series R-302, Washington D.C.: Inter-American Development Bank.
- Aedo, Cristian, and Osvaldo Larrañaga. 1994. Sistemas de entrega de los servicios sociales: La experiencia chilena. Washington D.C.: Inter-American Development Bank.
- Auguste, Sebastián, and Juan Pablo Valenzuela. 2004. Do students benefit from school competition? The Chilean experience. Ph.D. dissertation, University of Michigan, Ann Arbor, MI.
- Bellei, Cristian, and Isidora Mena. 2000. The new challenge: Quality and equity in education. In *Chile in the nineties*, ed. Cristian Toloza and Eugenio Lahera, 349–391. Palo Alto, CA: Stanford University Libraries.
- Bravo, David, Dante Contreras, and Claudia Sanhueza. 1999. Rendimiento educacional, desigualdad, y brecha de desempeño privado público: Chile 1982–1997. Working paper, Department of Economics, University of Chile.
- Carnoy, Martin, and Patrick McEwan. 2000. The effectiveness and efficiency of private schools in Chile's voucher system. *Educational Evaluation and Policy Analysis* 22, no. 3: 213–239.

- Gallego, Francisco. 2002. Competencia y resultados educativos. Teoría y evidencia para Chile. *Cuadernos de Economía* 39, no. 118: 309–352.
- Gallego, Francisco. 2004. School choice, incentives, and academic outcomes: Evidence from Chile. Mimeo, Massachusetts Institute of Technology, Cambridge, MA.
- Gauri, Varum. 1998. *School Choice in Chile. Two Decades of Educational Reform*. Pittsburgh, PA: Pittsburgh University Press.
- Hseih, Chang-Tai, and Mighel Urquiola. 2003. When schools compete: How do they compete? An assessment of Chile's nationwide school voucher program. Working Paper 1008, National Bureau of Economic Research, Cambridge, Mass.
- McEwan, Patrick. 2001. The effectiveness of public, Catholic, and non-religious private schools in Chile's voucher system. *Education Economics* 9, no. 2: 103–128.
- Mizala, Alejandra, and Pilar Romaguera. 1999. Schools performance and choice. The Chilean experience. *The Journal of Human Resources* 35, no. 2: 392–417.
- Mizala, Alejandra, and Pilar Romaguera. 2003. Equity and educational performance. Center for Applied Economics, Department of Industrial Engineering, University of Chile.
- Mizala, Alejandra, Pilar Romaguera, and Carolina Ostoic. 2004. A hierarchical model for studying equity and achievement in the Chilean school choice system. Center for Applied Economics, Department of Industrial Engineering, University of Chile.
- Rodriguez, Jorge. 1988. School achievement and decentralization policy: The Chilean case. *Revista de Analises Económico* 3, no. 1: 1.
- Sapelli, Claudio. 2003. The Chilean voucher system: Some new results and research challenges. *Cuadernos de Economía* 40, no. 121: 530–538.
- Sapelli, Claudio, and Bernardita Vial. 2002. The performance of private and public schools in the Chilean voucher system. *Cuadernos de Economía* 39, no. 118: 423–454.
- Vegas, Emiliana. 2002. School choice, student performance, and teacher and school characteristics: The Chilean case. World Bank Policy Research Working Paper 2833, April.

9 The Concession Schools of Bogotá, Colombia

Felipe Barrera-Osorio

In 1999, the city of Bogotá, Colombia, launched an educational program designed to broaden the coverage and quality of basic education. This program to establish concession schools is a partnership between the public and private education sectors, with private schools providing public education in twenty-five schools for a period of fifteen years. The state provides the infrastructure, selects the students, and pays a predetermined sum per full-time student per year (approximately Col\$1.2 million (U.S.\$520), according to Villa and Duarte 2005), which is higher than what most regular public schools receive (approximately Col\$1 million or U.S.\$430). The concession schools must provide education to the population assigned to them by the state, but they are allowed relative flexibility to contract administrative and teaching staff and can freely implement their pedagogic models. The concession schools must also meet performance standards (on quality and quantity) set by the secretary of education. For instance, each school commits to surpass the mean score of standardized tests in similar schools.

Over 25,000 students participate in the concessions program, representing close to 3% of the total public enrollment in the city (World Bank 2005). The schools were built following two main criteria. First, they were located in extremely poor areas of the city. Second, they were built in areas where the demand for primary and secondary education was higher than the number of student placements supplied by city public schools. Any student from the affected neighborhood can apply for enrollment in the concession schools. The secretary of education of the district uses means testing to allocate places in the concession schools among the applicants. The students who are not admitted into the concession schools are placed into nearby public schools.

During visits to schools in the public system done in 2004 and 2005, it became clear that the differences across regular public school and

concession schools were very sharp. In contrast to regular public schools, concession schools had very good infrastructure, similar to good private schools. Also, the relationship between teachers and students in the concession schools was open and very constructive. Finally, the concession school students were very proud of their schools.

Concession schools are located in areas ranking at the lowest end of the income distribution. Children in these zones in general face serious challenges, including lack of affection and other family problems, as well as poor nutrition. According to interviews with different headmasters, concession schools, in their objective to provide high-quality education, offer psychological counseling (daily for several students) and an environment of affection to students. Children who are suspected of having family problems are subject to home visits by social workers and psychologists from the school. Children who miss classes regularly are subject to home visits as well. To counter poor nutrition, several concession schools have their own food programs, which complement the public program. The regular public school food program consists mainly of fruit, a piece of cake, and a yogurt or a juice. Some concessions add a complete lunch, which generally includes a protein.

Another clear objective of the concession schools is to work with the communities in which they operate. Several have an open-door policy during weekends, and they encourage teacher-parent meetings on a regular basis. They work with the community through programs to resolve family problems and provide adult education. Finally, many of the headmasters consider the academic impact of the concession schools a byproduct of the other measures, believing they need to provide psychological and nutritional balance to students before they can address academic achievement.

Clearly, family problems and poor nutrition also plague students in regular public schools. However, those schools do not have the resources to implement the strategies that concession schools use. In fact, non-concession public schools often do not have the resources to maintain what minimal infrastructure they do have. For example, in both of the public schools that the World Bank team visited, the bathroom facilities were limited and out of service on some days.

Despite the apparently good reputation of concession schools, in 2005 the program was under debate. Some members of Bogotá's City Council claimed that the program did not yield the expected results because the average standardized test scores in the concessions were

lower than the average scores for regular public schools. However, as will be discussed, though the test scores for concession schools were lower according to a *general* comparison of means, in fact once confounding variables are controlled for, it appears that the concession schools do have a positive impact.

The qualitative evidence compiled during the visits to the concession schools and the public debate in the council induced three main hypotheses that are the subject of this chapter:

1. *Dropout rates are lower in concession schools than in similar public schools.* The dropout rate is another measure of schooling and, presumably, it responds faster to interventions than do test scores. Through the various interventions previously described, concession schools attempt to keep children in school.

2. *Regular public schools near the concession schools have lower dropout rates than public schools outside the influence of concessions.* Concession schools have had positive externalities, through their community work, on nearby public schools. In addition, increased competition in the educational market due to the existence of concession schools has caused improvements in nearby schools. Previous literature on school choice (Hoxby 2002) supports this hypothesis. I test this hypothesis on dropout rates rather than on test scores, under the presumption that dropout rates respond faster than test scores to the indirect effect of the program, and presumably it is very unlikely that one can observe effects on test scores yet.

3. *Concession school test scores are at least equal to or higher than test scores for regular public schools.* Measuring the impact of any program on test scores can be complicated, and theoretically we should observe changes in the schools after long-term exposure to the program. Given its recent implementation, the longest period that any students have attended a concession school is six years, which means their early years were spent in regular public schools.

Section 9.2 of this chapter discusses methodological issues, underlining the reasons why concession schools may produce better educational outcomes than regular public schools. Section 9.3 outlines the empirical strategy, which is based on propensity score matching estimators. Section 9.4 presents the results. Section 9.5 finishes with conclusions and a discussion on the relationship between dropout rates and test scores.

9.1 Methodological Issues and Theoretical Framework

9.1.1 General Framework

The basic equation for estimation is based on the idea that educational outcomes depend on a production function based on certain inputs (Hanushek 1986, 1996). Specifically, the literature considers that a measure of educational attainment, $Y_{i,j,t}$ of individual i in school j in a given moment t , depends on the inputs of the school, $Z_{j,t}$ and on the characteristics of the individual, $X_{i,t}$, such that:

$$Y_{i,j,t} = f(X_{i,t}, Z_{j,t}, \varepsilon_{i,t}) \quad (9.1)$$

Included among the variables of school inputs, $Z_{j,t}$, are the student-teacher ratio, the educational attainment of the teachers, school infrastructure, and school size. The characteristics of the individuals, $X_{i,t}$, control for household income, the educational level of the parents, the number of siblings, and so on. In equation (9.1), $\varepsilon_{i,t}$ captures the unobservable characteristics of the individual, such as ability, skills, and motivation that may influence test scores but cannot be measured. The dependent variables, $Y_{i,j,t}$, are the standardized test scores and the dropout rate.

Equation (9.1) depends on several premises:

- The quantity and quality of the school inputs are fundamental in the production of better education, be they measured by higher standardized test scores or lower dropout rates.
- The characteristics of the individuals are also critical elements in the production of better education. Individuals with better skills and better nutrition and with an adequate home environment should also perform better in school.
- These two groups of characteristics (school and individual/family) interact to yield the third fundamental component in the education production function.

In a meta-analysis of equation (9.1) Hanushek (1996) reaches several conclusions. First, there is no clear relationship between several of the school inputs and the quality of education. The pupil-teacher ratio, for example, may have a concave relationship with the outcome measures. A small number of pupils in the classroom may inhibit participation and it is possible that the positive externalities of participation do not occur. A large class size may also inhibit participation and may pro-

duce negative externalities such as noise. Second, the *quality* of the teacher is a key element in the production of education. And third, the role of the family is as important as the quality of the teacher.

The impact of the concession program on the quality of education can be explained through several channels (for a general discussion, see World Bank 2005). First, private participation assumes the application of an already proven pedagogic model since the private schools have already been operating for some time. Concession schools were, in fact, handed over to private schools with the highest standardized test scores. Likewise, concession schools are financially stable since the State pays a fixed sum per student, ensuring the stability of the pedagogic model.

Second, the freedom to choose the teaching and administrative staff may lead to a better quality of education than in the public schools, where the teachers' union makes it difficult to implement staff changes (for instance, see Borgas and Acosta 2005; Duarte 1996). Third, concession schools have contracts that establish goals in terms of standardized testing. Fourth, the infrastructure of these schools is superior to that of public schools, providing the students better learning opportunities. Concession schools were, in fact, built on better lots than was the average public school, with better equipment and a complete set of supplies for classrooms, laboratories, and libraries.

Finally, concession schools in general work actively with the pupils' parents and the surrounding communities. The community work has been one of the more discussed factors in visits to several concession schools: school officials, pupils, parents and other community members alike identify this community work as one the most important features of the initiative.

9.1.2 Some Empirical Evidence

In the case of Colombia, Gaviria and Barrientos (2001), Barrera (2003), and Sarmiento and others (2000) have estimated equation (9.1). These studies reach similar conclusions as Hanushek (1996). They show that school quality variables, such as the educational level of the teachers, tend to have a positive impact on standardized test scores. Also, they corroborate the importance of individual characteristics.

Early articles about concessions focused on the description of the experience. Corpoeducación (2004) and Villa and Duarte (2005) describe the concession school initiative in great detail. Rodríguez (2005) presents an overview of the concession schools program, explaining

the details of the program's design and potential effects of the program.

Sarmiento and others (2005) present an evaluation of concession schools. They follow a different methodology than the one used here. In short, they applied a very detailed questionnaire to 22 concession schools and 10 public ones with similar characteristics. The questionnaire focused on internal processes and educational production. Variables derived from the questionnaire were correlated with standardized test scores. They found that there are clear differences between the concession and pure public schools in terms of administration, autonomy of decisions, the capacity to adjust, and the impact on the community. Overall, they found that concession schools are performing better than the traditional public schools.

Charter schools in the United States offer additional insight. Despite the differences across states in the implementation of charter school programs in the United States, they are similar to the concession schools in that they operate independently from the traditional public school system, with (generally) a higher degree of autonomy than the typical public school, and in some cases they explicitly target low-income students (www.uscharterschools.org). Solmon and Goldschmidt (2004) found positive impacts of charter schools on standardized test scores and other characteristics, such as the retention rate.¹ In contrast, Hanushek and others (2005) present evidence of a negative impact of this type of school. Hoxby and Rockoff (2004) present strong evidence in favor of charter schools, using the randomized character of Chicago's charter school program to determine the impact of charter schools on standardized test scores. The randomized nature of the allocation process allowed them to create a treatment group and a control group that have the same observable and unobservable characteristics. They found that students who attended an average of two years in an elementary-level charter school in Chicago scored higher on both math and reading tests. Finally, Hoxby and Murarka (2007), using the randomized nature of placements in the charter system in New York City, found that students in charter schools have higher test scores than similar students in public schools.

9.2 Empirical Strategy

The basic methodology used to evaluate the impact of the program is to compare the group of individuals that were admitted to a conces-

sion school (treatment group) to the group of students who attend public school (comparison group) (see Heckman and others 1999). The correct evaluation of a program requires the establishment of a counterfactual for the treatment group; that is, what would have happened had the treated individual not been treated. Of course, it is not possible to observe the same individual in the two states and it is therefore necessary to choose another individual, to serve as a comparison, who is as similar as possible, both in observable and unobservable characteristics, to the treated individual. Simple comparisons of mean test scores (or dropout rates) between students in concession schools with students in other types of schools may be biased measures of the true impact because the two groups may be very different in their observable and unobservable characteristics.

In mathematical terms,² let Y^1 denote the standardized test score or the dropout rate for a student who attended concession school and Y^0 the individual who attended another type of school. Let T denote the treatment condition, which is equal to one ($T = 1$) if the person received treatment, and zero ($T = 0$) otherwise. The mean impact of the program (IP) will be given by $IP = E(Y^1/T = 1) - E(Y^0/T = 1)$, for example, the difference in average test scores for the *same* individual in two different states, with and without the intervention. It is not possible, however, to observe the same individual in both states. What is observable are two different individuals, one attending a concession school and the other not, $\tilde{IP} = E(Y^1/T = 1) - E(Y^0/T = 0)$.

The estimator \tilde{IP} can suffer from bias because of self-selection into the program. In short, the two types of individuals may differ systematically in observable and unobservable characteristics such that a typical control observation is not a good proxy of what would have happened to a treated individual had he or she not received the treatment. In the case of the concession school, the two groups, for example, are not comparable in terms of income, thus leading to bias. That is, $E(Y^0/T = 1) \neq E(Y^0/T = 0)$.

Ideally, a program like concession schools can be evaluated using a simple randomization strategy: given that there exists excess demand for concession schools, the government can perform a lottery to allocate individuals between concessions and other public schools. The randomization would ensure that the group of students that attends a concession school (treatment group) and the one that attends other public schools (control group) are very similar in observable

and unobservable characteristics. However, as already discussed, the school placements were not done by a lottery.

A second approach³ would be to take as a control group students who applied to a concession school but were assigned to another public school. Still, evaluations based on the comparison of these two groups may be prone to bias, mainly because the selection of students into concession and other public schools is not random.⁴

In contrast, this chapter uses the whole sample of individuals who attend public schools and uses matching estimators as the strategy to “reduce” selection bias. In short, the estimator will try to match each treated individual with an individual who does not attend a concession school, based on the observable characteristics of the individuals (a vector \mathbf{X}). In this way, the estimator can be modified by $\tilde{IP} = E(Y^1/\mathbf{X}, T = 1) - E(Y^0/\mathbf{X}, T = 0)$.

Moreover, instead of using the vector of characteristics \mathbf{x} , it is possible to determine the probability of participation in the program (where T is equal to 1 or 0), such that $P(\mathbf{X}) = \Pr(T/\mathbf{X}) = f(\mathbf{X})$. This probability is called the propensity score. In other words, the propensity score captures in a synthetic form the intention to participate in a program, based on a broad vector of observable characteristics thought to influence the participation decision and the outcome measures. For each individual (both in the treatment and control groups) a probability of participating in the program is estimated using the observable characteristics.

Therefore, the following estimation is used to calculate the impact of the program:

$$\tilde{IP} = E(Y^1/P(\tilde{\mathbf{X}}), T = 1) - E(Y^0/P(\tilde{\mathbf{X}}), T = 0) \quad (9.2)$$

Clearly, the endogeneity problem can arise due to either observable or unobservable characteristics. Equation (9.2) controls for the observable characteristics, but not for the unobservable ones. Heckman and others (1998) and Heckman, LaLonde, and Smith (1999) show that, in fact, the bias of estimation may come from three margins, and the most important one is the difference in the observable characteristics among individuals. As stated previously, it is essential for rigorous impact evaluation that the control and treatment groups have, on average, similar characteristics. Besides differences in the average treatment and nontreated individual, there may be differences in the support of the populations. For example, noneligible individuals cannot be part

of the control group since there are no treatment observations with the characteristics of these individuals. The third potential difference between the groups arises from potential differences in the unobservable characteristics. According to the estimates of Heckman and others (1998), once the observable characteristics are similar between groups, and the observations fall within the same support, the bias due to unobservable characteristics is relatively small.

The evaluation of the concessions program in Bogotá may suffer from self-selection into the program from two sources. First, the locations of the schools were not randomly chosen. Authorities built the concessions in areas where there was a high concentration of low-income individuals and a scarce supply of public education. Second, an unknown proportion of the students are not randomly assigned to the schools. Individuals, when applying to public education, can state their preferred school in their neighborhood. As previously discussed, this chapter copes with the problem of endogeneity by using propensity scores and matching estimators. In this way, I “minimize” the endogeneity problem and can obtain estimates that approximate the impact of the program. In any case, the predicted bias of the estimation is downward since the pool of individuals that attend concessions comes from extremely poor areas.

The chapter presents direct and indirect impacts of the concession schools. In order to estimate these impacts, I separate the public schools into three categories: (1) concession schools; (2) regular public schools close to concession schools (that is, within the influence of a concession school); and (3) public schools outside of the influence of concession schools. The difference between students in concession schools and the matched students who go to public schools outside the influence of concession schools is the measure of direct impact. In contrast, the indirect impact of concession schools is measured as the difference between the students in public schools in the vicinity of concession schools and the students in similar schools outside the concessions’ area of influence. The area of influence is defined as being within one kilometer of a concession school. Given that some concessions are going to have more than one regular public school within this definition of proximity, we also rank the proximity among the nearby schools.⁵

The indirect impact is governed conceptually by the idea that nearby schools may be forced to raise the quality of education to compete with concession schools, as well as to respond to community pressure. This

idea is similar to the argument that vouchers will increase the quality of education due to market and choice forces, as outlined by Friedman (1955). Recent literature finds evidence in favor of this type of mechanism. For instance, Hoxby (2002) shows that competition and choice (in the form of vouchers and charter schools) increase productivity of public schools significantly. In the case of Bogotá, not only do the concession schools impact the nearby public schools through community outreach but they also encourage better performance by regular public schools due to the competition for resources. Since 2002, the central government has transferred educational resources to the localities based on the number of students enrolled in school. Presumably, concessions attract students away from the regular public school system, and the greater the difference in quality between regular and concession schools, the greater the effect. In order to guarantee greater resources, the nearby public schools need to match the performance of the concession schools.

To estimate the indirect impact of the program, I use a two-step process. I first identify the baseline. Given the identification of nearby schools as discussed, I match them based on their common characteristics with similar schools outside the influence area as of 1999. As stated before, concession schools that started in 1999 were fully operational by 2000. These control schools are determined using propensity scores. Second, employing data for 2003, I estimate the indirect impact using those students who attended schools close to a concession school as treated individuals, and those students who attended the matched schools found in the previous step as the control group. For the indirect impact I only investigate effects on dropout rates under the assumption that changes in standardized testing, via competition effects, will tend to be observable only in the long term.

The baseline data can be used to control for differences in initial characteristics. However, another problem that may persist is the difference in preexisting trends between the treated schools and the matched schools. Unfortunately, data prior to 1999 does not exist to test for this possibility. However, a priori, there is no theoretical ground to believe that there exist systematic differences in trends between schools under the influence of concessions and schools outside this area of influence.

In short, the estimation that I will present is based on matching estimators using propensity scores to determine the treatment and control groups. The estimation will present evidence of "direct impact" (drop-

out rates and test scores for concession versus matched non-concession public schools outside the area of influence) and “indirect impact” (dropout rates for schools near the concession against matched schools outside the area of influence of concessions).

9.3 Data and Results

9.3.1 Description of the Data

This chapter uses data from two sources: the Ministry of Education (surveys C600 and C100) and Institute for the Development of Higher Education (Instituto Colombiano para el Fomento de la Educación Superior: ICFES), which administers standardized tests in Colombia. The C600 and C100 surveys provide general data on an important array of school characteristics and have an identification code that allows researchers to link these datasets with the ICFES test scores. The Ministry of Education collects the data directly via a questionnaire distributed to all the schools in the country. Data presented are at the school and shift level (the time period during which the school provides services).

The school-level data present information on the number of administrative personnel, the number of teachers and their level of education, the number of teachers by subject areas, the number of physicians in the school, the total number of students in the school by grade and by age, the number of students who failed a grade, and the number of students who dropped out. These data are available for both 1999 and 2003.

For 1999, there is also information on the physical characteristics of schools. The main variables are: furniture in the school (chairs and desks), support materials such as computers, the number of computers exclusively for teaching purposes, the total number of laboratories, the number of laboratories for specific subjects (physics, chemistry, biology, construction, and farming), the total number of rooms, the number of classrooms, the number of libraries, the number of food facilities and dorms, the number of other types of rooms, and the number of sports facilities (soccer fields and basketball courts).

The surveys also break down the data at the shift level. There are four main shifts during which students can attend school: in the morning (usually from 7 am to 12 pm), in the afternoon (from 12 pm to 4 pm), in the evening (from 2 pm to 7 pm); or they can attend a school with a “complete” shift (from 8 am to 3 pm). The shift mechanism was implemented throughout the country in the 1960s to maximize the use

of school infrastructure. In this way, some schools that previously operated only during the morning were subsequently open for two shifts (e.g., morning and afternoon), thus allowing them to enroll twice the number of students. It is important to note that the data discriminate between the two shifts as if they were two different schools.

Second, data from ICFES provide test scores for individuals and some student characteristics. The educational system in Colombia is composed of three levels: primary spanning grades 1 to 5; basic secondary spanning grades 6 to 9; and middle secondary composed of grades 10 and 11. The test scores used here are those of a general test that is administered to all students finishing the eleventh grade. Although the ICFES data provide test scores for various subjects, the analysis here focuses on mathematics and reading scores. Student characteristics such as gender and current enrollment status are also provided. Other variables linked to the individual students include: a school code, the city where the test was taken, the semester (either A, which is from February to November, or B, which runs from September to June), the type of secondary school that the individual attended (mainly academic or technical), whether the school is public or private, and the location of the school within the city.⁶ All ICFES data used in this analysis are for 2003.

Unfortunately, ICFES data on individual characteristics are limited. We use a fixed-effect model by location, which presumably can capture some of the socioeconomic characteristics of the individuals living in the area. In fact, the data identified nine localities in the city that are quite homogeneous in terms of income. In contrast, the information on the schools from the Ministry of Education is very rich, and I will exploit this as the source of variation in order to estimate the impacts.

In order to estimate the direct effect of the concession schools, this analysis uses the 2003 school and test-score data. A limitation of the study is that, despite having individual observations, the effects are calculated using variation across schools. In total I was able to get information for 17 concession schools (out of 25) versus 2,790 regular public schools.

To estimate the indirect effect I use panel data at the school level for 1999 and 2003. The sample size is 23 schools nearby the concession schools and 416 schools outside the influence of a concession school.

9.3.2 Descriptive Statistics

Table 9.1 presents data of the full sample of basic characteristics of public schools, divided into concession (close to 1,050 individuals in 17 schools) and non-concession schools (36,000 individuals in 2,790 schools). Eligibility requirements preclude the use of data on private schools, which may downplay the competition argument, though only slightly since there is still competition for resources among public schools.

The distribution of locations is quite similar between the two groups. The majority of the schools are coed. In terms of the type of secondary school, the majority of concession schools provide a classic academic education, whereas 30 percent of the public schools provide technical education. The distribution of shifts across public and concession schools is quite different: concession schools use complete shifts, whereas public schools are divided between morning, afternoon, and evening shifts. Even though there are differences in the two groups, the estimators presented as follows balance the two samples of students in terms of observable characteristics. This is very important since the estimators have to isolate the effect of concessions from differences in other variables. For example, new literature on the length of the school day and the quality of education shows a positive relationship between the two (Cerdan and Vermeersch 1996).

On average, public schools tend to be bigger than concession schools. The number of students in grades lower than their age group ("overage") is lower in concession schools than in the rest of public schools. The teacher-student ratio is quite similar (close to 28 students per teacher), as is the average of teachers' years of education (16).

The table also shows data on the two main impact variables, dropout rates and test scores. Dropout rates, measured by grade for grades 1 through 11, differ between the two types of schools. The dropout rate is 18% in regular public schools (with a standard deviation of 0.14), and 15% in concession schools (with a standard deviation of 0.09). Moreover, between grades five and six there is an increment in the rate. This increment in the dropout rate between grades five and six is also observed using national data (Barrera and Dominguez 2005). The rationale is that between those grades is the change between two levels of education (primary and secondary), and the opportunity cost for students starts increasing precisely after finishing primary education.

Table 9.1
Basic Statistics: Public Schools

	Non-concession		Concession	
	Mean	Std. Dev.	Mean	Std. Dev.
<i>A. Characteristics</i>				
<i>Localization</i>				
1	0.10	0.30	0.12	0.33
2	0.01	0.10	0.00	0.00
3	0.05	0.22	0.00	0.00
4	0.06	0.24	0.00	0.00
5	0.15	0.36	0.12	0.32
6	0.04	0.19	0.00	0.00
7	0.30	0.46	0.44	0.50
8	0.12	0.32	0.13	0.34
9	0.17	0.38	0.19	0.40
<i>Type of school</i>				
Male	0.07	0.26	0.00	0.00
Female	0.03	0.16	0.00	0.00
Coed	0.90	0.30	1.00	0.00
<i>Type of secondary</i>				
Academic	0.63	0.48	0.93	0.26
Technical	0.29	0.45	0.00	0.00
Both	0.07	0.26	0.07	0.26
<i>Shift</i>				
Complete	0.03	0.18	1.00	0.00
Morning	0.40	0.49	0.00	0.00
Afternoon	0.14	0.35	0.00	0.00
Evening	0.43	0.49	0.00	0.00
<i>Number of students</i>				
Total school	2954.60	1376.76	987.98	90.17
Taking exam	122.15	79.16	65.33	9.98
Old for grade	47.28	45.15	12.11	7.03
Repeating grade	103.30	73.72	47.56	35.93
Ratio teacher-stud.	28.44	6.20	27.20	3.48
<i>Years of teacher education</i>	16.07	2.28	16.02	0.99

Table 9.1
(continued)

	Non-concession		Concession	
B. Outcomes				
<i>Dropout rates</i>				
Grade 1	0.040	0.05	0.020	0.02
Grade 2	0.031	0.04	0.023	0.02
Grade 3	0.026	0.04	0.019	0.02
Grade 4	0.026	0.03	0.015	0.02
Grade 5	0.020	0.33	0.018	0.02
Grade 6	0.071	0.09	0.021	0.02
Grade 7	0.040	0.04	0.025	0.02
Grade 8	0.038	0.04	0.032	0.03
Grade 9	0.039	0.05	0.036	0.03
Grade 10	0.033	0.04	0.038	0.04
Grade 11	0.012	0.02	0.021	0.05
<i>Test scores</i>				
Mathematics	42.08	5.13	41.68	4.77
Reading	50.99	7.13	51.04	6.79
<i>Number of observations</i>				
<i>Students</i>				
Max.	36244		1056	
Min.	34218		1013	
<i>Schools</i>	2790		17	

Figure 9.1 shows the dropout rate per grade. The dropout rates in concession schools are lower and exhibit smooth behavior across grades. In contrast, public schools mimic the behavior of the dropout rates found in other datasets using national statistics (for example, Barrera and Dominguez 2005).

Interestingly, dropout rates for concession schools increase significantly in grade eight. This may indicate a change in the composition of students in secondary education in the concession schools. Since attending a concession school reduces the dropout rates for grade six, more students, including those who would have dropped out in the regular public system, are reaching higher grades. The population of students in secondary education in the concession schools includes those in the lower part of the income distribution, who have a higher probability of dropping out of school.

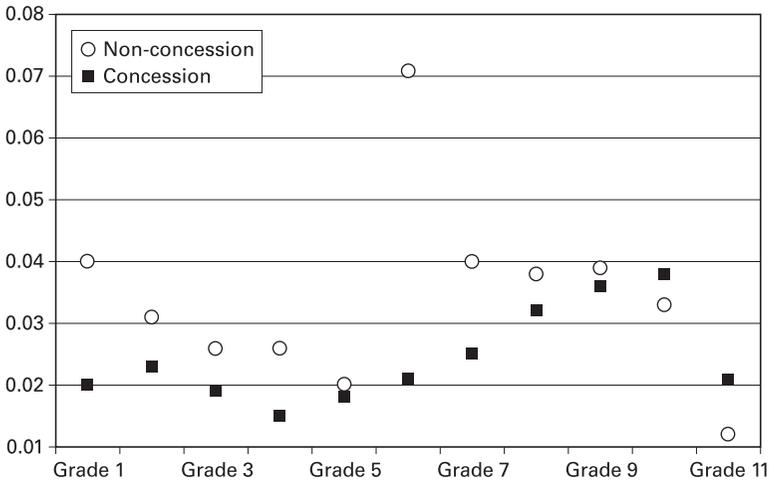


Figure 9.1
Dropout Rates, Concessions versus Non-concessions

Figure 9.2 presents mean standardized test scores for regular public and concession schools. It shows that there small differences between regular public schools and concessions. On average, public schools show slightly higher scores in mathematics and physics, and almost identical results in reading.

Table 9.2 presents basic statistics for the public schools located within a kilometer of a concession school, as well as public schools outside the influence of concessions.

In 1999, regular public schools near concession schools had, on average, fewer resources than other public schools. For instance, the number of computers in schools near concession schools was only 17, whereas it was 25 in schools in other parts of the city. Also, the absolute numbers of teachers, administrative personnel, physicians, and psychologists were lower in regular public schools near concession schools. The educational attainment of teachers in 1999, measured as the proportion of teachers with secondary studies to those with college or graduate studies, was very similar across the two school types. Finally, regular public schools near concession schools had, on average, 24 students per teacher, compared to 26 students per teacher in the rest of the public system. In sum, there is evidence that regular public schools near concession schools were smaller and poorer than the rest of the public system, although the quality of the teachers was similar.

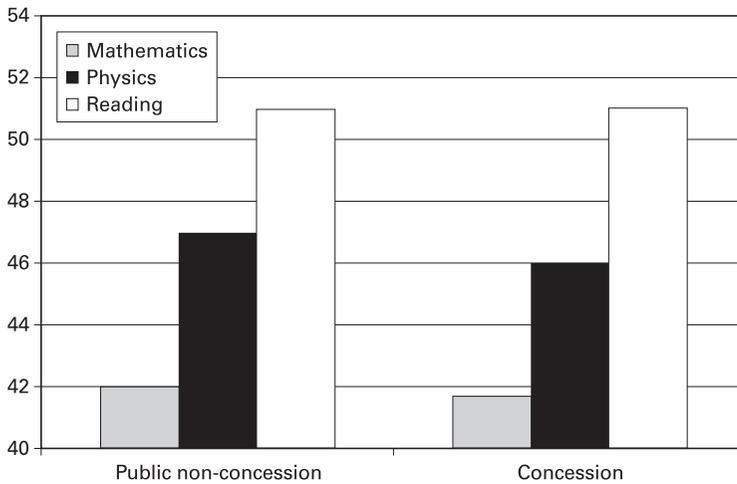


Figure 9.2
Mean Test Scores

Given that concession schools are located in low-income areas, these differences are not surprising and it is likely that any result based on an unmatched sample will be biased.

In 2003, in general, the regular public schools near concession schools were similar to the rest of the public schools, with some exceptions. The proportion of secondary schools with an academic focus was higher in nearby schools than in public schools further away. Also, a higher percentage of the nearby schools used the evening shift (0.61 versus 0.43, respectively). Furthermore, the nearby schools had lower overage ratios.

Regular public schools near concession schools tended to have lower rates than other public schools in 2003. The dropout rate increases from 2.1% in grade five to 5.1% in grade six, whereas the dropout rate for other public schools rises from 2% in grade five to 7.1% in grade six. However, the dropout rates in regular public schools near concession schools tend to be higher than the ones in the rest of public schools at higher grade levels. Again, these results are based on the unmatched samples and thus the controls may not be a good counterfactual.

9.3.3 Results

Estimates of equation (9.2), the average treatment impact on the treated, are presented as follows. There are several different estimators,

Table 9.2

Basic Statistics: Schools near Concession versus Public Schools

A. Characteristics of schools				
	Schools near a concession		Schools far away from a concession	
	Mean	Std. dev	Mean	Std. dev
1. "Before concessions" (1999)				
<i>Infrastructure</i>				
Number of computers	17.82	16.75	24.96	22.69
Number of classrooms	21.40	10.58	22.24	12.93
Number of bathrooms	1.45	0.78	1.67	0.87
Number of sport facilities	1.78	0.54	2.59	1.52
<i>Teachers</i>				
Number of teachers	30.27	16.34	34.46	24.06
Number of administrative personnel	6.97	4.45	9.69	11.96
Number of physicians	0.06	0.24	0.45	1.10
Number of psychologists, etc.	1.52	1.29	2.19	1.85
% teachers with second education	0.07	0.18	0.06	0.12
% teachers with college education	0.60	0.23	0.60	0.62
% teachers with graduate education	0.25	0.17	0.34	0.34
Ratio students-teachers	24.92	3.24	26.16	28.78
<i>Dropout rates</i>	0.09	0.07	0.07	0.06
	Schools near a concession		Schools far away from a concession	
2. Follow-up (2003)				
<i>Localization</i>				
1	0.00	0.05	0.10	0.30
2	0.00	0.00	0.01	0.10
3	0.00	0.00	0.05	0.22
4	0.04	0.19	0.06	0.24
5	0.20	0.40	0.15	0.36
6	0.00	0.00	0.04	0.19
7	0.15	0.36	0.30	0.46
8	0.45	0.50	0.12	0.32
9	0.16	0.37	0.17	0.38
<i>Gender of the school</i>				
Male	0.00	0.00	0.07	0.26
Female	0.00	0.00	0.03	0.16
Coed	1.00	0.00	0.90	0.30
<i>Type of secondary</i>				
Academic	0.80	0.40	0.63	0.48
Technical	0.06	0.24	0.29	0.45
Both	0.14	0.35	0.07	0.26

Table 9.2
(continued)

	Schools near a concession		Schools far away from a concession	
<i>Shift</i>				
Complete	0.04	0.20	0.03	0.18
Morning	0.28	0.45	0.40	0.49
Afternoon	0.07	0.25	0.14	0.35
Evening	0.61	0.49	0.43	0.49
<i>Number of students</i>				
Total school	2544.18	786.25	2954.60	1376.76
Taking exam	136.97	69.02	122.15	79.16
Old for grade	35.52	35.30	47.28	45.15
Repeating grade	114.93	88.69	103.30	73.72
Ratio teacher-stud.	31.42	2.56	28.44	6.20
<i>Years of teacher education</i>	16.49	0.73	16.07	2.28
<i>Dropout rates</i>				
Grade 1	0.035	0.04	0.040	0.05
Grade 2	0.030	0.03	0.031	0.04
Grade 3	0.030	0.03	0.026	0.04
Grade 4	0.018	0.02	0.026	0.03
Grade 5	0.021	0.02	0.020	0.33
Grade 6	0.054	0.06	0.071	0.09
Grade 7	0.029	0.03	0.040	0.04
Grade 8	0.051	0.04	0.038	0.04
Grade 9	0.046	0.03	0.039	0.05
Grade 10	0.040	0.03	0.033	0.04
Grade 11	0.012	0.02	0.012	0.02
<i>Number of schools</i>	23		416	

ranging from the nearest neighbor to kernel estimators, that can be used to determine the counterfactual. In this chapter the estimation is based on the 10 nearest neighbors matching estimator, with a caliper of 0.01; that is, the counterfactual is made of only those observations with a propensity score within 0.01 of the propensity score of the treated observation. All variables outside the common support were excluded (see Vinha 2005). This analysis also checks the robustness of the estimation. As a first approximation, results for the dropout rate are quite stable and independent of the type of estimator; on the contrary, the results for the impact on test scores vary with the type of estimation.

Table 9.3

Direct and Indirect Impact of Concessions: Effects over Dropout Rates

Probit estimates Depended variable	Direct impact over dropout rate		Indirect impact over dropout rate	
	Concession		Schools near concession	
	Coefficient	Standard error	Coefficient	Standard error
Total number of students	-0.008	0.001	-0.015	0.003
Dispersion in the test	-0.366	0.080	-0.708	0.178
Localization 4			13.472	8.162
Localization 5	0.024	0.168	9.129	8.556
Localization 7	0.212	0.138	13.929	8.089
Localization 8	-0.052	0.163	12.411	8.234
Localization 9	0.048	0.155	12.455	8.311
Evening shift	-0.243	0.173	1.966	0.430
Ratio teacher-stud.	-0.284	0.046	0.514	0.094
Average no. of years of teacher education	-0.035	0.025	0.080	0.079
% of students repeating	-1.723	0.351	1.407	0.502
% of students old for grade	3.327	0.719	5.040	1.709
Number of computers, 1999			0.027	0.020
Number of classrooms, 1999			0.053	0.038
Number of restrooms, 1999			-4.686	0.719
Number of sport facilities, 1999			-1.723	0.260
Number of teachers, 1999			-0.476	0.278
Number of administrative personnel 1999			0.202	0.050
Number of psychologist, 1999			-0.069	0.187
Ratio teacher-stud., 1999			0.059	0.038
% teachers with second, 1999			35.714	10.066
% teachers with college, 1999			33.968	9.841
% teachers with graduate studies, 1999			25.912	8.898
Log likelihood	-529		-231	
Pseudo R^2	0.1391		0.5714	
Number of observations	2334		1217	

Table 9.3
(continued)

	Direct impact over dropout rate		Indirect impact over dropout rate	
Matching	Impact variable: dropout rate		Impact variable: dropout rate	
Variable: dropout rate				
Difference treatment-control				
Unmatched	-0.0130		-0.0069	
ATT	-0.0173		-0.0082	
Bootstrap statistics				
Repetitions	1000		1000	
Standard error	0.0039		0.0096317	
Bias-corrected confidence interval	-0.0244	-0.0112	-0.0341	0.0004

The results for the direct and indirect effects on dropout rates are presented in Table 9.3. The unit of observation is the dropout rate by grade by school. The first two columns present the results from the estimation of equation (9.3) for concession schools, whereas columns three and four present the results for the indirect impact on nearby regular public schools. The estimation uses data at the school and grade level.

In general, the coefficients of the probit estimation to determine the propensity scores are the move in the expected direction for both types of impacts. I tested for the balance of characteristics across treated and control schools. The groups are balanced in all variables except two (number of students and proportion of students in grades lower than their age). In order to improve the balance in the two samples, I omitted observations with the extreme propensity scores from the analysis. In any case, one variable remained unbalanced.

The lower part of table 9.3 presents the impact of the program on dropout rates. The results show that concession schools (17 in the sample) have lower dropout rates (with a difference of 1.7 points) than similar public schools (2,790 public schools). Given the range of dropout rates (between 1.2% and 7.1%), this is an important and large effect. In order to find the standard error for the estimator, a bootstrap procedure was performed with 1,000 repetitions. The effect is statistically different from zero at the 90% level of significance.

Columns three and four present evidence of the indirect impact. That is, the probit is run with a dependent variable that equals one for

regular public schools near concession schools and zero for public schools outside the influence of concessions. Again, in general, the probit estimates move in the expected direction and several of them are statistically significant. The estimated indirect impact of concession schools on nearby public school dropout rates is a reduction of 0.008 points. However, the standard error for the estimator (using a bootstrap procedure with 1,000 repetitions) indicates that the 90% confidence interval is between -0.03 and 0.0004 . Thus, I cannot rule out that there was no impact.

Table 9.4 presents estimations of the direct impact of concession schools on the standardized test scores in mathematics and reading. The data are at the individual level. As in the previous regressions, the majority of the coefficients of the independent variables in the probit estimation move in the expected direction, and several of them are statistically significant, with one caveat: in contrast to the previous estimation, there are several variables that are not balanced in the treatment and control individuals (results are not shown). To address this, I reduced the range of propensity scores in which the matching is performed, with some improvements on the balance of the samples. The implication is, again, that the treatment impact is for those individuals within this range of propensity scores and not for the whole population. The results hold for both estimations (math and reading).

The calculated impact is positive and statistically significant for both reading and mathematics test scores. Mathematics scores for concession schools are almost one point higher than similar regular public schools and the effect is significantly different from zero. The impact on reading scores for concession schools is higher, with an estimated impact of almost 2 points. Given that the average scores are 42.08 and 50.99, the results imply improvements of 2.4% and 4%, respectively.

It is important to note that a simple comparison between concession schools and other public schools shows that concession schools have, on average, lower math tests. Indeed, the unmatched impact is -0.2099 . However, once the estimation controls for the observable characteristics, the impact of concessions on the score is positive and significant.

9.4 Conclusions

In conclusion, there is strong evidence of a direct impact of concession schools in reducing dropout rates. There is also some evidence of an

Table 9.4
Direct Impact of Concessions: Effects on Test Scores (Mathematics and Reading)

Probit estimates Depended variable	Math tests		Reading tests	
	Concession		Concession	
	Coefficient	Standard error	Coefficient	Standard error
Total number of students	-0.018	0.001	-0.018	0.001
Dispersion in the test	-0.351	0.033	-0.197	0.029
Localization 5	-0.441	0.079	-0.542	0.080
Localization 7	0.149	0.063	0.140	0.064
Localization 8	0.073	0.075	0.079	0.076
Localization 9	-0.150	0.071	-0.181	0.072
Evening shift	0.102	0.072	0.068	0.073
Ratio teacher-stud.	-0.071	0.005	-0.072	0.005
Average years of teacher education	-0.089	0.012	-0.095	0.011
% of students repeating	-2.508	0.183	-2.575	0.179
% of students old for grade	19.165	0.779	18.789	0.774
Constant	4.683	0.300	4.474	0.330
Log likelihood	2152.87		-2846.556	
Pseudo R^2	0.2768		0.268	
Number of observations	18629		18630	
Matching	Impact variable: mathematics		Impact variable: reading	
Variable: test scores				
Difference treatment-control				
Unmatched	-0.2099		0.6234	
ATT	0.9732		1.9364	
Bootstrap statistics				
Repetitions	100		100	
Standard error	0.522		0.748	
Bias-corrected confidence interval	1.2684	1.4655	1.5501	2.8472

indirect impact of the concession schools on the dropout rates in nearby regular public schools. Furthermore, there is evidence of a positive impact on test scores of students in concession schools when compared with students in other public schools.

Moreover, as discussed previously, there is some evidence of downward bias in the estimations. Indeed, OLS estimators are lower than the matching estimators. This finding strengthens one important idea of this chapter: given that propensity and matching estimators correct only partially the sources of bias, presumably the effects of concessions are larger than the ones presented here.

The results for dropout rates are especially important in light of the current situation in the country. The enrollment rate in secondary education in the cities is reaching levels of 85% but the dropout rates are higher in the transition from primary to secondary education. Concession schools seem to be a promising intervention for reducing desertion from schools at this critical juncture. However, as public investment in each concession school is around \$2.5 million, it is important to perform a cost-benefit analysis.

The test score results are also promising, especially considering that they are just the initial impacts. The concession schools program started in 1999, four years before the test score data were collected. Individuals who took the exam were in grade 11, and therefore, they most likely transferred into the concession schools in grade 8. Presumably, the impact on individuals who start in a concession school from grade one onward will be higher.

Instruments for improving the quality of education are limited. In fact, the educational sector in Colombia, and most likely in several other countries, is subject to inflexible policies adopted in the past under different conditions. Concession schools are an option that may be able to generate consensus as a positive measure. However, the potential scale of any such program may be limited. The program relies on private, high-quality schools to manage public schools. Clearly, there are only a limited number of such schools and, of those, even fewer may participate in the program.

Notes

Formerly deputy director of Fedesarrollo (Colombia); now senior education economist, HDNED, World Bank. The World Bank provided financial support for this project. The secretaria de educación del distrito provided generous help and data. I would like to

thank the National Planning Department (Departamento Nacional de Planeación, DNP) for providing some of the data used in this article. I am indebted to Rajashri Chakrabarti, Ronald Fryer, Brian Jacob, Harry Patrinos, Katja Vinha, and two anonymous referees for very useful comments. The findings, interpretations, and conclusions expressed in this chapter are entirely those of the author. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the executive directors of the World Bank or the governments they represent.

1. Nelson and Hollenbeck (2001) present a critical view of Solmon and Goldschmidt.
2. The basic reference for the discussion of the problem is Heckman, LaLonde, and Smith (1999). This section is based on chapter 2 in Vinha (2005), which presents a concise explanation of the problem and the estimation using propensity scores and matching.
3. This approach was suggested by an anonymous referee.
4. Moreover, the information on who applies to a concession school is not available to the public.
5. One area of future research will be to test for robustness of the results using another radius for the area of influence.
6. The data identifies nine main geographical areas (subdivisions of location of the school in the north, south, west, and east parts of the city).

References

- Barrera, F. 2003. Decentralization and education: An empirical evaluation. Ph.D. dissertation, Department of Economics, University of Maryland College Park.
- Barrera, F., and C. Domínguez. 2005. Educación básica: Opciones futuras de política. Work in process for the Misión para el Diseño de una Estrategia de Reducción de la Pobreza y la Desigualdad, Fedesarrollo.
- Borgas, G., and O. L. Acosta. 2005. Educational reform in Colombia. In *Institutional Reforms*, ed. A. Alesina. Cambridge, MA: MIT Press.
- Cerdan, P., and C. Vermeersch. 2006. More time is better: An evaluation of the full time school program in Uruguay. Impact Evaluation Working Paper Series, World Bank, Washington, DC.
- Corpoeducación. 2004. Evaluation of concessions program. Unpublished document, Bogotá.
- Duarte, J. 1996. La debilidad del Ministerio de Educación y la politización de la educación: dos problemas a enfrentar en el plan decenal. *Coyuntura Social* 14: 145–167.
- Friedman, M. 1955. Role of government in education. In *Economics and the Public Interest*, ed. Robert Solo. New Brunswick, N.J.: Rutgers University Press.
- Gaviria, A., and J. H. Barrientos. 2001. Características del plantel y calidad de la educación en Bogotá. *Coyuntura Social* 25: 81–98.
- Hanushek, E. A. 1986. The economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature* 24, no. 3: 1141–1177.

- Hanushek, E. A. 1996. Measuring investment in education. *Journal of Economic Perspectives* 10, no. 4: 9–30.
- Hanushek, E. A., J. F. Kain, S. G. Rivkin, and Gregory F. Branch. 2005. Charter school quality and parental decision making with school choice. NBER Working Papers 11252, National Bureau of Economic Research, Cambridge, Mass.
- Heckman, J., H. Ichimura, J. Smith, and P. Todd. 1998. Characterizing selection bias using experimental data. *Econometrica* 66, no. 5: 1017–1098.
- Heckman, J., R. LaLonde, and J. Smith. 1999. The economics and econometrics of active labor market programs. In *Handbook of Labor Economics*, ed. O. Ashenfelter and D. Card. Amsterdam: North Holland.
- Hoxby, C. 2002. School choice and school productivity (or, Could school choice be a tide that lifts all boats?). NBER working paper no. 8873, Cambridge, MA.
- Hoxby, C., and S. Murarka. 2007. New York City's charter schools overall report. Cambridge, MA: New York City Charter Schools Evaluation Project, June.
- Hoxby, C., and J. Rockoff. 2004. The impact of charter schools on student achievement. HIER working paper, Harvard University, Cambridge, MA.
- Nelson, C., and K. Hollenbeck. 2001. Does charter school attendance improve test scores?: Comments and reactions on the Arizona achievement study. Staff Working Papers 01-70, W. E. Upjohn Institute for Employment Research, Kalamazoo, MI.
- Rodríguez, A. 2005. Case Study: Public school concession model of Bogotá, Colombia. Unpublished document, the World Bank.
- Sarmiento, A., L. Becerra, and J. González. 2000. La incidencia del plantel en el logro educativo del alumno y su relación con el nivel socioeconómico. Mayo de 2004, borrador, DNP.
- Sarmiento, A., C. E. Alonso, G. Duncan, and C. A. Garzon. 2005. Evaluación de la gestión de los colegios en concesión en Bogotá 2000–2003. Documento de trabajo, Departamento Nacional de Planeación, Bogotá.
- Solmon, L., and P. Goldschmidt. 2004. Comparison of traditional public schools and charter schools on retention, school switching and achievement growth. Policy report, no. 192, Goldwater Institute.
- Villa, L., and J. Duarte. 2005. Concessionary public schools in Bogotá: An innovation in school management in Colombia. In *Private Education and Public Policy in Latin America*, ed. L. Wolff, J. C. Navarro, and P. Gonzalez. Washington, DC: PREAL.
- Vinha, K. 2005. The impact of the Washington Metro on development patterns, Ph.D. dissertation, Department of Agricultural and Natural Resource Economics, University of Maryland, College Park.
- World Bank. 2005. *Colombia: Contracting education services*. Report no. 31841-CO. Colombia and Mexico Country Management Unit, Education Unit, Human Development Department, Latin America and the Caribbean Region. Washington, DC: World Bank.

10 Public and Private Schooling Initiatives in England

Stephen Machin and Joan Wilson

While a lot of media and government policy attention has recently been devoted to public-private initiatives in the English schooling market, there is remarkably little research on the issue in the economics of education field. This is perhaps surprising since the English schooling system has, since the move to a quasi-market that began in the late 1980s (LeGrand 1991, 1993), been characterized by a lot of enthusiasm directed towards more choice, more competition, and an increased role for the market. In this chapter we address this question, first offering a general background discussion looking at the private provision of schooling and how it has adapted over time, and second looking in more detail at a specific, high-profile attempt to bring some aspects of private sector ethos to pupils in the state sector.

There has been a long history of private education in England, but over almost its entire history it has stayed largely independent of what goes on in the state sector. Of course, it is not easy to define the characteristics of schools in the private sector. In historical terms the classic English “public schools” like Eton or Harrow generated the well-known image of private education that Gordon, Aldrich, and Dean (1991) describe as “providing the sons of the commercial and entrepreneurial classes with the manners of a gentleman. Definition, it appeared, came from within: an acceptance, a recognition, an instinct of others who had received a training which could be labelled ‘public school’” (p. 200). Over the twentieth century the private school (i.e., public schools and other fee-charging schools) stayed firmly present in the English education system. But they retained their independence: for example, currently, private school pupils do not take the same examinations as state school pupils, unless the school chooses that they do so.

Only relatively recently have there been serious attempts to bring significant private sector involvement to the state sector in English

education. There are several reasons why this has become a popular venture. First, the development of a quasi-market in education has political currency.¹ Its link to incentives and to the perceptions of better performance in the private sector lends itself naturally to the education market. Second, in the last couple of decades there has been an upsurge of public-private ventures in a range of industries in the United Kingdom. Third, teacher unions have weakened, and traditionally they would have opposed private finance initiatives and public-private partnerships.

The chapter has two main parts. Section 10.1 discusses private education in England. Section 10.2 looks at a particularly high-profile private finance initiative that has been introduced to the English state school sector recently, the city academies program. Section 10.3 offers some conclusions.

10.1 Private Education in England

10.1.1 Brief History and Legislation

Private education has been important in England for a long time and remains so today, despite the provision of state education for all facilitated through some of the significant education acts of the twentieth century. The 1918 Education Act, for example, abolished any exemptions to the compulsory minimum school-leaving age (then imposed at age fourteen) and removed all fees in elementary schools. The 1944 Act established a nationwide system of free, compulsory schooling from age five to fifteen (with the compulsory minimum school-leaving age raised from 14 to 15 in 1947), and organised the system into primary and secondary schools.²

The 1988 Education Reform Act set the scene for the quasi-market for schooling. The major provisions of the 1988 Act were to set up the National Curriculum, to introduce testing and league tables, to offer local management of schools, and to increase accountability (through a regular inspection regime and by changing the nature of school governing bodies³). The act also set up grant-maintained (GM) schools that were allowed to select up to 10 percent of their pupils on the basis of ability or aptitude; and city technology colleges (CTCs), the first attempt to bring the private sector into the state sector, as CTCs are partially funded by private sector business.

The early acts, of course, had an impact on the extent of private schooling in England and the 1988 Act clearly gave scope for the intro-

Table 10.1
State and Private Schools in England, 2006

	All ¹	Private	Private Share
Number of schools	24091	2199	.091
Number of FTE pupils	7985349	595317	.075
Number of FTE teachers	459863	64503	.140
Pupil-teacher ratio	19.1	9.8	n/a

Notes: Authors' own calculations using various data sources.

1. Includes primary, secondary, special, and private (independent) schools.

duction of the kinds of private finance initiatives and public-private partnerships that have been a feature of English schools in the recent past. What we consider next in this section is the extent of private education in England and how outcomes for pupils attending private schools differ from those in the state sector. This is important to establish to see why some advocate that elements of the private school “ethos”—such as those that relate to financial and governance autonomy as well as teaching practice—should be adopted in the state sector.

10.1.2 The Extent of Private Education

According to the Department for Children, Schools and Families (DCSF) statistics, just over 9 percent of schools are private (independent) schools: table 10.1 reports that in 2006 there were 24,091 schools in England, of which 2,199 were private. Figure 10.1 shows the evolution of the share of private schools through time. It was higher at around 12.5 percent of schools in the early 1960s, dipping down to 8 percent by 1980 and then gradually rising through the 1990s and early 2000s to its current level of around 9.5 percent from 2004 onward.

Around 7 percent of pupils (around 600,000 out of 8 million) currently attend private schools, with the participation rate being higher for secondary school pupils. Figure 10.2 shows changes over time in the pupil share, which fell from 8 to 6 percent between the early 1960s and mid-1970s, after which it climbed through the 1980s to around 7 percent by the early 1990s. Since then it has stabilized around this level (7.6 percent in 2006).

There are significant regional variations in pupil participation and the presence of private schools. Table 10.2 shows that only 3 percent of schools in the North East are private, while in Inner London the share

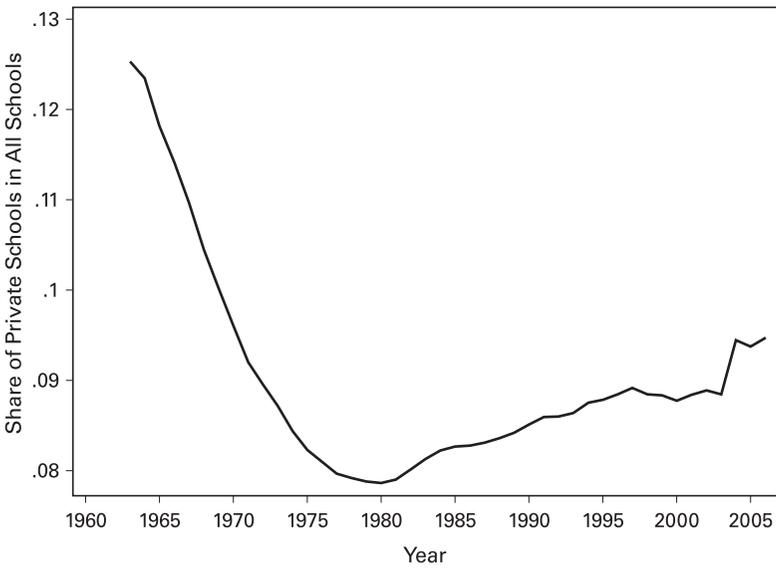


Figure 10.1
 Share of Private Schools in Total Schools, 1963 to 2006
 Source: Calculated from various issues of *Statistics of Education—Schools in England*.

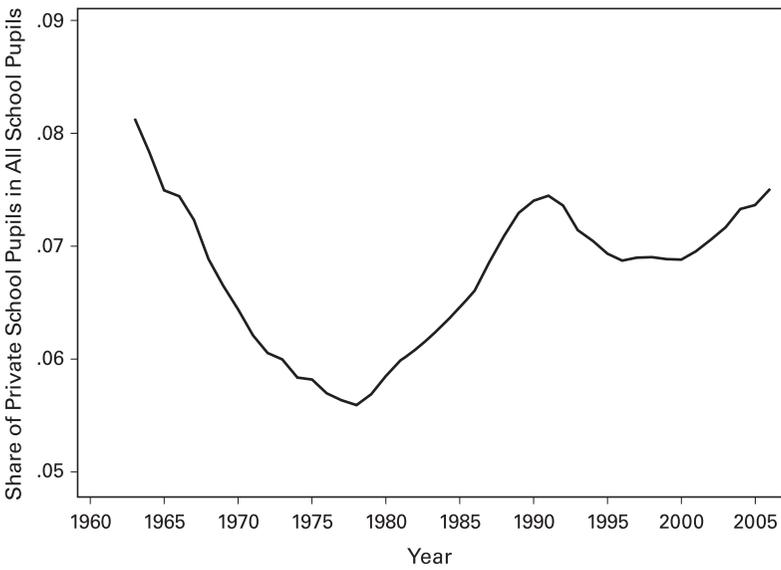


Figure 10.2
 Share of Private School Pupils in Total School Pupils, 1963 to 2006
 Source: Calculated from various issues of *Statistics of Education—Schools in England*.

Table 10.2
Regional Variations, 2006

	Number of schools	Number of private schools	Private share	Number of pupils	Number of pupils in private schools	Private share	Pupil- teacher ratio in private schools
England	24091	2199	.091	7985349	595317	.075	9.8
North East	1235	38	.031	396799	16396	.041	12.3
North West	3450	225	.065	1106137	57661	.052	16.0
Yorkshire and Humberside	2432	135	.056	806575	32975	.041	13.8
East Midlands	2225	142	.064	685052	37959	.055	9.4
West Midlands	2565	180	.070	883010	45945	.052	8.4
East of England	2800	215	.077	886343	63152	.071	8.4
Inner London	1127	237	.210	417383	65030	.156	9.0
Outer London	1729	244	.141	752668	70659	.094	9.7
South East	3930	547	.139	1285245	143891	.112	8.3
South West	2598	236	.091	766137	61649	.080	8.4

Note: Authors' own calculations using various data sources.

is just above 20 percent. In terms of pupil participation, the range from lowest to highest goes from 4 to about 16 percent. It is undoubtedly the case that the private school sector is more heavily concentrated in the wealthier parts of London and the South East of England.

10.1.3 Characteristics of Private Versus State Schools

Other than their fee-charging and charitable status,⁴ private schools differ significantly from state schools along a number of dimensions. The most obvious difference concerns teaching resources. There are far more teachers for each pupil in private schools: the pupil-teacher ratio is about 16.8 for state secondary schools and only 9.8 for private schools (table 10.7 and table 10.1 [or 10.2] respectively).

Table 10.3 broadly summarizes differences in teacher characteristics between the private and state sectors (drawing on the evidence of Green et al. 2008). The first row restates the fact that pupil-teacher ratios are markedly lower in private schools. The second, third, and fourth rows consider teacher salaries, hours, and holidays. It is interesting that salaries are, if anything, lower and hours are longer for private school teachers. The most revealing observation may be that holidays

Table 10.3

Comparison of Teacher Characteristics in the Private Relative to the State Sector

Teacher characteristic	Private against state	Evidence
Pupil-teacher ratios	Lower	DCSF* statistics of education
Teacher salaries	If anything, lower	Labor Force Survey wage equations (Green, Machin, Murphy, and Zhu 2008)
Teacher hours	Higher	Labor Force Survey hours equations (Green, Machin, Murphy, and Zhu 2008)
Teacher holidays	Longer	Labor Force Survey paid holiday entitlement equations (Green, Machin, Murphy, and Zhu 2008)

Note: * Department for Children, Schools, and Families (DCSF), formerly known as the Department for Education and Skills (DfES).

are longer, showing that teachers probably like the better work conditions and holiday arrangements in private schools.

10.1.4 Outcomes for Private versus State School Students

Table 10.4 considers outcomes for private versus state school pupils. On an observational level, children attending private schools do end up with higher academic qualifications, are more likely to attend university, and get paid more in the labor market than children from the state sector. This has led to a widespread perception that private schools do get better examination results for children who attend them.

It is also the case that, unlike most studies of state schools, some research has identified a role for better resourcing to shape pupil outcomes within the private sector. Graddy and Stevens (2005) note that lower pupil-teacher ratios are an important determinant of fees in private schools and are able to identify bigger resource effects in their study of private schools in the U.K., showing that schools with lower pupil-teacher ratios do in fact deliver better examination results.

Irrespective of any interpretation one might want to place on the superior outcomes for private school children, it is probably the combination of the observation/perception that private school pupils “do better” than state school pupils, together with the increased marketization of education, that has led to growing interest in transferring private-sector-autonomous practices to the state sector. Compared to other sectors in the U.K., where private sector financing and involvement have been fairly substantial, this remains relatively new in the education field. We consider some of the recent developments in the next section of the chapter.

Table 10.4

Academic and Labor Market Outcomes for Private School Pupils Relative to State School Pupils

Outcome	Private against state	Evidence
GCSEs (exams taken at age 15/16)	Higher	DCSF, Naylor, Smith, and McKnight (2002)
A Levels (exams taken at age 17/18)		
University attendance	Higher	In 2003, 13.2 percent of new first-year students from independent schools (Teaching Quality Information National Student Survey)
Labor market earnings (among graduates)	Higher	Naylor, Smith, and McKnight (2002), Green, Machin, Murphy, and Zhu (2007)

10.2 Public-Private Initiatives—City Academies

10.2.1 Private Sector Involvement in the State Sector

In the area of education in England, there have been two main forms of private sector involvement in the state sector: private finance initiatives (PFIs) and public-private partnerships (PPPs). The former try to bring aspects of private sector business more directly into the provision of assets in the public sector. For example, PFI projects in schools may involve the purchase of services from the private sector such as school buildings, facilities such as sports halls, or specific services including heating systems, information and communications technology (ICT), or catering equipment. They are much more concerned with non-academic operations (thus sometimes referred to by practitioners as “chore” not “core”). In terms of functioning, private sector companies bid for a PFI contract and, as for traditional procurement, this is usually a competitive tendering process to ensure value for money.

Public-private partnerships, on the other hand, encompass a wide range of activities in which the public and private sectors work together, including joint ventures. The TeacherNet Web site describes PPPs as being “about more than money. They are about improving the services that the public sector provides. In terms of schools, that translates directly to raising educational standards.”⁵

In the English schooling system, one of the most high-profile partnerships with private sector co-funding has been the recent city

academies program. In some ways academies represent a mixture or hybrid of both PFI and PPP in that they are a joint venture between the state and their private sector sponsors, where the latter are directly involved in the provision of education services and assets. We consider the academies program next, both in terms of its nature and its capacity to enhance pupil performance.

10.2.2 The City Academies Program

City academies are new independent state schools established on a partnership or joint venture basis between central government and private sector sponsors. So far the academies program has mainly been applied to schools catering to the secondary school stage of education (i.e., where pupils are beyond the age of 11 and 12). They are “new” schools in the sense of being newly classified as academies, and most involve the development of a new school building. However, in most cases an academy’s new physical facility is actually established on the same land site as a school that the academy replaces (often a failing urban school). According to the Academies Sponsor Prospectus (2005), their “buildings and facilities—either new build or remodelling of an existing school building—are financed and built in partnership between the sponsor and the government.⁶ Their annual revenue funding comes entirely from the government at a level comparable to other [local] schools. No fees are paid by parents.” The private sector sponsors can originate from a range of areas (e.g., business, faith groups, individuals). Sponsors delegate management of the school to a largely self-appointed board of governors or directors.⁷ In comparison with state schools maintained by Local Education Authorities (LEA), “Academies governing bodies employ all Academy staff. The governing body is responsible for agreeing [on] levels of pay, conditions of service with its employees, as well as policies for staffing structure, career development, discipline and performance management.”⁸ The academy is expected to specialize in at least one subject area, chosen initially at the discretion of the sponsor, but with local community interests considered. The most notable distinctions between academies and other state schools are therefore their autonomy and the existence and degree of involvement of their private sector sponsors.⁹ Table 10.5 summarizes public-private sector involvement in the delivery of services and the financing of education in England. The table highlights that academies are, in essence, a minority private/majority public financed initiative.

Table 10.5
Delivery and Financing by Public and Private Actors in Education

	<i>Financing of initiative</i>		
	Public	Minority private/ majority public	Private (capital)
<i>Delivery of service</i>			
Public	Management of (maintained) state schools	Specialist schools ¹	
Private	Contracting-out services	Academies; Some LEA services	Private finance initiatives
Public and private	Supply teachers (when needed)	Education Action Zones ²	Contracting-out services

Notes:

1. Specialist schools are maintained secondary schools that follow the National Curriculum and specialize in a designated subject area. A small amount of financing must be raised through private sector sponsors, while the majority of funding comes in the form of additional government grants in excess of that received by nonspecialist state schools.
2. Education Action Zones involve a cluster of around 15 to 25 schools that adopt innovative practices to raising education standards in disadvantaged areas. For this they receive around £1 million in additional funds (approx 75% of which comes from central government and 25% is raised through private sector sponsors).

Source: Adapted from Gadkowski (2007, table 2).

There are some similarities, but also notable differences, between city academies and U.S. charter schools. The latter are public (i.e., state) schools set up from charters typically drawn up by groups of educators, parents, and community leaders (some are converted from existing public schools, although a small number were once private schools). Like U.S. district public schools and U.K. city academies, they receive public funding according to the number of students attending (although, in a number of states, they do not receive the full equivalent of their district counterparts). Unlike traditional district schools, most charter schools do not receive funding to cover the cost of premises and operating. Most rely on independent means to fund their capital costs (even if some states may offer financial help with startup costs). It is probably fair to say that, at least currently, academies remain more closely tied to the state system than do the majority of U.S. charter schools.

The city academies program was introduced by David Blunkett, the then secretary of state for education, in a speech in March 2000, and the first projects were announced in September 2000. The first three academies were established in September 2002. Nine more opened in

Table 10.6
City Academies Opened in September 2002 to September 2005

Academy	Region	Opening date	Private sector involvement	Specialization
The Business Academy, Bexley	Outer London	September 2002	Garrard Education Trust—£2.5 million	Business and enterprise
Greig City Academy, Haringey	Inner London	September 2002	Greig Trust and Church of England £1.7 million	Technology (especially ICT)
Unity City Academy, Middlesbrough	North East	September 2002	Amey plc—£1.9 million	Applied enterprise
Capital City Academy, Brent	Outer London	September 2003	Sir Frank Lowe—£2 million	Sports and art
The City Academy, Bristol	South West	September 2003	Bristol City Football Club and the University of the West of England £1.7 million	Sports
The West London Academy, Ealing	Outer London	September 2003	Reed Executive plc £2 million	Sports and enterprise
Manchester Academy, Manchester	North West	September 2003	United Learning Trust (The Church Schools Company), Manchester Science Park Ltd—£1.3 million	Business and enterprise, and art
The King's Academy, Middlesbrough	North East	September 2003	Emmanuel Schools Foundation—£2 million	Business and enterprise
Djanogly City Academy, Nottingham	East Midlands	September 2003	Sir Harry Djanogly	ICT
City of London Academy, Southwark	Inner London	September 2003	Corporation of London—£2 million	Business and enterprise and sports
The Academy at Peckham, Southwark	Inner London	September 2003	Lord Harris of Peckham—£3 million	Business and enterprise, and performing arts
Walsall City Academy	West Midlands	September 2003	Mercers' Company and Thomas Telford Online—£2.5 million	Technology
London Academy, Barnet	Outer London	September 2004	SGI Limited—£1.5 million	Business, enterprise, and technology
Mossbourne Community Academy, Hackney	Inner London	September 2004	Sir Clive Bourne, Seabourne Group plc £1.6 million	Technology

Stockley Academy, Hillingdon	Outer London	September 2004	Ininger Townsley Stockbrokers and others—£1.5 million	Science and technology
Lambeth Academy, Lambeth	Inner London	September 2004	United Learning Trust—£1.5 million	Business and enterprise, and languages
Northampton Academy, Northampton	East Midlands	September 2004	United Learning Trust—£0.7 million	Sports, business, and enterprise
Trinity Academy, Doncaster	Yorkshire and The Humber	September 2005	Emmanuel Schools Foundation—£2 million	Business and enterprise
St Paul's Academy, Greenwich	Outer London	September 2005	Roman Catholic Diocese of Southwark—£0.2 million	Sports and enterprise
Salford City Academy, Salford	North West	September 2005	United Learning Trust and Salford Diocese—£0.2 million	Sports, business, and enterprise
Marlowe Academy, Kent	South East	September 2005	Roger De Haan and Kent County Council—£2.2 million	Business and performing arts
The Harefield Academy, Hillingdon	Outer London	September 2005	David Meller and others—£0.4 million	Sports
Haberdashers Aske's Knights Academy, Lewisham	Inner London	September 2005	Haberdashers' Livery Company £0.3 million	ICT and sports science
Haberdashers Aske's Hatcham College Academy, Lewisham	Inner London	September 2005	Haberdashers' Livery Company £0.7 million	ICT and music
Dixons City Academy, Bradford	Yorkshire and The Humber	September 2005	Dixons CTC Trust £0.6 million	Performing arts and product design
Academy of St. Francis Assisi, Liverpool	North West	September 2005	Diocese of Liverpool and The Roman Catholic Archdiocese of Liverpool—£1 million	Environment
Macmillan Academy, West Middlesbrough	North East	September 2005	Macmillan CTC £0.4 million	Science and PE, and outdoor education

Note: See <<http://www.standards.dfes.gov.uk/academies/projects/openacademies/?version=1>>

Table 10.7
City Academies, 2006

	All secondary	City academies	City academies share
Number of schools	3358	27	.008
Number of FTE pupils	3298185	25196	.008
Number of FTE teachers	199131	1717	.009
Pupil-teacher ratio	16.8	14.8	n/a

Note: Authors' own calculations using various data sources.

September 2003, five in September 2004, and a further ten in September 2005. Table 10.6 lists details of the twenty-seven academies set up in those years.¹⁰ As can be seen from the table they cover quite a diverse range of specializations and sponsors, and are located in various regions of the country. It is noteworthy that the places where they have been introduced are, for the most part, characterized by social disadvantage and poor educational attainment. Table 10.7 also shows that they are currently covering only a small (less than 1 percent) share of schools and pupils, but many more are planned in the near future (see note 10 at the end of this chapter).

The explicit aim from government is that city academies are being introduced to raise educational standards. The presumption is that standards will be raised through the innovative nature of the academy culture and the skills brought to the academy by sponsors (e.g., sponsors may play a role in developing the curriculum). It is argued that this will facilitate better management and governance, which in turn will lead to improvements in educational attainment.

Some evaluation of the initial phases of the city academies program has been conducted by PriceWaterhouseCoopers (PwC) (2007). (As part of a five-year evaluation, PwC consultants have produced four annual reports, in 2004, 2005, 2006, and July 2007). They discuss their findings as early and ongoing work informing the progress of the academies program. The 2007 report considers each of the twenty-seven academies opening between September 2002 and September 2005. On the basis of their fieldwork they conclude that they are able to identify positive endorsements of sponsors, positive feedback from pupils, and evidence of innovative teaching and management styles being implemented.

PwC has also carried out quantitative analysis of pupil performance, by comparing improvement in final school-year exams (the General

Certificate of Secondary Education, or GCSE¹¹) in academies with the national average and with some selected groups of schools. They summarize their evidence by stating that “academies’ progress in terms of pupil achievement has generally exceeded corresponding improvements at a national level and amongst other similar schools” (2007, executive summary, vii).

One serious point to note here is that the schools that were turned into academies were typically located in socially deprived areas and had very poor track records in terms of GCSE achievement. They were among the worst performing schools in their respective LEAs, often positioned right at the bottom of the stack. Comparing with the national average is not the right yardstick. Because of possible issues of mean reversion (i.e., if they are at the bottom of the stack they are likely to bounce back towards the mean), it is necessary to evaluate their performance relative to comparable schools also characterized by mean reversion. This is the approach we take in this chapter. Like PwC we acknowledge that it is relatively early days yet in the academies program and, given the very high profile of the academies, it is important to get it right, but we take a first look at this in the next subsection.

10.2.3 A Start on Gauging the Impact of Academy Status on Pupil Achievement

Conceptually, one could evaluate the impact of academy status on pupil achievement if there were two identical schools (i.e., same levels and trends in achievement prior to academy introduction) and one was given academy status (and associated funding and autonomy) while the other was not. Even if they are poorly performing schools but the scope for mean reversion is the same, then a comparison of pupil achievement before and after becoming an academy in the academy school versus the non-academy school can provide an estimate of the impact of becoming an academy on educational achievement.

Apart from one issue, to do with the pupil population changing (we will return to this), a school-level analysis that compares schools that become academies to a matched set of schools can provide a consistent estimate. The issue is finding the matched schools. In our initial cut at this, we have adopted two strategies. The first matches each academy school with the nearest performing school via a one-to-one match on pre-policy examination levels and trends in pupil achievement.¹² In the second, we also report results using all other secondary schools in the academy’s LEA as a comparison group.

Table 10.8

School-Level Changes in GCSE Exam Performance in Schools Changing to Academy Status and in Comparison Schools—% Getting 5 or More A*-C GCSEs

A. Academies Opening in September 2002

	Pre-academy, 2000–01 school year	Post-academy, 2002–03 to 2005–06 school years (averaged)	Post-pre change
Academies (3)	20.5	31.2	10.7
Matched schools (3)	21.7	36.2	14.5
			D-i-D = –3.8 (10.1)
All other state schools in LEA (23)	37.2	48.4	11.2
			D-i-D = –0.5 (8.3)
National average	50.0	55.7	5.7

B. Academies Opening in September 2003

	Pre-academy, 2001–02 school year	Post-academy, 2003–04 to 2005–06 school years (averaged)	Post-pre change
Academies (8)	23.4	37.5	14.1
Matched schools (10)	29.2	39.6	10.4
			D-i-D = 3.7 (9.5)
All other state schools in LEA (106)	39.4	46.4	7.0
			D-i-D = 7.1 (7.2)
National average	51.5	56.7	5.2

C. Academies Opening in September 2004

	Pre-academy, 2002–03 school year	Post-academy, 2004–05 and 2005–06 school years (averaged)	Post-pre change
Academies (3)	24.0	37.7	13.7
Matched schools (3)	29.3	35.3	6.0
			D-i-D = 7.7 (13.8)
All other state schools in LEA (85)	52.3	55.7	3.4
			D-i-D = 10.3 (8.9)
National average	52.9	58.2	5.3

Table 10.8
(continued)*D. Academies Opening in September 2005*

	Pre-academy, 2003–04 school year	Post-academy, 2005–06 school year	Post-pre change
Academies (10)	46.0	55.6	9.6
Matched schools (9)	42.6	51.3	8.7
			D-i-D = 0.82 (16.9)
All other state schools in LEA (191)	42.0	51.2	9.2
			D-i-D = 0.36 (13.1)
National average	53.7	59.2	5.5

Note: Column 1: number of observations in parentheses. Three out of 27 academies are new schools (one opening in 2003–04 and two opening in 2004–05). Three out of 27 academies each replace two predecessor schools (for one of the academies opening in 2002–03 and two opening in 2003–04). For one of the academy schools opening in 2002–03 its two predecessor schools have the same match school. Column 4: D-i-D denotes difference-in-difference. Robust standard errors in parentheses.

Table 10.8 carries out a descriptive analysis showing final-year school examination performance in schools that become academies, both as academies and in their predecessor school status. The analysis is split into four panels, one for each of the newly opened cohorts of academies for which we have examination data. The table shows a pre-academy year of examination performance in column 1 (academic year 2000–01 for the first cohort in the upper panel, through to 2003–04 for the fourth cohort in the lower panel) and then subsequent performance in the adjacent columns. The columns on the right show the pre-post changes for schools that do become academies and for their matched counterparts in each panel.

The table makes it evident that academies did improve their GCSE performance after changing status. This is the case for all four cohorts, with their improvement in GCSE performance rising between 9.6 percentage points (the fourth cohort) and 14.1 percentage points (the second cohort).¹³

It is evident that, on average, these improvements look quite good relative to changes in the national average. However, they look less impressive when benchmarked against other poorly performing matched state schools that did not become academies, but that were also prone

to mean reversion. This is because standards rose for the matched schools as well, by between 6 percentage points (third cohort) up to 14.5 percentage points (first cohort). Therefore the difference-in-differences (D-i-D) estimates in the table, which show the gap between the pre-post change for academies relative to the pre-post change for matched schools, are mostly positive but statistically indistinguishable from one another. Qualitatively, the same pattern emerges if all state schools in the academy's Local Education Authority are used as the comparator group. Overall there is some weak evidence of improved performance in some of the cohorts, in numerical terms.

One important aspect that we have also considered is pre-academy trends in the academy predecessor schools and the comparison schools. These are shown in table 10.9. The (negative) gap between the academy predecessor schools and the comparison schools was similar and stable through time in the years prior to academy status, except in the actual year before conversion where a dip in the gap seems to occur. But this "permanent" longer-run difference is important to consider.

Indeed, there is a serious need to carefully control for pre-policy evolutions in GCSE scores for several years before academy status occurred. We therefore report estimates of statistical difference-in-difference models in table 10.10. The upper panel of the table shows two sets of regression estimates for each of the four cohorts of academy schools, using matched schools as comparators. The bottom panel reports the same specifications for the broader set of control schools, all state schools in the LEA. The two sets of regression estimates differ in whether or not they also control for time-varying school characteristics (log(school size), proportion eligible for free school meals, proportion non-white).¹⁴

It is evident from the results in table 10.10 that benchmarking against a longer pre-policy time period produces some positive academy effects. Given the small number of academies, statistical imprecision is not so informative; although it is worth pointing out that the magnitudes of the point estimates are fairly modest for three of the four cohorts (especially once the control variables are included), but there is clear evidence of significant positive effects for the third cohort (the academies opening in September 2004). The pattern for most of the cohorts is of no short-run effects of becoming an academy on GCSE performance, but there is a positive effect for the one cohort.

Table 10.9
School-Level Year-on-Year Differences in the % of Pupils Attaining 5 or More A*-C GCSEs, 1995–96 to 2005–06

	Academies opening in September 2002		Academies opening in September 2003		Academies opening in September 2004		Academies opening in September 2005	
	Pre-academy-matched schools and academy-matched schools differences	Pre-academy-state schools in LEA and academy-state schools in LEA differences	Pre-academy-matched schools and academy-matched schools differences	Pre-academy-state schools in LEA and academy-state schools in LEA differences	Pre-academy-matched schools and academy-matched schools differences	Pre-academy-state schools in LEA and academy-state schools in LEA differences	Pre-academy-matched schools and academy-matched schools differences	Pre-academy-state schools in LEA and academy-state schools in LEA differences
1995–96	-5.7 (5.3)	-22.3 (4.3)	-2.8 (4.0)	-14.9 (3.0)	-8.7 (2.5)	-24.6 (2.6)	-2.4 (9.9)	-0.2 (6.9)
1996–97	-3.8 (3.9)	-18.9 (2.8)	-3.3 (4.1)	-15.8 (2.8)	-20.7 (3.1)	-28.7 (2.0)	-1.3 (10.7)	-1.4 (7.9)
1997–98	-7.7 (6.9)	-22.4 (5.3)	-4.6 (5.4)	-16.1 (4.3)	-4.0 (6.4)	-26.0 (4.5)	4.4 (11.0)	2.9 (7.8)
1998–99	-9.6 (0.8)	-20.9 (3.0)	-5.0 (5.0)	-18.1 (4.0)	-2.7 (6.4)	-28.3 (4.5)	0.2 (11.0)	0.1 (7.4)
1999–00	-7.9 (5.9)	-21.8 (4.9)	-7.2 (5.3)	-17.1 (3.8)	-4.7 (2.7)	-26.2 (2.2)	2.7 (11.9)	1.5 (8.6)
2000–01	-2.7 (5.4)	-16.4 (4.6)	-6.1 (5.2)	-16.9 (4.0)	-6.7 (3.4)	-28.6 (2.1)	2.9 (12.1)	1.5 (8.9)
2001–02	Becomes academy		-5.6 (5.6)	-15.0 (4.5)	-8.7 (8.6)	-28.1 (6.0)	4.5 (12.8)	1.5 (9.5)
2002–03	-9.7 (7.5)	-18.0 (5.5)	Becomes academy		-5.3 (10.8)	-27.5 (6.6)	7.1 (13.6)	3.5 (10.5)
2003–04	-6.7 (7.6)	-20.0 (5.0)	-3.4 (7.2)	-11.7 (5.4)	Becomes academy		3.4 (12.6)	4.0 (9.8)
2004–05	-3.3 (12.4)	-14.1 (10.1)	-1.2 (8.7)	-7.5 (6.4)	1.7 (10.0)	-20.5 (7.0)	Becomes academy	
2005–06	-0.3 (10.3)	-10.8 (8.6)	-3.0 (7.8)	-7.7 (4.4)	3.0 (7.3)	-15.0 (5.0)	4.3 (11.2)	4.4 (8.7)

Note: Robust standard errors in parentheses.

Table 10.10 School-Level Difference-in-Difference Estimates of City Academy Status on GCSE Performance, 1995–96 to 2005–06

<i>A. Comparison with matched schools</i>								
	Academies opening in September 2002		Academies opening in September 2003		Academies opening in September 2004		Academies opening in September 2005	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Becomes academy	-0.49 (3.56)	1.57 (3.88)	3.80 (3.11)	0.01 (3.42)	10.00 (4.18)	8.95 (5.01)	1.86 (3.73)	-0.15 (3.85)
School fixed effects	Yes (6)	Yes (6)	Yes (18)	Yes (18)	Yes (6)	Yes (6)	Yes (19)	Yes (19)
Year dummies	Yes (9)	Yes (9)						
Time varying controls	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	.80	.85	.68	.81	.64	.66	.95	.94
Number of schools	7	7	21	17	6	6	19	17
<i>B. Comparison with all other state schools in LEA</i>								
	Academies opening in September 2002		Academies opening in September 2003		Academies opening in September 2004		Academies opening in September 2005	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Becomes academy	3.02 (3.01)	3.58 (3.44)	8.45 (2.52)	4.12 (2.71)	8.27 (2.67)	4.58 (3.36)	3.01 (2.24)	2.86 (2.14)
School fixed effects	Yes (27)	Yes (27)	Yes (116)	Yes (116)	Yes (89)	Yes (89)	Yes (201)	Yes (201)
Year dummies	Yes (9)	Yes (9)						
Time varying controls	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	.84	.85	.84	.87	.87	.89	.87	.88
Number of schools	26	26	110	94	81	81	186	120

Note: Coefficient estimates (robust standard errors); Control variables are time-varying school characteristics— $\log(\text{school size})$, proportion eligible for free school meals, proportion nonwhite. GCSE performance is measured by the percentage of pupils getting 5 or more A*-C GCSE grades.

As noted, it is possible that the pupil mix may have changed as the school changed status to become an academy. It turns out that pupil mobility among students in predecessor schools is low and most who were there at key stage 3 (aged thirteen/fourteen and in school year nine) also take their GCSEs two years later in the academy. We have therefore considered value added-models at the pupil level that are able to address this possible issue of changing pupil mix. They are reported in table 10.11. One difference is that, because of our availability of pupil-level data, only three cohorts can be considered. Nonetheless, in the second and third cohorts (respectively those opening in September 2003 and 2004) there are positive (small but mostly statistically significant) impacts on pupil value-added. Thus while standards tended to not rise so much on average, there is some evidence that value-added improved significantly in some of the schools that were granted academy status.

10.3 Concluding Remarks

In this chapter we have considered some of the issues to do with public-private partnerships in English education. We began by examining the role of the private sector in English schools and the increased appetite for private sector ethos, autonomy, and attitudes to be brought to state sector schools in the context of the quasi-market for schooling. We presented some early empirical evidence on a high-profile private-public joint venture, the city academies program. It is premature for this joint venture to be appraised, and we find no evidence of general positive effects on academic attainment from academy status. However, there is substantial variation and there is some specific evidence of positive effects in some of the cohorts of new academies. That there are some positive short-run effects for some academies is interesting in that, in the longer term, the pupil profile of schools may change as well.

The academies program is evolving rapidly and it is likely that children may need more exposure to the academies for substantial beneficial effects on achievement to occur. It is evident that a very important future research exercise on the role of private sector collaboration in the state school sector will be to evaluate the impact of their more widespread introduction on the academic performance of English pupils.

Table 10.11
Pupil-Level Value-Added Models of Progression from Key Stage 3 to Key Stage 4 (GCSE), 2001–02 to 2004–05

	Dependent variable: Pr(5 or more A*-C GCSEs)					
	Academies opening in September 2002		Academies opening in September 2003		Academies opening in September 2004	
	One-on-one matched schools (1)	Other state schools in LEA (2)	One-on-one matched schools (3)	Other state schools in LEA (4)	One-on-one matched schools (5)	Other state schools in LEA (6)
Becomes academy	-0.49 (0.12)	-0.22 (0.12)	0.24 (0.17)	0.23 (0.12)	0.78 (0.26)	0.48 (0.23)
Controls for key stage 3 achievement	Yes	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes (6)	Yes (27)	Yes (18)	Yes (114)	Yes (6)	Yes (86)
Year dummies	Yes (3)	Yes (3)	Yes (3)	Yes (3)	Yes (3)	Yes (3)
R-squared	.77	.37	.31	.16	.30	.13
Number of pupils	4706	19862	11383	81862	3932	60902
Number of schools	7	26	21	108	6	81

Note: Coefficient estimates (robust standard errors); both $\times 100$ to maintain comparability with tables 10.8, 10.9, and 10.10.

Notes

We would like to thank Rajashri Chakrabarti, Susan Dynarski, Tom Kane, Sandra McNally, Paul Peterson, and an anonymous referee for a number of helpful comments on an earlier draft.

1. See Le Grand (1991, 1993) and the more recent discussion of the quasi-market in Machin and Vignoles (2005).

2. The compulsory minimum school-leaving age was raised again in 1973 to sixteen, the level at which it currently stands. It is expected that it will be raised to eighteen in England by 2015 (see *BBC News*, November 6, 2007: <http://news.bbc.co.uk/1/hi/education/7080699.stm>).

3. The 1988 Act established parental representation on school governing bodies and required Local Education Authorities (LEAs) to delegate staff recruitment and financial management to the board of school governors (Machin and Vignoles 2005).

4. Private schools have charitable status and so their fee income is not taxed.

5. Source: <http://www.teachernet.gov.uk/management/resourcesfinanceandbuilding/funding/schoolsprivatefinanceinitiative/faqs/>.

6. Specifically, sponsors “make a charitable donation of 10% of the building costs, up to a total of £2 million (or £1.5 m for an Academy based on remodelled rather than completely new buildings) towards the initial capital cost of their Academy.” Capital contributions of the sponsor are expected to be made over the length of the building project (two to three years). Source: <http://www.standards.dfes.gov.uk/academies/pdf/AcademySponsorProspectus2005.pdf?version=1>. These contributions may be replaced with sponsor-provided long-term endowment funds, of equivalent financial value, for academies opening in the future (NAO 2007). Following further changes made to the academies programme in 2007, the 2 million funding requirement is waived when the sponsor is a university, a fee-charging private school, or a high-achieving state school (Sibieta et al. 2008).

7. An academy usually has around thirteen governors, typically seven of whom are appointed by the sponsor. Of the remaining six, one must be a local authority representative, and at least one elected parent representative is required.

8. Staff usually transfer directly from the predecessor school to the academy school, and their existing employment terms and conditions are legally protected. Source: http://www.standards.dfes.gov.uk/academies/what_are_academies/organisation/?version=1. Table 10.5 shows that more than half of the academy school set up by September 2005 were in the inner and outer London regions (14 of the 27 listed). This reflects government targets requiring 60 of the first 200 academy schools to be established in London (NAO 2007).

9. The autonomy of academies relative to other state schools seems to extend to their policy on pupil expulsions. In the academic year 2005–06, academy schools permanently excluded 5.5 pupils in every 1,000. The comparative figure for other state secondary schools in England was 2.4 in every 1,000 (See *BBC News* story July 13, 2007, <http://news.bbc.co.uk/1/hi/education/6897429.stm>).

10. We list only those academy schools set up in September 2002 through September 2005 because to date we do not have pupil examination performance data covering academies

opening in subsequent years. However, as of August 2007, there were forty-six academies open (the twenty-seven listed in table 10.5, plus nineteen that opened in September 2006) and many more are intended to follow (the current U.K. government has unveiled plans to establish 400 academies, with at least 200 of these open or planned to be opened by 2010).

11. GCSEs are the examinations taken at the end of the final year of compulsory schooling (in year eleven at age fifteen/sixteen). GCSEs were first introduced in 1986, to GCE O-Level and the Certificate of Secondary Education (CSE) qualifications. The first GCSE exams were sat in 1988 and were originally graded from A to G. Nowadays pupils take a number of GCSEs, which differ across schools, in different subjects, and these are assigned pass grades ranging from A* through G. The A* grade was first implemented in 1994 as a means of classification for outstanding examination achievement. The current key headline figure at school level is the percentage of children achieving five or more GCSEs with grades A* through C. All Academies open in September of a given year, and comparison of final school year exams in the Academy schools relative to the national average is based on the results of GCSE exams taken in the summer of the following year.

12. Specifically, our pre-policy matching is based on school-level data from the academic year 1995–96 to the academic year prior to the one in which the school became an academy (since we have school-level data available from 1995–96 onward). As a third criterion we also look for similarities between the match school and the pre-academy school using their school type (in the maintained sector other school types are community, voluntary aided, voluntary controlled, foundation, or city technology college). Finally, we also considered the nearest school in geographical terms as a spatially matched control group, with similar findings to those reported.

13. These numbers also show that, in terms of GCSE performance, the schools that became academies were right near the bottom of the pile in national terms before becoming academies (for example, in the 2001–02, 2002–03, 2003–04, and 2004–05 academic years the national averages were 51.5, 52.9, 53.7, and 57.1 percent, respectively).

14. School fixed effects involve controlling for time-invariant characteristics of schools.

References

- Gadkowski, L. B. 2007. Britain's city academies: Can corporate citizenship strengthen state-supported education? Unpublished dissertation, London School of Economics.
- Gordon, P., R. Aldrich, and D. Dean. 1991. *Education and Policy in England in the Twentieth Century*. London: Woburn Press.
- Graddy, K., and M. Stevens. 2005. The impact of school resources on student performance: A study of private schools in the united kingdom. *Industrial and Labor Relations Review* 58: 435–451.
- Green, F., S. Machin, R. Murphy, and Y. Zhu. 2007. The changing private returns to independent education in Britain. Unfinished draft.
- Green, F., S. Machin, R. Murphy, and Y. Zhu. 2008. Competition for private and state school teachers. Centre for the Economics of Education Discussion Paper No. 94. London: London School of Economics.

Le Grand, J. 1991. *Equity and Choice*. London: Harper Collins.

Le Grand, J. 1993. *Quasi-Markets and Social Policy*. London: Macmillan.

Machin, S., and A. Vignoles. 2005. *What's the Good of Education? The Economics of Education in the United Kingdom*. Princeton: Princeton University Press.

National Audit Office (NAO). 2007. *The Academies Programme*. London: The Stationery Office.

Naylor, R., J. Smith, and A. McKnight. 2002. Why is there a graduate earnings premium for students from independent schools. *Bulletin of Economic Research* 54: 307–378.

PriceWaterhouseCoopers. 2007. Academies evaluation, 4th annual report. London: Department for Education and Skills.

Sibieta, L., H. Chowdry, and A. Muriel. 2008. *Level Playing Field? The Implications of School Funding*. Berkshire, UK: CfBT Education Trust.

IV **Conclusions**

11 Education Contracting: Scope of Future Research

Harry A. Patrinos

School choice is often promoted as a means of increasing competition in the school system (Friedman 1955). It is believed that competition will lead to efficiency gains as public and private schools compete for students and try to improve quality while reducing expenses (Neal 2002). By encouraging more private schools, vouchers will allow schools to become innovative and bring improvements to the learning process. Public schools, in order to attract the resources that come with students, will improve. Opponents claim that under a voucher system private providers will be unaccountable to taxpayers. Claims of efficiency gains are also questioned. Further, critics sometimes claim that choice will lead to privatization, less public control of education, and increased segregation (Ladd 2002). Others argue that increased choice may lead to social breakdown and civil conflict, and that without institutional controls, private schools may teach racism and religious intolerance, thus exacerbating existing social tensions. However, except for the United States, there are few rigorous—even fewer random—impact evaluations (Kremer 2003).

In most countries the state is both the major financier and provider of education. However, government efforts to expand schooling have not reached all members of society. While governments have an interest in promoting and financing education, it does not necessarily follow that the public sector has a role in providing it. There are often other providers, such as churches, home schools, and private schools, both for-profit and not-for-profit. By extending financing to these providers, governments would give all parents the opportunity to participate more fully in their child's education by choosing the school that is right for them.

Forms of Contracts

While there are many ways to incorporate elements of choice in school systems, as well as many means of including the private sector in the provision of services at the compulsory level, here the concern is with forms of contracting for service delivery. Contracting refers to the process whereby a government procures education or education-related services, of a defined volume and quality, at an agreed price, from a specific provider for a specified period, with the provisions between financier and service provider recorded in a contract.

Many forms of contracting are used in education, depending on which services are bought from the private sector. Norman LaRocque in chapter 4 of this volume summarizes the forms of contracting. I use the same categorization and present a few examples and the strength of the evidence based in table 11.1. There are many cases around the world of school places being bought from the private sector by government, including Australia, Japan, and the United Kingdom. Contracting with schools to enroll publicly funded students is used extensively and has proven to be a good strategy for rapidly expanding access to education while avoiding large capital costs. Also, contracting for support services (meals, maintenance) is widely used. Contracting for management services is one of the most important issues, but it is very difficult to implement, not least because of the challenge of identifying

Table 11.1
Selected Education Contracting Examples and Evidence Base

Voucher-type programs	Charter-like schools	Private finance initiative
<i>OECD countries</i>		
Denmark*	United States****	Australia
Italy*	United Kingdom**	Canada
Netherlands**		Germany
Sweden***		Ireland
United States****		United Kingdom
<i>Developing/transition countries</i>		
Chile**	Colombia***	Colombia
Colombia****	Fe y Alegria**	Mexico
Czech Republic**		

Notes: Strength of evidence: * weak; ** strong; *** very strong; **** excellent (randomized)

Source: Author's compilation.

measurable performance criteria. Contracting a private actor to operate a public school has proven controversial in some countries, regardless of results. A few countries are experimenting with contracts for private financing and construction of schools. An extension of the private finance model is contracting for private actors to run schools, as well as finance and build them, a model that has not yet been tried in education. Contracting for professional services (such as curriculum development) is also fairly easy to specify and monitor.

Evidence

In general, the best evaluations use designed experiments that randomly assign benefits and include a true control group. In the case in which the allocation of vouchers is not random, the type of children leaving the worst schools are presumably the more able students, and the students remaining in the school are, therefore, the less able ones. In the absence of a randomized design, or some form of natural experiment, rigorous techniques such as propensity-score matching, local average-treatment effects, regression discontinuities, and so on, are used. Outcomes to evaluate could be cost savings, increases in enrollments, and improvements in learning, among others. The many benefits of contracting also make such projects highly amenable to proper impact evaluations.

From the United States, Hoxby (2003a) shows that the public schools are threatened by competition, leading them to reform and improve so as not to lose students. Thus, competition has an impact on public schools, especially where there was previous popular dissatisfaction with them. Hoxby (2003b) reviews the evidence from the United States relying on policy experiments. She finds that public schools do in fact respond to competition by raising their achievement and productivity. Student achievement rises when students attend voucher or charter schools. Further, she argues that voucher and charter school programs do not cream-skim; they disproportionately attract students who were performing badly in their regular public schools. Howell and Peterson (2002) show evidence that vouchers benefit African-American students more than participants from other ethnic groups in their examination of test scores, parental satisfaction, parent-school communications, and political tolerance among students and parents participating in programs in New York; Dayton, Ohio; Washington, D.C.; and San Antonio, Texas. West and Peterson (2006) analyze Florida's accountability

law, the A+ Plan, where the average test performances of students in grades three through ten must be reported annually for each school, and in which students at twice-failed schools are given the opportunity to attend another school. They show positive impacts on student performance.

Milwaukee's experiment with school vouchers receives a lot of attention. The program started in 1990 and gives selected children from low-income families taxpayer-funded vouchers to allow them to attend private schools. Rouse (1998) compares voucher students with control groups, using various statistical methods to remove biases. Her conclusion is that in standardized reading tests there appears to be no difference between voucher students and their public school peers. But standardized math test scores rose significantly more rapidly for students who used vouchers to attend private schools than for their counterparts in public schools. This suggests that providing vouchers to low-income students to attend private schools could help increase the mathematical achievement of those students who participate.

A good deal of research has evaluated charter schools in the United States (Hoxby 2004; Bettinger 2005). A few studies have found significant improvement, but several have found either no impact or deterioration in school performance. Hoxby's (2003a) analysis of charter schools in Michigan and Arizona shows positive evidence.

Vouchers in Other Countries

There are a few systematic evaluations of the effects of vouchers worth mentioning. An experiment with vouchers is going on now in Italy. An immediate outcome was that the cost of private schooling declined. Using a longitudinal study of voucher recipients, Brunello and Checchi (2005) find that private schools may be selected for different reasons than quality considerations. Also, by exploiting individual data on voucher applicants, they present evidence that the percentage of voucher applicants is higher when the average quality of private schools is higher. However, their study does not establish causation, and the authors rightly point to the need for further research with better data.

Large-scale, universal programs exist in a few European countries. Some are so old and well established that it is almost impossible to evaluate them in the usual sense. These would include Denmark and the Netherlands. In Denmark, any group of parents can claim public

funding by declaring themselves a private school if they have at least twenty-eight students. The state funds all schools that meet minimum requirements. All schools receive grants according to the number of students enrolled. About 12 percent of children attend a private school, and this percentage has been increasing in recent years. Andersen and Serritzlew (2006) attempt to analyze the impact of private school competition on Danish language and math test scores. They use a logit model and OLS to investigate the effect of market share on test scores, controlling for a variety of school factors, socioeconomic background, teachers, and local taxes. They use cross-section data for 2002. They conclude that competition does not improve the achievement of public school students, but does increase public school expenditures per student. This study, however, suffers from the lack of over-time data and any identifying variable to control for selection.

The Dutch education system has been decentralized and demand-driven since 1917 (Patrinos 2002). Almost 70 percent of schools in the Netherlands are administered and governed by private school boards. Public and private schools are funded by government on an equal footing, and most parents have a choice of several schools near their homes. While schools are free to determine what is taught and how, the Ministry of Education does impose a number of statutory quality standards. In recent years, there has been a trend towards greater autonomy and decentralization. Many central government powers have been transferred to the level of the individual school. There is evidence that Dutch students are among the best educated in the world (according to TIMSS and PISA results),¹ and that the system produces very low levels of learning inequality (Patrinos 2004). More recently, in a working paper Himmler (2007) uses cross-section data and instruments for the number of Catholics living in the local education market and estimated the impact of competition on public school outcomes. He uses a variety of competition measures, including geographic proximity and the Herfindahl index (a commonly accepted measure of market concentration) to control for the possible endogeneity of Catholic competition to public school quality. He finds that competition leads to improved secondary school grades, and that competition does not increase per-student spending or grade inflation. However, the study completely discounts the presence of sorting by ability.

More recent universal choice systems are more easily subject to evaluation. The sweeping changes that ended communism in Eastern Europe had a major impact on education. Immediately after the

transition, private schools became legal and soon began receiving public funds. In the Czech Republic, 4 percent of students attend private schools overall, but as much as 14 percent at the upper secondary level, up from 1 and 3 percent in 1991. A direct analysis of the impact of the voucher on private and public schools was undertaken, finding that private schools have arisen in response to market incentives (Filer and Munich 2002). Private schools are more common in fields where public school inertia has resulted in an undersupply of places. Also, private schools are more common where the public schools are performing worse academically. Public secondary schools facing significant private competition in 1995 improved their relative success in obtaining university admissions for their graduates by over four positions (out of 77) between 1996 and 1998. One problem with the study is that data on university access come *after* the establishment of private schools in the Czech Republic. Still, that would mean that the positive effect is underestimated. More serious might be the lack of controls on selection effects, since the reform was not a randomized experiment. But private schools tend to attract weaker students than the students remaining in the public system.

In the early 1980s, less than 1 percent of Swedish children attended private schools, even though half of the private schools did not charge fees and citizens felt the centralized public system was unresponsive. A series of reforms in the 1990s introduced greater parental influence through the devolution of funding and management. New rules allowed money to follow students, and municipalities were required to fund private schools. As a result, enrollments in private schools continue to grow, to more than 10 percent in 2003. Evaluations generally show positive results. Sandström and Bergström (2005) find that results improve for public school students when the degree of competition from private schools increases. They instrument using the share of students attending independent schools and who have no failing grades to control for endogeneity of private school selection, and use a sample selection model. They control for socioeconomic background, immigrant status, distance, and school factors. They use panel data for the period 1992–97. They specifically test for the impact of greater competition in the municipality on improving the performance of public school students. They find that ninth-grade math test scores increase by one-fifth of a standard deviation when the local private school enrollment share increases by 10 percent. They also find that the share of

students in private schools is larger if academic achievement of public school students was low prior to the enactment of the reform. Ahlin (2002) also finds positive effects of local school competition in Sweden. The analysis improves upon Sandström and Bergström (2005) by including a value-added specification on test scores. Ahlin incorporates previous student performance into her equations and finds that a 10 percent increase in the local share of private school enrollment leads to one-fifth of a standard deviation increase in ninth-grade math performance, but no significant effects on English or Swedish. Ahlin controls for student characteristics, family background and municipal characteristics, and uses data over time (1991–97). She also estimates quantile regressions and reports homogeneous effects for both low- and high-performing students.

Chile is the only developing country to have a universal voucher program. Subsidized private schools have proven to be slightly more cost-effective than municipal schools. Research results are mixed. Most studies, however, are subject to criticism, not least because of the reliance on post-voucher plan data and no preprogram trends (Hoxby 2003b). The identification problem is serious since the reform did not include any arbitrary exclusions. Hsieh and Urquiola (2006) use an instrumental variable approach and over-time data with a fixed effects model. Presumably, the fixed effects model will control for observable and unobservable time-invariant effects. This study finds no evidence that choice improved average educational outcomes as measured by test scores, repetition rates, and years of schooling. However, the authors find evidence that the voucher program led to increased sorting, as the “best” public school students left for the private sector. In a careful examination of the evidence, Cristian Bellei (chapter 8 in this volume) finds that different studies yield very different conclusions due to methodological differences; data limitations; and differences in abilities to control for various biases such as selection, inability to include appropriate controls, interaction effects, and so on. When correcting for such biases no evidence is found that private voucher schools are more effective than public schools in Chile.

In the 1990s Colombia experimented with a targeted voucher program. The program was oversubscribed so a lottery was put in place to randomly assign students to private schools with excess capacity. Taking advantage of the random design, several rigorous evaluations have been undertaken. The program led to considerable enrollment

increases, especially for the disadvantaged, at a low cost to government. The Colombia voucher program grew substantially, incorporating more than 125,000 students from poor families, was efficient in terms of lower unit cost per beneficiary student, and provided education of at least comparable quality to that provided in public schools.

Taking advantage of the randomized design, Angrist and others (2002) and Angrist, Bettinger, and Kremer (2006) found that voucher beneficiaries had higher educational attainment: they were 10 percentage points more likely to finish the eighth grade three years after they won the vouchers. They were also 5 to 6 percentage points less likely to repeat a grade, scored 0.2 standard deviations higher on achievement tests than non-voucher students, and were 20 percent more likely to take the college entrance exam than students who had not won a voucher in the lottery. They were also 0.6 to 1.0 percentage points less likely to be married and 2.5 to 3.0 percentage points less likely to be working. Angrist and others (2002) also estimated that voucher beneficiaries were likely to earn U.S.\$36 more in wages each year, compared to the U.S.\$24 per beneficiary that it cost the government to provide vouchers instead of places in public schools. In a study of the program's longer term effects, Angrist, Bettinger, and Kremer (2006) found that the program improves scores for both average students and those over the 90th percentile.

Charter Schools and Variants in Other Countries

The most extensive example of contracting in Latin America is the Fe y Alegría (FyA) school network, which is described by Norman LaRocque in chapter 4. FyA has a long history in Venezuela, where it was founded in 1955. FyA schools are believed to outperform traditional public schools. Allcott and Ortega (2007) estimate the average treatment effect (ATE), the difference in test scores between students in treated and untreated schools, or how a student would have performed in Fe y Alegría as opposed to in a public school. They estimate this effect using ordinary least squares and propensity score matching, after assuming that there is no omitted variables bias and that the treatment effect is homogeneous. Their outcome variables are math and verbal scores. They control for nationality, socioeconomic status, household factors, and school factors. While they cannot fully rule out bias due to unobservables, they do argue that their results do not suffer from lack of overlap and differing economic environments. They find

an average treatment effect of 0.1 standard deviations. They argue that the better performance of the Fe y Alegría school comes from its labor contract flexibility and decentralized administrative structure.

The city of Bogotá, Colombia, has introduced the concession schools program, under which twenty-five newly built public schools in poor neighborhoods were turned over to high-quality private institutions. The program began in 2000 and serves 26,000 students. Schools are paid U.S.\$506 per student (below the average annual cost of a student who attends a half-day public school), must provide educational services to poor children, and must accept all students. The provider has full autonomy over school management and is assessed on results. A recent impact evaluation using propensity score matching by Felipe Barrera-Osorio (chapter 9) in this volume finds that dropout rates were lower in concession schools and competition from concession schools led to a decline in dropout rates in nearby public schools. There are few similar programs outside the United States. A similar version may be the United Kingdom's City Academies program, which in the first two to three years of its existence does not show any improved pupil performance relative to state schools (see Stephen Machin and Joan Wilson, chapter 10 in this volume).

Private Finance Initiative (PFI)

The United Kingdom, starting in 1997, pioneered initiatives to contract with private consortiums to provide school facilities. Canada, Australia, and other countries have implemented similar PFIs to expand private involvement in financing and providing infrastructure. Developing countries are following suit now, including Mexico and Colombia. There is little evidence on the impact of contracting for the delivery of education services, although some studies have assessed PFIs on the price and timeliness of delivery of infrastructure.

Conclusions and a Call for Further Research

We know more about certain types of contract options. Namely, we know a lot about voucher programs and charter schools in the United States. We know much less about other contracting forms from other countries. Therefore, impact evaluations are needed to increase the information base by which policy makers can make informed decisions. While the assessment literature for innovative education contracting

programs is increasing rapidly over time, most of the research is for the United States. Meanwhile, there are some very interesting programs in developing and transition countries that are not receiving much attention. More research could help us uncover whether cross-country differences in the operation and funding of schools matter for student achievement.

It would appear that competition matters. Most studies show improvements in public schools over time that are subject to competition from private schools in the local education market. This is the case in more developed countries, such as the United States, Sweden, the Czech Republic, and the Netherlands; but not in Denmark, and probably not in Chile. While all nonrandomized studies are problematic to some extent, the lack of over-time data (Netherlands, Denmark), lack of preprogram data (Chile), and difficulties controlling for selection or sorting (Netherlands, Czech Republic, Denmark) make some of the studies suspect. At a minimum, evaluations of such programs should be done over time, with data covering several years before the implementation and at least a few years after program launch.

The fundamental problem in estimating the impact of voucher programs is that students and schools often self-select into the program (the selection problem). In this case a comparison between students who participate and those who do not participate confounds the effects of the program with the initial differences in characteristics between participants and nonparticipants. It is likely that better informed households are more likely to apply to voucher programs. In this case, students from better informed and more active households may perform differently than students who did not apply to the program. Therefore, any observed final educational outcomes not only comprise the results from the voucher program but also the inherent differences in characteristics of the families or students. One possible solution in order to evaluate outcomes in established school choice programs might be to experiment with the motivation to participate. That is, policy makers could offer more information on the benefits of vouchers, for example by publishing test scores, to a targeted group of families in disadvantaged economic conditions.

Many researchers rely on the instrumental variables (IV) approach, which uses a variable with two characteristics: it can explain participation in the program but is uncorrelated with the outcome measures of interest. Clearly, the main problem of the IV approach is validity. The majority of available variables that are correlated with participation

are correlated with the outcome as well. Even when one finds a variable correlated with participation, it is impossible to test whether it is uncorrelated with the unobservable part of the outcome variable. The other potential methods—Heckman correction models, difference-in-difference estimators, and matching estimators—are based on strong assumptions.

The need for more evaluations using strong designs is clear. Voucher programs are ideal settings in which to design experimental setups. The demand for education is increasing, and the resources are scarce. In this case, allocation of benefits by lottery will ensure horizontal equity and transparency to the process. In the event that the voucher is targeted using a proxy index, then the program can be evaluated by regression discontinuity design (RDD), given unbiased estimators. The RDD estimation is possible if the program identified its beneficiaries using an assignment variable. For example, if selection was based on a proxy-mean index, then regression discontinuity analyses could potentially be used in such cases, since they make use of the assignment variable and the observations with scores close to the cutoff point for program eligibility. If all those with a score below a certain cutoff are beneficiaries and those with a score above the cutoff are denied access to the program, then students with scores just below the cutoff point (beneficiaries) are very similar to students above the cutoff point (comparison group). Thus, it is possible to compare the outcome variables for those two groups and attribute the differences to the program.

Social issues and vouchers must be on the research agenda. Vouchers and other forms of private participation should not only be assessed in terms of efficiency in improving test scores, but also in terms of their impact on social tensions. It could be that without institutional control, private schools may teach racism and religious intolerance, thus exacerbating social tensions. These are important empirical questions that must be included in future research. For example, in the case of Pakistan, recent findings on the enrollment numbers differ by an order of magnitude from those reported by and in the media. The religious school sector (*madrassa*) is small compared to educational options such as public and private schooling, accounting for less than 1 percent of overall enrollment in the country (Andrabi and others 2006).

The evaluation of programs is fundamental for the selection of successful public policies. In effect, a positive evaluation may lead to the realization of the importance of investing part of the national budget in a program with proven results. A negative evaluation, on the contrary,

may imply considerable savings for the public treasury since it is possible to cancel programs that, without the evaluation, would have continued and maybe even been extended.

There is a need for multi-country, -institutional, and -year research, with various sources of funding, and a common methodological framework, under a common organizing framework. The research could go beyond analyzing what works and explain why it works, how, and under what circumstances.

Notes

World Bank, 1818 H Street NW, Washington, D.C., 20433 (hpatrinos@worldbank.org). The views expressed here are those of the author and should not be attributed to the World Bank.

1. Trends in International Mathematics and Science Study (TIMSS) and Program for International Student Assessment (PISA).

References

- Ahlin, A. 2002. Does school competition matter? Effects of large scale school choice reform on student performance. Working paper, Department of Economics, Uppsala University, Sweden.
- Allcott, H., and D. Ortega. 2007. The performance of decentralized school systems: Evidence from Fe y Alegría in Venezuela. Working paper, Instituto de Estudios Superiores de Administración, Caracas, Venezuela.
- Andersen, S. C., and S. Serritzlew. 2006. The unintended effects of private school competition. *Journal of Public Administration Research and Theory* 17: 335–356.
- Andrabi, T., J. Das, A. Ijaz Khwaja, and T. Zajonc. 2006. Religious school enrollment in Pakistan: A look at the data. *Comparative Education Review* 50, no. 3: 446–477.
- Angrist, J., E. Bettinger, E. Bloom, E. King, and M. Kremer. 2002. Vouchers for private schooling in Colombia: Evidence from randomized natural experiments. *American Economic Review* 92, no. 5: 1535–1558.
- Angrist, J., E. Bettinger, and M. Kremer. 2006. Long-term consequences of secondary school vouchers: Evidence from administrative records in Colombia. *American Economic Review* 96, no. 3: 847–862.
- Bettinger, E. P. 2005. The effect of charter schools on charter students and public schools. *Economics of Education Review* 24: 133–147.
- Brunello, G., and D. Checchi. 2005. School vouchers Italian style. IZA Discussion Paper Series 1475, Bonn, Germany.
- Filer, R. K., and D. Munich. 2002. Responses of private and public schools to voucher funding. Working paper, Center for Economic Research and Graduate Education of

Charles University and Economics Institute of the Academy of Sciences of the Czech Republic, Prague.

Friedman, M. 1955. Role of government in education. In *Economics and the Public Interest*, ed. Robert Solo. New Brunswick, N.J.: Rutgers University Press.

Himmler, O. 2007. The effects of school choice on academic achievement in the Netherlands. Working paper, Georg-August-Universität Göttingen, Germany.

Howell, W. G., and P. E. Peterson. 2002. *The Education Gap: Vouchers and Urban Schools*. Washington, D.C.: Brookings Institution.

Hoxby, C. M. 2003a. *The Economics of School Choice*. Chicago: University of Chicago Press.

Hoxby, C. M. 2003b. School choice and school competition: Evidence from the United States. *Swedish Economic Policy Review* 10: 9–65.

Hoxby, C. M. 2004. A straightforward comparison of charter schools and regular public schools in the United States. Working paper, Harvard Institute of Economic Research.

Hsieh, C.-T., and M. Urquiola. 2006. The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program. *Journal of Public Economics* 90, no. 8–9: 1477–1503.

Kremer, M. 2003. Randomized evaluations of educational programs in developing countries: Some lessons. *American Economic Review Papers and Proceedings* 93, no. 2: 102–106.

Ladd, H. F. 2002. School vouchers: A critical view. *Journal of Economic Perspectives* 16, no. 4: 3–24.

Neal, D. 2002. How vouchers could change the market for education. *Journal of Economic Perspectives* 16, no. 4: 25–44.

Patrinos, H. A. 2002. Private education provision and public finance: The Netherlands as a possible model. Occasional Paper No. 59, NCSPE, Columbia University.

Patrinos, H. A. 2004. Private education provision and public finance: The Netherlands as a possible model. Paper presented at the 2004 AEA meetings, San Diego, CA.

Rouse, C. E. 1998. Private school vouchers and student achievement: An evaluation of the Milwaukee Parental Choice Program. *Quarterly Journal of Economics* 113, no. 2: 553–602.

Sandström, F. M., and F. Bergström. 2005. School vouchers in practice: Competition will not hurt you. *Journal of Public Economics* 89, no. 2–3: 351–380.

West, M. R., and P. E. Peterson. 2006. The efficacy of choice threats within school accountability systems: Results from legislatively induced experiments. *Economic Journal* 116, no. 510: C46–C62.

Contributors

Felipe Barrera-Osorio
World Bank

Cristian Bellei
Harvard University

Eric P. Bettinger
Case Western Reserve University

Rajashri Chakrabarti
Federal Reserve Bank

Geeta G. Kingdon
University of Oxford

Michael Kremer
Harvard University

Norman LaRocque
Education Forum

Stephen Machin
University College London

Karthik Muralidharan
University of California–San Diego

Thomas J. Nechyba
Duke University

Harry Anthony Patrinos
World Bank

Paul E. Peterson
Harvard University

Joan Wilson
London School of Economics

Ludger Wößmann
University of Munich

Index

- A+ Plan, 247–248
- Ability tracking, 58–59
- Academies Sponsor Prospectus, 226
- Aedo, Cristian, 169
- All India Education Survey, 111
- Andersen, S. C., 249
- Angrist, Joshua, 144, 149, 152, 252
- Arizona, 248
- Army schools, 111
- ASER survey, 115, 136n4
- Australia, 5, 83–84, 246
- Average treatment effect (ATE), 252

- Banerjee, A. S., 112
- Barrera-Osorio, Felipe, 8–9, 193–218
- Barrientos, J. H., 197
- Bashir, Sajitha, 118, 126–127
- Bayer, P., 49
- Belgium, 19
- Bellei, Cristian, 7–9, 165–192, 251
- Bergström, F., 250–251
- Bettinger, Eric, 7, 9, 143–164, 248, 252
- Bishop, John H., 18, 23
- Bloom, Erik, 144
- Blunkett, David, 227
- Book banks, 99
- Bravo, David, 169
- Brazil, 4–5
 - funding patterns and, 19
 - private schools and, 47–48
 - public-private partnerships and, 14, 19
- Bribery, 93
- Brunello, G., 248
- Brunner, E., 64
- Build-operate-transfer (BOT), 73

- Calderon, Alberto, 146
- Carnoy, Martin, 169

- Catholic Church, 4, 48
 - Chile and, 168, 170
 - competition effect and, 249
 - Jesuits and, 80
- Caucutt, E., 57
- Cerdan, P., 205
- Certification, 230–231
- Chakrabarti, Rajashri, 3–11
- Charter schools, 4, 198
 - accountability and, 75, 78
 - city academies and, 226–227
 - contracting and, 75, 78
 - Fe y Alegria (FyA) and, 80, 252–253
 - government red tape and, 78
 - legal issues and, 78
 - United States and, 8, 75, 78, 198, 226–227
- Chaudhury, Nazmul, 92, 96
- Checchi, D., 248
- Chicago Public Schools (CPS), 75
- Chile, 4, 8–10, 251, 254
 - competition effect and, 168, 189
 - cream skimming and, 167
 - enrollment and, 167
 - institutional design in, 166–167
 - language and, 167–168
 - market-oriented initiatives and, 165–168, 188
 - mathematics and, 167–168
 - parents' education level and, 178–179
 - peer effects and, 180
 - public-private partnerships and, 165–191
 - regression analysis of, 167–188
 - school types in, 166–167
 - SES index and, 168, 172–177, 180–182, 191n7
 - socioeconomic status and, 179–181
 - student selection and, 172–178
 - systemic effects and, 167–169

- Chile (cont.)
 vouchers and, 7, 132, 166–167, 170–181, 251
- Chubb, John E., 23–24, 49
- Church schools, 18
 Catholic, 4, 48, 80, 168, 170, 249
 competition effect and, 249
- City academies, 9
 Academies Sponsor Prospectus and, 226
 Blunkett and, 227
 certification and, 230–231
 charter schools and, 226–227
 General Certificate of Secondary Education (GCSE) and, 230–234, 237, 239n11
 Local Education Authorities (LEA) and, 226, 231, 234
 performance of, 230–237
 private finance initiatives (PFIs) and, 225–226
 program of, 226–231
 specialization and, 230
 sponsors and, 230
 TeacherNet and, 225
- City technology colleges (CTCs), 220
- Classroom size, 83
 Colombia and, 145, 196–197
 India and, 91, 95–96, 101–103
 United Kingdom and, 223–224
- Cleveland Scholarship and Tutoring program, 6
- Cohen-Zada, D., 54
- Colombia, 4–6, 9
 dropout rates and, 195, 202–203, 205, 207, 209, 213
 enrollment and, 143, 193
 Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 144–145, 150–162, 203
 Ministry of Education and, 79, 203
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 143–148, 155–156, 159
 public-private partnerships and, 143–163
 pupil-teacher ratio and, 145, 196–197
 regression analysis of, 143–163, 196–216
 vouchers and, 7, 132, 143–163, 251–252
- Common Core of Basic Competence, 150
- Competition effect
 Chile and, 167–168, 189
 Colombia and, 202
 future policy research and, 247–249, 254
 India and, 101–103
- Concession schools, 10n1
 autonomy and, 198
 Colombia and, 8, 78–80, 193–217, 253
 direct/indirect impact of, 201, 209–216
 dropout rates and, 195, 202–203, 205, 207, 209, 213
 economic issues and, 193, 197, 216, 253
 enrollment and, 193
 infrastructure of, 203–204
 Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 203–204
 open-door policy of, 194
 performance and, 193–195, 198–216
 poor families and, 194
 public school differences and, 193–194
 pupil-teacher ratio and, 196–197
 quality of, 193–194
 regression analysis of, 196–216
 resources of, 203, 208–209
 self-selection and, 201
 test scores and, 194–195, 199, 208
- Contracting
 charter schools and, 75, 78, 252–253
 concession schools and, 78–80
 defined, 71
 Education Management Organizations (EMOs) and, 74–75
 forms of, 246–247
 government use of, 71
 infrastructure public-private partnership (PPP) model and, 73–74, 82–84
 international examples of, 74–84
 management contract model and, 72–73
 model topologies and, 72–74
 operational contract model and, 72
 performance and, 247–248
 policy design and, 84–86
 potential benefits of, 72
 private finance initiatives (PFIs) and, 83–84, 225–226, 253
 private management and, 74–80
 public schools and, 74–80
 service delivery model and, 72–73
 service procurement and, 71
 transparency and, 72, 85
 United States and, 74–78
 vouchers and, 248–252 (*see also* Vouchers)
- Contreras, Dante, 169
- Cooley, J., 49

- Corpoeducación, 197
 Côte d'Ivoire, 5, 81
 Cream skimming, 47, 56–59, 65–66, 167
 Credit constraints, 24–29, 35, 40
 Czech Republic, 250, 254
- De, Anuradha, 91, 99
 Denmark, 248–249, 254
 Department for Children, Schools and Families (DCSF), 221
 Department of Education and Training (DET), 83–84
 Direct Payment Agreement, 127
 District Information System for Education (DISE), 113
 Dixon, Pauline, 91, 93, 104–105, 116, 118
 Dominguez, C., 205
 Drèze, J., 111, 115, 118, 125–126
 Dropout rates, 195, 202–203, 205, 207, 209, 213
 Duarte, J., 193
 Duflo, Esther, 112
- Economic agents, 48–49
 Economic issues
 bribery and, 93
 concession schools and, 79, 193, 197, 216, 253
 contracting and, 71–86
 cream skimming and, 57–58
 credit constraints, 24–29, 35, 40
 different cost types and, 55
 Direct Payment Agreement and, 127
 Educational Service Contracting (ESC) and, 81
 education policy and, 48–49
 equilibrium and, 48–59
 free riders and, 51–52
 Fund for Assistance to Private Education (FAPE), 81
 funding effects and, 26–35
 grants-in-aid system and, 129–130
 Herfindahl index and, 249
 housing choices and, 47, 60–64
 human capital and, 3
 income heterogeneity and, 53
 Indian schools and, 112–113, 122–126
 introducing politics and, 53–54
 lack of resources and, 132
 niche markets and, 47
 operation interactions and, 36–38
 performance analysis and, 25–40
 per pupil spending and, 68n5
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 146
 poor families and, 24, 116, 131–133, 145, 152–153, 194
 private finance initiatives (PFIs) and, 225–226, 253
 property values and, 67
 public-private partnerships and, 14, 18–23 (*see also* Public-private partnerships [PPPs])
 quasi-public school markets and, 60–64
 rents and, 49, 54
 rural private schools and, 99–105
 Salary Distribution Act and, 127
 socioeconomic status and, 179–181, 250–251
 subsidies and, 52–53, 81, 127, 130–131, 134, 152, 165–171, 178–188, 191n7, 251
 teacher salaries and, 91, 101, 125–127, 130–131, 223
 transparency and, 72, 85
 unions and, 127–129
 vouchers and, 3–4, 6, 143–163 (*see also* Vouchers)
- Edison Schools, 75
 Education Act, 220
 Education guarantee schools, 111
 Education Management Organizations (EMOs), 74–75
 Education Reform Act, 220
 Education Service Commission, 112, 128
 Education Service Contracting (ESC), 81
 Education Voucher system (EVS), 81–82
 Efficiency, 245, 252, 255
 Chile and, 165
 Colombia and, 156
 India and, 97, 104, 107, 125, 130–131
 public-private relationships and, 5, 9, 17, 23–24, 41, 72, 86
 relative effectiveness and, 118–122
 resource, 47, 51–54
 United States and, 47, 51–59, 63, 66
- Egypt, 84
 Epple, D., 57–59
 Equations
 achievement score, 119–120
 performance analysis, 25–30
 production function, 196
 program impact, 200
 voucher effect, 152

- Equilibrium
 cream skimming and, 56–59
 education policy and, 48–50
 peer effects and, 54–55
 policy and, 52–57
 Equity issues, 131–133
 Examination boards, 111
- Ferreira, F., 49
 Ferreyra, M., 54, 58
 Fe y Alegría (FyA), 80, 252–253
 Filer, R. K., 250
 Finland, 14, 16, 19
 Florida
 A+ Plan and, 247–250
 Opportunity Scholarship program, 6–7
 Supreme Court and, 6–7
 France, 4
 Free riders, 51–52
 Friedman, M., 245
 Fuchs, Thomas, 18
 Fund for Assistance to Private Education (FAPE), 81
- Gallego, Francisco, 168, 170
 Galor, Oded, 24
 Gauri, Varum, 167–168, 171–172
 Gaviria, A., 197
 General Certificate of Secondary Education (GCSE), 230–234, 237, 239n11
 Germany, 5
 Glinskaya, Elena, 112
 Goldschmidt, P., 198
 Government, 92–93, 112–113. *See also*
 Policy
 charter schools and, 75, 78
 city academies and, 225–237
 contracting and, 71–86, 246–247
 grant-maintained (GM) schools and, 220
 private school sponsorship and, 81
 Right to Education Bill and, 107
 subsidies and, 52–53, 81, 127, 130–131, 134, 152, 165–171, 178–188, 191n7, 251
 vouchers and, 143–163 (*see also* Vouchers)
 Government Assistance to Students and Teachers in Private Education (GASTPE), 81
 Govinda, R., 118
 Goyal, M., 112
 Graddy, K., 224
 Gradstein, Mark, 23–24
 Grant-maintained (GM) schools, 220
 Grants-in-aid system, 129–130
 Greece, 4, 14, 19
 Green, F., 223
 Greene, William H., 26
 Gutierrez, Marybell, 145
- Hanna, Rema, 112
 Hanushek, Eric, 23, 49, 132, 196–198
 Harris, J., 49
 Heckman, J., 199–201
 Herfindahl index, 249
 Himmler, O., 249
 Horizontal differentiation, 54–56, 59
 Housing choices, 47
 geographical constraints and, 59
 public schools and, 60
 quasi-public schools and, 60–63
 residential segregation and, 60–61
 vouchers and, 62–65
 Howell, W. G., 247
 Hoxby, C., 49, 59, 198, 247–248
 Hsieh, Chang-Tai, 132, 167–168, 251
 Human capital, 3
 Human Development Network, 13
- Iceland, 14, 19
 India, 6
 absenteeism and, 91–92, 95, 97, 103–105, 128
 achievement scores and, 119–121
 aided schools and, 92–93, 107, 108n6, 112, 115–123, 126–134, 136n4
 bribery and, 93
 conditions in, 99, 101
 decentralizing reform and, 132
 Direct Payment Agreement and, 127
 District Information System for Education (DISE) and, 113
 Education Service Commission and, 112, 128
 enrollment and, 93, 111–118, 135
 examination boards and, 111
 government recognition and, 113
 grants-in-aid system and, 129–130
 infrastructure and, 99, 101
 internal efficiency and, 118–126
 lack of reliable data for, 111–112
 lack of resources and, 132
 language and, 119–123, 125
 Madhya Pradesh, 118–119, 133
 mathematics and, 108n7, 118–125

- Ministry of Human Resource Development (MHRD) and, 126–127
- National Commission on Teachers and, 128–129
- official/household data and, 113–116
- parent characteristics and, 102, 104–105
- performance in, 104–105, 111–112, 119–122
- per-pupil expenditures in, 122–123
- private schools and, 91–103
- public-private partnerships and, 106–107, 126–134
- public school failure and, 97
- pupil-teacher ratio (PTR) and, 96, 101–103
- recognized schools and, 111
- relative sizes of school sectors in, 112–118
- Right to Education Bill and, 107
- rural/urban growth and, 116–118
- Salary Distribution Act and, 127
- sampling methodology for, 92–94
- school costs in, 122–126
- Tamil Nadu, 118, 133
- teacher characteristics and, 91–92, 103–105, 127–129, 132
- teacher salaries and, 91, 125–126
- transfer certificates (TCs) and, 113
- typology of school types in, 112–113
- unions and, 127–129, 132
- Uttar Pradesh, 113–114, 118–119, 122–123, 125, 127, 129, 134, 136n1
- vouchers and, 106, 132–133
- Information and communications technology (ICT), 225
- Infrastructure public-private partnership (PPP) model, 73–74, 82–84
- Initiatives, 8–9
- city academies and, 225–237
- equity issues and, 131–133
- further research for, 253–256
- market-oriented, 165–168, 188
- mobilization policy and, 47–67
- Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 143–144, 155–156, 159
- private finance initiatives (PFIs) and, 83–84, 225–226, 253
- teacher response to, 49
- Instituto Colombiano Para El Fomento De La Educación Superior (ICFES), 144
- concession schools and, 203–204
- language and, 150–152
- mathematics and, 150–152, 157
- median scores on, 145
- outcomes analysis of, 153, 156–162
- popularity of, 150
- regression analysis of, 150–152, 155–161
- subsidies and, 152
- valid ID and, 150
- voucher effect and, 155–162
- Instrumental variables (IV) approach, 112, 254–255
- Ireland, 19
- Italy, 4, 14
- Jalan, Iyotsna, 112
- Japan, 246
- Jesuits, 80
- Jiminez, Emmanuel, 24, 155
- Justman, Moshe, 23–24, 54
- King, Elizabeth, 143–145
- Kingdon, Geeta G., 6, 9, 91, 93, 111–139
- Korea, 16, 19
- Kremer, Michael, 5, 9
- Colombia and, 144, 146
- future research and, 245, 252
- India and, 91–109, 115, 119, 128
- Krueger, Alan, 49, 152
- Ladd, Helen F., 132, 245
- LaLonde, R., 200
- Language, 55, 249
- Chile and, 167–168, 170–174, 186
- Colombia and, 150, 156–159
- India and, 108n7, 118–121, 123, 125, 136n1
- LaRocque, Norman, 5, 71–87, 126, 132, 246, 252
- Larrañaga, Osvaldo, 169
- Latvia, 14, 19
- Learning disabilities, 67
- Leases, 73, 82
- Lebanon, 5
- Legal issues
- charter schools and, 78
- Florida's accountability law and, 247–248
- vouchers and, 6–7
- Levine, D., 112
- Libraries, 99, 197, 203
- Literacy. *See* Reading
- Local Education Authorities (LEA), 226, 231, 234

- Lotteries
 Colombia and, 143–156, 159, 162
 PACES and, 145–148
 Luxembourg, 19
- Machin, Stephen, 8, 219–240
- Management, 3–6. *See also* Policy
 charter schools and, 75, 78
 concession schools and, 78–80
 contracting and, 71–86
 service delivery and, 80–82
- Mathematics
 Chile and, 167–179, 182–187, 191n8
 Colombia and, 150–161, 198, 204, 207–208, 214
 India and, 108n7, 118–125
 Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 157
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 146
 Program for International Student Assessment (PISA) and, 17, 32
 public-private partnerships analysis and, 13, 17, 30, 32–35, 40, 43n12, 248–252
 Trends in International Mathematics and Science Study (TIMSS) and, 249
- Mayer, Daniel, 148
- McEwan, Patrick, 169–170
- McHugh, C., 58
- McMillan, R., 49
- Mehta, Arun, 99, 111
- Meier, Volker, 24
- Members of the Legislative Assembly (MLAs), 128
- Members of the Legislative Council (MLCs), 128
- Mendez, Jairo, 143
- Mexico, 4, 14, 19
- Michigan, 248
- Micro Impacts at Macroeconomic Policies (MIMAP), 116
- Milwaukee, 6, 248
- Milwaukee Parental Choice Program (MPCP), 6
- Ministry of Education (Colombia), 203
- Ministry of Education (Netherlands), 249
- Ministry of Human Resource Development (MHRD), 126–127
- Minneapolis-St. Paul, 8
- Minnesota, 78
- Mizala, Alejandra, 169–170
- Moe, Terry M., 23–24, 49
- Morales-Cobo, Patricia, 145
- Munich, D., 250
- Muralidharan, Karthik, 5, 9, 91–109, 112, 115, 119
- Murarka, S., 198
- Muzammil, Mohammad, 122, 126–127
- National Commission on Teachers (NCT), 128–129
- National Sample Survey, 95
- Neal, D., 245
- Nechyba, Thomas J., 5, 9, 47–69, 126, 132–133
- Netherlands, 4, 5, 19, 248–249, 254
- New Jersey, 65
- Newlon, E., 58
- New Schools Project, 83–84
- New York, 198, 247
- New Zealand, 4–5, 14, 132
- Nonformal education centers, 94
- Nongovernmental organizations (NGOs), 18, 80
- Noronha, Claire, 91, 99
- Norway, 14, 19
- Nutrition, 194
- Oates, Wallace, 49
- Ohio, 6, 247
- Operational contract model, 72
- Orazem, Peter, 143, 145
- Ordinary least squares (OLS) analysis, 95, 136n7, 170, 188, 215, 249
- Organisation for Economic Co-Operation and Development (OECD), 17–18, 32
- Ostoic, Carolina, 170
- Pandey, Priyanka, 112
- Paqueo, Vicente, 24
- Pardo, Carlos, 145
- Parents, 6, 247–248
 education level of, 25, 178–179
 housing choices and, 47, 59–65
 income levels of, 67
 India and, 102, 104–105
 policy and, 49
 valuation of education by, 25–27
- Patrinos, Harry A., 9, 13, 245–257
- Pedagogical targeting, 47
 cost differences and, 55
 equilibrium and, 54–55
 horizontal differentiation and, 54–56

- peer effects and, 54–55
vertical differentiation and, 56–59
- Peer effects
cross-type, 55–56
equilibrium and, 54–55
horizontal differentiation and, 54–56
positive, 47
socioeconomic status and, 180
vertical differentiation and, 56–59
- Penn World Tables, 126
- Performance. *See also* Regression analysis
A+ Plan and, 247–248
achievement scores and, 119–121
alternative empirical specifications and, 27–30
Chile and, 167–172
city academies and, 230–237
Colombia and, 143–163, 193–216
competition effect and, 101–103, 168, 189, 245, 247–249, 254
concession schools and, 193–195, 198–216
examination boards and, 111
funding effect and, 26–27
further research for, 253–256
General Certificate of Secondary Education (GCSE) and, 230–234, 237, 239n11
Herfindahl index and, 249
India and, 104–105, 111–112, 119–122
instrumental variable methods and, 112, 254–255
mathematics and, 13, 17, 30, 32–35 (*see also* Mathematics)
policy design and, 85
Program for International Student Assessment (PISA) and, 5, 13, 16–18, 28, 32
propensity-score matching and, 112
pupil fixed-effects approaches and, 112
quality and, 70, 80 (*see also* Quality)
reading and, 13, 17, 33, 38, 41, 121–125, 155, 161–162, 198, 204, 208, 214, 248
relative effectiveness and, 118–122
science and, 13, 17, 33, 41, 191n8, 249, 256n1
selection bias and, 25–27, 35–36
study results on, 30–40
systemic effects and, 167–169
teacher promotions and, 122–123
treatment effect models and, 112
Trends in International Mathematics and Science Study (TIMSS) and, 249, 256n1
vouchers and, 252 (*see also* Vouchers)
- Peterson, Paul E., 3–11, 13, 247–248
- Philadelphia, 75
- Philippines, 5, 81–82
- Plan de Ampliación de Cobertura de la Educación Secundaria (PACES)
background of, 145–148
lotteries and, 143–156, 159, 162
poor families and, 145
pupil-teacher ratios and, 145
regression analysis of, 145–163
subsidies and, 152–153
valid ID and, 146–148
voucher effects and, 150–163
- Policy
ability tracking and, 58–59
Chile and, 165–191
city academies and, 225–237
Colombia and, 143–163, 193–217
complex challenges for, 48–51
concession schools and, 194
constraint definition and, 48–49
contracting and, 71–86
cream skimming and, 47, 56–59, 65–66
design lessons for, 84–86
Direct Payment Agreement and, 127
economic issues and, 48–49
Education Act and, 220
education contracts and, 245–256
Education Reform Act and, 220
equilibrium and, 48–50, 52, 54–57
Florida's accountability law and, 247–248
free riders and, 51–52
future, 245–256
government red tape and, 78
horizontal differentiation and, 54–56
housing choices and, 47, 59–65
income heterogeneity and, 53
India and, 91–108
introducing politics and, 53–54
new form of public-private partnerships, 130–133
parents and, 49
pedagogical targeting and, 47, 54–56
Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 143–144, 155–156, 159
private sector mobilization and, 47–67
real world outcomes and, 49
resource efficiency and, 47, 51–54
Right to Education Bill and, 9, 107, 130–132, 134
Salary Distribution Act and, 127

- Policy (cont.)
 United Kingdom and, 219–240
 vertical differentiation and, 56–59
 voice and, 51–52
 voucher targeting, 62–67
- Poor families, 24
 concession schools and, 194
 disadvantaged children and, 131–132
 equity issues and, 131–133
 India and, 116
 nutrition and, 194
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 145
 subsidies and, 152–153
- Pradesh, Andhra, 101
- PriceWaterhouseCoopers (PwC), 230–231
- Primary sampling units (PSUs), 92
- Pritchett, Lant, 23
- Private finance initiatives (PFIs), 83–84, 225–226, 253
- Private schools
 bribery and, 93
 Catholic, 4, 48, 80, 168, 170, 249
 Chile and, 165–191
 classification of, 18
 classroom size and, 83, 91, 95–96, 101–103, 145, 196–197, 223–224
 Colombia and, 143–163, 193–216
 competition effect and, 101–103, 168, 189, 245, 247–249, 254
 contracting and, 80–82
 cream skimming and, 47, 56–59, 65–66, 167
 cross-country involvement analysis and, 17–23
 effectiveness of, 118–122, 169–170
 enrollment and, 113–115, 221
 equilibrium without peer effects and, 54–55
 free riders and, 51–52
 funding patterns and, 18–23
 growth in, 116–118
 horizontal differentiation and, 54–56
 housing choices and, 47, 59–64
 India and, 91–103
 internal efficiency of, 118–126
 introducing politics and, 53–54
 mobilization policies and, 47–67
 niche markets and, 47
 nongovernmental organizations (NGOs) and, 18, 80
 nonsubsidized, 122–123, 166–167, 170
 official/household data and, 113–116
 pedagogical targeting and, 47, 54–56
 performance analysis and, 23–30, 104–105 (*see also* Performance)
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 145–148
 positive peer effects and, 47
 public-private partnerships and, 3–11 (*see also* Public-private partnerships [PPPs])
 pupil participation rates and, 221, 223
 quasi-public school markets and, 61–64
 relative cost of, 122–126
 resource efficiency and, 47, 51–54
 rural, 91–107
 school infrastructure and, 99, 101
 sector size effects and, 112–118
 service delivery and, 80–82
 socioeconomic status and, 179–181, 250–251
 state schools and, 223–224, 226
 student assessment and, 13–14
 student selection and, 172–178
 subsidies and, 52–53, 81, 127, 130–131, 134, 152, 165–171, 178–188, 191n7, 251
 superior results in, 23
 teacher absenteeism and, 5–6, 91–92, 95, 97, 103–105, 128
 unaided, 112–113
 unrecognized, 111
 vertical differentiation and, 56–59
 vouchers and, 6–8, 62–64, 143–163, 251–252
- Probability proportional to size (PPS), 94–95
- PROBE Team, 91, 116, 121–122
- Program for International Student Assessment (PISA), 5
 background questionnaires and, 18
 database of, 17–18
 literacy and, 17–18
 OECD and, 17–18
 public-private partnerships and, 13, 16–18, 28, 32
- Propensity-score matching methods, 112
- Psacharopoulos, George, 155
- Public-private partnerships (PPPs)
 accountability and, 23–24
 charter schools and, 4, 8, 75, 78, 80, 198, 226–227, 252–253
 Chile and, 165–191
 city academies and, 225–237

- Colombia and, 143–163, 193–217
 concession schools and, 193–217
 contracting and, 71–86
 debate over, 13
 empirical models for, 24–30
 funding and, 14, 16, 18–23, 26–35, 129–130
 grants-in-aid system and, 129–130
 historical perspective on, 126–130
 importance of cross-country differences in, 23–24
 India and, 106–107, 126–134
 infrastructure model and, 73–74, 82–84
 management and, 3–6, 71–86
 New Schools Project and, 83–84
 operation interactions and, 36–38
 performance analysis and, 24–40 (*see also* Performance)
 policy design and, 84–86
 poor families and, 24
 Program for International Student Assessment (PISA) and, 13, 16–18, 28, 32
 as project-based endeavors, 13
 proposed new form of, 130–133
 regression analysis and, 25–40 (*see also* Regression analysis)
 resources and, 3–4
 systemic effects and, 13–14
 TeacherNet and, 225
 teacher unions and, 127–129
 United Kingdom and, 19, 127, 219–240
 vouchers and, 38 (*see also* Vouchers)
- Public schools
 ability tracking and, 58–59
 Chile and, 165–191
 classification of, 4, 18
 Colombia and, 143, 162
 competition effect and, 247–247
 concession school differences and, 193–194
 contracting and, 74–80
 cross-country involvement analysis and, 17–23
 effectiveness of, 118–122, 169–170
 enrollment of, 75
 equilibrium without peer effects and, 54–55
 failure of, 132
 free riders and, 51–52
 full-fledged, 67
 funding patterns and, 18–23
 India and, 97
 internal efficiency of, 118–126
 introducing politics and, 53–54
 outcomes of, 224
 performance analysis and, 24–30 (*see also* Performance)
 price of, 49–50
 private management of, 74–80
 quasi, 60–63, 65
 relative cost of, 122–126
 residential segregation and, 60–61
 sector size effects and, 112–118
 student assessment and, 13–14
 student selection and, 172–178
 teacher absenteeism and, 5–6
 voice and, 51–52
- Pupil fixed-effects approaches, 112
- Pupil-teacher ratio (PTR)
 Colombia and, 145, 196–197
 India and, 91, 95–96, 101–103
 United Kingdom and, 223–224
- Quadrant-dummy specification, 28–29
- Quality, 78, 80
 ability tracking and, 58–59
 Chile and, 165–168, 171, 176, 185, 189–190
 Colombia and, 155, 159, 161–162, 193–197, 201–202, 208, 216
 concession schools and, 193–194, 197
 cream skimming and, 47, 56–59
 future policy and, 245–249, 252–253
 India and, 106–107, 129–131, 134
 pupil-teacher ratio and, 96, 101–103, 196–197
 U.S. private sector mobilization and, 51–68
- Quasi-public schools, 60–63, 65
- Randomization strategy, 199–200
- Rawlings, Laura, 145
- Reading, 248
 Colombia and, 155, 161–162, 198, 204, 208, 214
 India and, 121–125
 Program for International Student Assessment (PISA) and, 17–18
 student achievement and, 13, 17, 33, 38, 41
- Regression analysis
 bootstrap procedure and, 214
 Chile and, 167–188
 Colombia and, 143–163, 196–216

- Regression analysis (cont.)
 concession schools and, 196–216
 cross-country variation and, 25–38
 funding effects and, 26–35
 India and, 104–105, 111–112, 119–122
 Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 150–152, 155–161
 instrumental variables (IV) approach and, 254–255
 operation interactions and, 36–38
 ordinary least squares (OLS), 95, 136n7, 170, 188, 215, 249
 performance studies and, 25–30
 Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 145–163
 quadrant-dummy specification and, 28–29
 randomization strategy and, 199–200
 voucher effects and, 150–163
 within-country variations and, 38–40
 Regression discontinuity design (RDD), 255
 Rents, 49, 54
 Residential segregation, 60–61
 Resources, 47, 51–52
 cross-type peer effects and, 55–56
 equilibrium and, 54–55
 horizontal differentiation and, 54–56
 income heterogeneity and, 53
 introducing politics and, 53–54
 pedagogical targeting and, 54–56
 vertical differentiation and, 56–59
 “Right to Education” Bill, 9, 107, 130–132, 134
 Rockoff, J., 198
 Rodriguez, A., 197–198
 Rodriguez, Jorge, 169
 Romaguera, Pilar, 169–170
 Romano, R., 57–59
 Rouse, C. E., 248
 Russia, 19
- Saavedra, Juan, 146
 Salary Distribution Act, 127
 Samson, Meera, 91, 99
 San Antonio, 247
 Sanchez, Fabio, 143
 Sandström, F. M., 250–251
 Sanhueza, Claudia, 169
 Sapelli, Claudio, 169–170
 Saran, M., 125–126
 Sarmiento, A., 198
 Schmid, Juan Pedro, 112
 School choice. *See* Policy
 Science, 13, 17, 33, 41, 191n8, 249, 256n1
 Selection bias, 25–27, 35–36
 Sen, Amartya, 118
 Serritzlew, S., 249
 Service delivery model, 72–73
 Shleifer, Andrei, 23
 Smith, J., 200
 Solmon, L., 198
 Sonstelie, J., 64
 State schools, 223–224
 city academies and, 226–237
 Local Education Authorities (LEA) and, 226
 Stevens, M., 224
 Students
 ability tracking and, 58–59
 cream skimming and, 47, 56–59, 65–66, 167
 cross-type peer effects and, 55–56
 dropout rates and, 195, 202–203, 205, 207, 209, 213
 fixed-effects approaches and, 112
 horizontal differentiation and, 54–56
 Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 144–145, 150–162
 learning disabilities and, 67
 parents’ education level and, 25, 178–179
 participation rates and, 221, 223
 peer effects and, 47, 54–59, 180
 per-pupil expenditures and, 68n5, 122–123
 poor nutrition and, 194
 Program for International Student Assessment (PISA) and, 13, 16–18, 32
 pupil-teacher ratio (PTR) and, 91, 95–96, 101–103, 145, 196–197, 223–224
 selection issues and, 172–178
 socioeconomic status and, 179–181, 250–251
 transfer certificates and, 93
 vertical differentiation and, 56–59
 Sundararaman, V., 112
 Sweden, 14, 19, 254
 Switzerland, 19
 Synagogues, 4
 Systemic effects, 13–14, 167–169
 System of Measurement of Educational Quality (SIMCE), 166, 171, 175, 189–190

- Tan, J., 155
- TeacherNet, 225
- Teachers
- absenteeism and, 5–6, 91–92, 95, 97, 103–105, 128
 - accountability and, 121–122, 128
 - block grants and, 130–131
 - degrees and, 92
 - Direct Payment Agreement and, 127
 - enrollment reporting and, 115
 - idleness and, 121, 128
 - National Commission on Teachers and, 128–129
 - pedagogical targeting and, 47, 54–56
 - pupil-teacher ratio (PTR) and, 91, 95–96, 101–103, 145, 196–197, 223–224
 - salaries of, 91, 101, 125–127, 130–131, 223
 - Salary Distribution Act and, 127
 - socioeconomic status and, 179–181
 - unions and, 127–129, 132
- Teal, Francis, 112
- Texas, 247
- Thayer, M., 64
- Tooley, James, 91, 93, 104–105, 116, 118
- Torres, Carlos, 145
- Trade unions, 18, 127–129, 132
- Transfer certificates (TCs), 93, 113
- Transparency, 72, 85
- Treatment effect models, 112
- Trends in International Mathematics and Science Study (TIMSS), 249, 256n1
- United Kingdom, 4–5, 246
- charter schools and, 8
 - city academies and, 8–9, 225–237
 - city technology colleges (CTCs) and, 220
 - Department for Children, Schools and Families (DCSF) and, 221
 - Education Act and, 220
 - Education Reform Act and, 220
 - enrollment and, 221
 - grant-maintained (GM) schools and, 220
 - Local Education Authorities (LEA) and, 226, 231, 234
 - private finance initiatives (PFIs) and, 83, 225–226, 253
 - private schools and, 220–224
 - public-private partnerships and, 19, 127, 219–240
 - pupil participation rates and, 221, 223
 - state schools and, 223–224, 226
 - TeacherNet and, 225
 - vouchers and, 132
- United States, 5
- charter schools and, 8, 75, 78, 198, 226–227
 - competition effect and, 247–248
 - contracting and, 74–78
 - Florida's accountability law and, 247–248
 - further research for, 253–254
 - private sector mobilization and, 47–67
 - public/private funding patterns and, 19
 - vouchers and, 3, 6–7, 132
- University Grants Council, 127
- Urquiola, Mighel, 132, 167–168, 251
- Varghese, N. V., 118
- Vegas, Emiliana, 169
- Venezuela, 5, 80
- Vermeersch, C., 205
- Vertical differentiation, 56–59
- Vial, Bernardita, 170
- Villa, L., 193
- Voice, 51–52
- Vouchers, 3–4, 9, 67, 245, 253
- Chile and, 7, 132, 166–167, 170–181, 251
 - college exams and, 144
 - Colombia and, 7, 132, 143–163, 251–252
 - cream skimming and, 65–66
 - Czech Republic and, 250
 - Denmark and, 248–249
 - federally funded, 6–7
 - further research for, 254–255
 - geographical targeting and, 63
 - housing choices and, 62–65
 - India and, 106, 132–133
 - Instituto Colombiano Para El Fomento De La Educación Superior (ICFES) and, 155–162
 - legal issues and, 6–7
 - lotteries and, 143–156, 159, 162
 - Netherlands and, 248–249
 - per pupil spending and, 68n5
 - Philippines and, 81–82
 - Plan de Ampliación de Cobertura de la Educación Secundaria (PACES) and, 143–163
 - political economy of, 63–64
 - private schools and, 6–8, 62–64, 143–163, 251–252
 - quasi-public schools and, 62–65
 - student selection and, 172–178
 - Sweden and, 250–251

Vouchers (cont.)

targeting policies and, 62–67

teacher unions and, 132

United States and, 3, 6–7, 132

Washington, D.C., 7, 75, 78, 247

Weiner, Myron, 122

West, M. R., 247–248

Wilson, Joan, 8, 219–240

Wohlgemuth, Darin, 143, 145

World Bank, 13, 143, 194, 197

Wößmann, Ludger, 3, 5, 9, 13–45

Zeira, Joseph, 24