Introduction

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This book brings together my teaching notes and research on education finance. This collection could serve as a textbook for a graduate course in education finance or as supplemental readings for a graduate course on state and local public finance or on education policy.¹

The questions addressed in this book are important. Is the property tax an equitable way to finance elementary and secondary education? How much more does it cost to reach a state's education targets in a high-poverty school district than in a rich district? What design for state education aid best meets a state's student performance objectives? How much more does it cost to buy housing in a high-quality school district than in a low-quality one? Should small school districts be consolidated? What is the best way to fund school infrastructure? My hope is that this book will encourage many students, and perhaps some scholars, to address these and related questions.

Much of the research reprinted in this book is co-authored. Indeed, I owe a profound debt to William Duncombe, who is a co-author on more than

¹The lecture slides for my masters and Ph.D. classes on state and local public finance are available in Yinger (2020).

half of the chapters in this book.² My other co-authors also made major contributions to this book, for which I am grateful.³

This book has eight parts: Local Public Finance, The Property Tax, Cost Functions for Public Education, The Demand for Public Education, State Aid to Education, School Quality and Property Values, School District Consolidation, and School Infrastructure. In some cases, the articles fit into more than one of these topics. Chapter 8, for example, shows how a provision of the property tax in New York State affects education demand, but it includes estimation of education cost functions. Moreover, the other chapters in Part 4 focus on education demand, but they also discuss and estimate education cost functions along the way.

The two chapters in Part 1 provide background on the U.S. federal system with a focus on public elementary and secondary schools. Chapter 1, “Overview of the Property Tax in the United States,” explains the organization and funding of local governments, describes and analyzes the local property tax, and discusses many variations in property tax design across states. This chapter is a compilation and expansion of my teaching notes on many aspects of the property tax. It also presents a new approach to the incidence of the property tax on owner-occupied housing. Chapter 2, “Bidding and Sorting,” presents the standard analysis of household location and housing price determination in a system of local governments.⁴ One feature of this system, namely the sorting of high-income households into high-quality school districts, has important implications for education costs and demands — and for economic inequality.

Part 2 turns to more detailed analysis of various features of the property tax. Chapter 3, “Property Tax Capitalization,” explains a key feature of a system of local governments and competitive housing markets, namely, the capitalization of property taxes into house values. This capitalization is defined as a situation in which the price of housing declines as the local property tax rises, while all else remains equal.⁵ (As discussed in Part 6, school quality is also capitalized into housing values.) Chapter 4, “Is the

²William Duncombe passed away in May 2013. Appendix D, which appears at the end of this book, provides information about his career.

³I would also like to thank Kitty Nasto, without whom this book would not have been possible. She assisted me on book-related tasks too numerous to name.

⁴Chapter 2 draws heavily on Ross and Yinger (1999). More recent literature is reviewed in Yinger (2015).

⁵This chapter draws on the analysis of property tax capitalization in Yinger *et al.* (1988).

Property Tax a Benefit Tax? The Case of Rental Housing,” which is co-authored with Robert J. Carroll, explores the incidence of the property tax on rental housing. This chapter shows that because they are mobile, renters bear only a small portion of the property tax burden in the Boston area. This finding contradicts the view (discussed in Chapters 1 and 2) that the property tax is a “benefit tax,” which is a tax that serves simply as a price for local public services.

Part 3 turns to education cost functions. A cost-function indicates the spending required for a school district to reach a given student-performance target using best practices. As a result, these chapters examine variation in spending across school districts, controlling for student performance and accounting for school district efficiency.⁶ Chapter 5, “Are Education Cost Functions Ready for Prime Time? An Examination of their Validity and Reliability,” is co-authored with William Duncombe. It explores the strengths and weaknesses of cost functions for studying education, exposes some misconceptions about district-level education production functions, and estimates cost functions for Missouri. Chapter 6, “The No Child Left Behind Act: Have Federal Funds Been Left Behind?” is co-authored with William Duncombe and Anna Lukemeyer.⁷ This chapter estimates education cost functions for Kansas and Missouri and shows that, in light of these cost functions, federal funding through the No Child Left Behind Act (NCLB) “cannot come close to funding high standards without implausibly large increases in school-district efficiency.” Moreover, this chapter shows that NCLB gave states an incentive to keep their standards low.⁸

Chapter 7, co-authored with William Duncombe, is titled “How Much More Does a Disadvantaged Student Cost?” This chapter explains why student disadvantage is an important cost factor in providing public education.

⁶School district efficiency cannot be directly observed, and several different approaches are available to bring it into the analysis. Starting with Duncombe *et al.* (1996), my co-authored articles accounted for efficiency by including in the cost function an efficiency index calculated using Data Envelopment Analysis. In 2003, however, my co-authors and I decided that a better approach is to estimate cost functions that control for variables with a conceptual link to efficiency. Duncombe and Yinger (2011), reproduced as Chapter 5, and Duncombe *et al.* (2015) review the literature on alternative approaches to accounting for efficiency and other issues that arise in estimating cost functions.

⁷Anna Lukemeyer passed away in 2018. Among other things, she brought extensive knowledge of state education court cases to our joint research (Lukemeyer 2003). She will be missed. For information on Professor Lukemeyer’s publications, see https://www.maxwell.syr.edu/cpr/efap/Anna_Lukemeyer/.

⁸Lukemeyer *et al.* (2008) provide further analysis of NCLB using cost functions.

It also shows how to estimate education cost indexes that account for student disadvantage and shows that these costs indexes are comparable to the extra weights for pupils from poor families or with other disadvantages that appear in many state education aid formulas. This chapter also estimates education cost functions and pupil weights for New York State.

This book brings in the demand for education in Part 4. The chapters in this part include cost-function estimation, including estimation of school district efficiency. As these chapters show, information from a cost function is necessary for a correctly specified demand analysis. These chapters also show that the general issues raised by the demand for education are common across many states, while many of the details are state-specific.⁹

Chapter 8, “The Unintended Consequences of Property Tax Relief: New York State’s STAR Program,” which is co-authored with Tae Ho Eom, William Duncombe, and Phuong Nguyen-Hoang, shows that local voters in New York State changed their behavior when a state-funded property tax exemption altered their incentives. These behavioral responses led to significant unintended consequences.¹⁰

Chapter 9 is titled “Education Finance Reform, Local Behavior, and Student Performance in Massachusetts.” It is co-authored with Phuong Nguyen-Hoang. This chapter estimates cost and demand functions for Massachusetts. The twist is that this analysis is used to show that a major education finance reform in the state led to a significant increase in student performance. Chapter 10, “Making Do: State Constraints and Local Responses in California’s Education Finance System,” which is co-authored with William Duncombe looks at the case of California, where school districts are heavily constrained by state policy. This chapter shows that, despite

⁹A follow-up to the article reproduced in Chapter 8, Nguyen-Hoang and Yinger (2018b), shows that the behavioral economics concepts of salience and framing can help to explain the price elasticities in a model of the demand for school quality.

¹⁰Chapter 8 includes estimates of the so-called flypaper effect, which is the impact of \$1 of state aid on the demand for education relative to the equivalent increase in voter income. Further analysis of the data behind Chapter 8 by Nguyen-Hoang and Yinger (2018a) finds that these estimates of the flypaper effect are too high because of a scaling problem in the voter income variable. The flypaper effects should be about 15, not 50. This problem does not affect the other estimates in the chapter. A flypaper effect of 15 implies that about \$0.30 of every dollar of aid is spent on education and the rest is used for tax relief. Nguyen-Hoang and Yinger also show that the behavioral economics concepts of salience and framing can help to explain variation in the flypaper effect over time and across school districts.

these constraints, local voters respond to the same types of incentives as local voters in other states.

Part 5 focuses on state aid to education. The first chapter in this part, Chapter 11, “State Aid and the Pursuit of Educational Equity: An Overview,” introduces this topic. It describes the various types of state aid formulas, examines the role of cost adjustments in state aid design, explains the roles of local taxes and school district efficiency, and describes the aid formulas and court cases in many different states. Chapter 12, “School Finance Reform: Aid Formulas and Equity Objectives,” which is co-authored with William Duncombe, provides a detailed explanation of various school finance formulas. This chapter shows, using data from New York State, that a so-called power-equalizing aid formula provides less assistance to high-need districts than does an equal-cost foundation aid formula. It also shows that even with improvements in district efficiency, large increases in aid to needy districts are needed to meet even a minimal performance standard. Chapter 13, co-authored with Helen F. Ladd, explores the philosophical basis for a policy of aiding needy school districts. The final chapter in this part, Chapter 14, “Capitalization and Equalization: The Feedback Effects of Foundation Aid for Schools,” asks whether the property value changes induced by state aid reform alter the aid a district will receive in later years. The focus is on lump-sum aid delivered through a foundation aid formula. This chapter shows that in the case of foundation aid, these feedback effects are likely to be small or non-existent.

One key issue in evaluating state education aid reforms is whether those reforms boost student performance, particularly in high-need school districts. Cost function studies address this issue to some degree because they estimate the relationship between spending and performance. Chapter 9, for example, uses estimated cost and demand functions to simulate the impact on student performance of a major state aid reform in Massachusetts. In addition, Chapter 11 discusses some of the literature on state aid reform and student test scores. Since these chapters first appeared, several scholars have published articles on this issue using data sets that follow student performance for many years (see Jackson *et al.*, 2016; Hyman, 2017; and Lafortune *et al.*, 2018). These articles provide strong evidence that a well-designed state aid reform has positive long-term academic and employment consequences for the affected students, especially those in high-need districts.

Homebuyers are willing to pay more to live in a school district with better schools. This “school quality capitalization” is the subject of Part 6.

Chapter 15, “The Capitalization of School Quality into House Values: A Review,” is co-authored with Phuong Nguyen-Hoang. This chapter provides a review of the literature on this topic. Studies in many different places find evidence for this type of capitalization. The other chapter in this part, Chapter 16, is titled “The Impact of State Aid Reform on Property Values: A Case Study of Maryland’s Bridge to Excellence in Public Schools Act.” This chapter is co-authored with Il Hwan Chung and William Duncombe. It shows that a major education finance reform in Maryland had significant impacts on house values, especially in the neediest districts.

School District Consolidation is one of the most dramatic changes in school organization over the past century. Indeed, over this period, the number of school districts has declined by over 90 percent. The chapters in Part 7 examine the potential cost savings from consolidation and look into the impact of consolidation on property values. Chapter 17, “The Benefits and Costs of School District Consolidation: What Recent Research Reveals about Potential Cost Savings,” co-authored with William Duncombe, provides an accessible overview of the research on these topics. Chapter 18, “Does School District Consolidation Cut Costs?,” which is also co-authored with William Duncombe, makes use of a unique panel data set for rural school districts in New York State to obtain precise estimates of the cost impacts of consolidation, including both adjustment costs and costs related to enrollment change. This study finds large cost savings for small districts, but little cost savings for the consolidation of two districts each with enrollments of 2,000 pupils or more.

Chapters 19, “How Does School District Consolidation Affect Property Values: A Case Study of New York” co-authored with William Duncombe and Pengju Zhang, estimates the extent to which consolidation affects house values. The focus on house values accounts for household attitudes toward consolidation, which may reflect not only cost savings, but also other factors, such as changes in travel time or access to teachers, that do not appear in the school budget.

The final part of this book addresses the topic of School Infrastructure. Chapter 20 is titled “School District Responses to Matching Aid Programs for Capital Facilities: A Case Study of New York’s Building Aid Program.” It is co-authored with Wen Wang and William Duncombe.¹¹ This chapter

¹¹Wen Wang passed away in 2017. He made valuable contributions to the topic of this book, namely, education finance in the United States (see Wang and Duncombe, 2009, Wang and Zhao, 2011, and Zhao and Wang, 2015). Professor Wang also published extensively on education finance in China and on local government finance generally in both the

estimates a model of school infrastructure spending in New York State, which supports this spending through a state matching grant. It shows that most school districts respond to the price incentive created by this matching grant. Despite the fact that the matching rate is higher for needy districts, however, these districts do not respond to this incentive, presumably because their other needs are so great. The last chapter, Chapter 21, “Still Unknown: The Impact of School Capital on Student Performance,” explains what is needed to estimate the impact of school infrastructure on student performance, and shows that some claims in recent research on this topic are not correct.

This book also has four appendices. Appendix A, “Present Value and Discounting with Applications to Local Public Finance,” provides a review of the algebra of present value and discounting with some applications that are relevant to the material in this book. These applications include the income method for assessing property, the setting of pension benefits, and the pricing of municipal bonds.

Appendix B, “The State and Local Lunch Group,” was originally written for a conference honoring the career of Professor Helen “Sunny” Ladd, but this appendix sheds light on the start of my career, too. Not only did Sunny and I collaborate on several projects early in our careers, we also were both part of a network of young scholars in Cambridge, Massachusetts, from the mid-1970s to the mid-1980s who met to discuss topics in local public finance and who formed many different partnerships to pursue publications on these topics. This appendix identifies these partnerships. One of the publications that arose from my connections to the State and Local Lunch Group (SLLG) appears in this book as Chapter 13, co-authored with Helen Ladd and another (Yinger *et al.*, 1988) is the source of most of the material in Chapter 3. However, every chapter in this book builds on what I learned from working with the talented scholars who participated in the SLLG.¹²

Appendix C is a tribute to my public finance professor at Princeton, Wallace Oates. Many of the chapters in this book build on ideas that I first learned about in his course — and cannot seem to stop thinking about. Finally, Appendix D is a tribute to my frequent co-author, William

United States and China. He will be missed. For more information on Professor Wang’s publications, go to <http://cpr.maxwell.syr.edu/efap/index.html>.

¹²Another SLLG-linked publication (Bradbury *et al.*, 1984) explores local public cost functions and fiscal disparities across towns in Massachusetts. Because towns provide K-12 education in Massachusetts, my research on education cost functions (Part 3 of this book) and on state aid to education (Part 5) builds on this article.

Duncombe, who passed away in 2013. This appendix also contains a list of Bill's publications in education finance and provides links to additional information about his career.

Housekeeping Notes

1. The authors' affiliations at the beginning of each chapter refer to their affiliations in 2019, not to their affiliations at the time the re-printed article was first published.
2. References at the end of each chapter that are now published but were forthcoming or in working paper form at the time the re-printed article was first published have been updated. Associated publication dates have also been updated in the text.
3. Citations referring to articles that are reprinted in this book are indicated in the reference lists in square brackets. A reference for Duncombe and Yinger (2005), for example, is entered as:

Duncombe, William D., and John Yinger. 2005. "How much more does a disadvantaged student cost?" *Economics of Education Review* 24(5) (October): 513–532. [Chapter 7]

4. The original version of Chapter 11, which appeared in a book (Yinger, 2003), did not have its own reference list. The reference list for Chapter 11 in this book is excerpted from the overall reference list in Yinger (2003).
5. Chapter 11 was originally published as an overview chapter in an edited volume, namely, Yinger (2003). As such, it often refers to the chapters in that volume. To avoid confusion, all these chapter references have been converted to standard references. Instead of (Duncombe and Johnston, Chapter 5), for example, the text in Chapter 11 now reads (Duncombe and Johnston, 2003). In addition, the Duncombe and Johnston study and all the other studies in Yinger (2003) have been added to the reference list for Chapter 11.

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