

3rd edition

Henry M. Levin
Patrick J. McEwan
Clive Belfield
A. Brooks Bowden
Robert Shand

ECONOMIC EVALUATION in EDUCATION

Cost-Effectiveness and
Benefit-Cost Analysis



3rd edition ECONOMIC EVALUATION in EDUCATION

"In order to improve our educational systems, we need to increase our understanding of economic evaluation. This text provides the tools for both practitioners and researchers to achieve this end. This is unequivocally the best text in the field."

—**Dan Jorgensen**, *University of Denver*

"This is a practical and clear text that practitioners can use. The authors make a strong case for the importance of economic evaluations and then provide coherent, sequential, and precise steps for conducting economic evaluations. This is a must-use for any policy methods class."

—**Charol Shakeshaft**, *Virginia Commonwealth University*

"Clear and effective representation of a valuable approach to cost analysis offered by authorities in the field."

—**Charles David Crumpton**, *University of Maryland*

"This text offers evaluators a rare opportunity to enhance the effectiveness and utility of their work: Policymakers need information on programs' effects and their costs if they are to make informed decisions. This text clearly teaches both the 'how' and 'why' of economic evaluation."

—**Gary Skolits**, *University of Tennessee*

This text (titled *Cost-Effectiveness Analysis* in its previous editions) is the only full-length book to provide readers with the step-by-step methods they need to plan and implement a benefit-cost analysis in education. The authors examine a range of issues, including how to identify, measure, and distribute costs; how to measure effectiveness, utility, and benefits; and how to incorporate cost evaluations into the decision-making process. The updates to the **Third Edition** reflect the considerable methodological development in the evaluation literature, and the greater empiricism practiced by education researchers, to help readers learn to apply more advanced methods to their own analyses.



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Third Edition

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Economic Evaluation in Education

Third Edition

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Preface

The first edition of this volume was published in 1983 and the second edition in 2001. Unfortunately, over this long period, there was mostly a lot of talk about cost-effectiveness (CE) analysis, but there was not very much action.

In the past decade, there has been a lot more investigation of CE and benefit-cost (BC) analysis. At every level of government, education decisionmakers are being asked to accomplish more with the same or even fewer resources. There is great hope that new educational technologies will improve education and reduce cost, but decades of promises have resulted in few studies incorporating effectiveness and cost and even less conclusive evidence. Philanthropies are more eager to calculate their “return on investment” in social programs. And, in an era of greater accountability, the general public is increasingly scrutinizing how resources are allocated to schools and colleges. Even academic journals have become more accepting of articles applying CE and BC analyses. These pressures and interests have fostered more research and inquiry into the efficiency of educational spending.

With this new attention, it is especially important that cost evaluation be performed to a rigorous standard and that it be expressed in such a way that it can be widely understood by policymakers, education professionals, and the general citizenry. To meet this imperative, these audiences need a thorough and detailed explication of what cost evaluation is and how it should be performed.

To our knowledge, this book remains the only full-length treatment of the subject for education researchers. Some general textbooks for evaluators devote a section to the topic (notably Boardman, Greenberg, Vining, & Weimer, 2011), and two recent books have set out general standards and principles (for health, see Neumann, Sanders, Russell, Siegel, & Ganiat, 2016; for general methodology, see Farrow & Zerbe, 2013). By contrast, this book is focused completely on the rationale and methods of economic evaluation in the field of education. Its primary

distinction from other texts is its extensive treatment of how to perform cost analyses.

Since the second edition of this book, there has been considerable methodological development in the evaluation literature. This development in part reflects the intensive use of CE analysis by health researchers, but it also reflects the greater empiricism practiced by education researchers. We hope this new edition clearly expresses these methodological developments so that researchers can apply more advanced methods. As well, we hope this new edition adequately includes this new empirical research so that more is known about what investments are socially efficient.

The volume has undergone substantial modification from earlier editions. As in the second edition, we continued to replace and update many of the examples with recent cost studies from education. We further updated the text with references to methodological and applied research.

We have also added several new chapters. There is a new chapter (Chapter 2) on how to structure an economic analysis so that it is properly integrated with an impact evaluation. Often, getting the right structure for an economic evaluation is one of the most difficult challenges; in Chapter 2, we describe how such an evaluation should be articulated to a theory of change. To more clearly explain cost evaluation, we have expanded to four chapters (Chapters 3–6), with an explicit separation between identifying ingredients (in Chapter 4) and pricing them out (in Chapter 5). This edition includes a separate chapter (Chapter 7) on how to measure effectiveness; perhaps surprisingly, how effectiveness is measured is often the most contentious part of CE analysis. This new Chapter 7 sets out the preferred qualities of an effectiveness measure for the purposes of performing a CE analysis, the reporting that is formally set out in Chapter 8. Following on, this edition has an additional chapter—and much more detail—on estimating benefits (Chapter 9); this makes it easier to explain BC analysis (Chapter 10). The final new chapter (Chapter 11) is on uncertainty and how to perform sensitivity testing. The last two chapters—on checklists and policy issues—are carried over from the second edition, although the policy discussion is newly updated to address current debates and controversies. Each chapter includes a set of discussion questions and exercises. Answers to selected exercises are given in Appendix A. Finally, Appendix B includes a discussion of a new tool—*CostOut*—for aiding researchers in performing harmonized and rigorous CE studies.

As we look across the past three-plus decades, we hope this new edition reaffirms our fundamental claim: Economic evaluation of education is important and should be taken seriously.

Acknowledgments to the Second Edition

This book benefited greatly from discussions and suggestions over the years about how we might update, expand, and improve the first edition of this book. Over the span of 17 years and 13 printings, we received considerable feedback from scholars, policy analysts, and students that surely improved the content and presentation of the revision. Many researchers, too numerous to mention, have generously shared their work. We want to express our thanks to all of them. We also thank Darrell R. Lewis and Jon S. Eberling for their review of the final manuscript.

Henry M. Levin wishes to dedicate this edition to the memory of his close friend, Professor Jose Luis Moreno Becerra. Moreno was a professor of applied economics at the University of La Laguna in the Canary Islands, Spain. He was a graduate student in the Economics of Education at Stanford some two decades ago and returned to Spain, receiving the highest score in the nation in a competition for a prestigious professorship in applied economics. Such a performance gave him the first choice of positions at any Spanish university. He returned to his home in the Canary Islands, and over the years, he became a leading voice of the economics of education throughout Spain. He was a founder and the first president of the Economics of Education Society of Spain, a group with a dynamic agenda and an annual meeting of very high quality. His sudden death in 1999 saddened a wide circle of colleagues and friends, and we cherish our associations with him, both academic and personal. We wish to present this as an homage to Jose Luis for his wife, Tere, and his two children, Ernesto and Elena.

Finally, Patrick J. McEwan wishes to dedicate this edition to the memory of his father. Richard T. McEwan always harbored aspirations of being an academic, but his family was not wealthy and many educational opportunities were unavailable. By working many years at a

job that was less than fulfilling, he ensured that both his children would be sufficiently privileged to choose careers that were denied to him. Unfortunately, he did not live long enough to share in their accomplishments. If this book succeeds in its goals, then it is partly due to his curiosity, his intellect, and his encouragement.

Acknowledgments to the Third Edition

Since the second edition of this book, much has changed: Methods of economic evaluation have become more sophisticated and detailed, and the attention paid to questions of efficiency and cost-effectiveness (CE) has increased greatly. We hope this new edition clearly expresses these methodological developments. But we especially hope that it captures the sense that economic evaluation of education should be taken seriously.

In revising this book, we have benefited greatly from discussions and interactions with many researchers, policymakers, and professionals. Most recently, with support from the Institute of Education Sciences, we have been privileged to teach economic evaluation to education researchers; their perspectives and contributions have made this a better book. Also, we appreciate the contributions of Meridith Friedman for assembling the references, Viviana Rodriguez Andrade for formatting the book, and all our colleagues at the Center for Benefit-Cost Studies of Education (CBCSE) at Teachers College, Columbia University. We want to express our thanks to all these persons. Collectively, they are working to make education systems more effective and more efficient and to provide a better future for new generations of students. As, we hope, are we.

ACKNOWLEDGMENTS FROM HENRY M. LEVIN ●

In the early 1970s, as a young academic with a few publications on cost-effectiveness (CE) analysis, I was asked by Marcia Guttentag to write a chapter for the forthcoming *Handbook of Evaluation Research*, which SAGE published in 1975. Although I surveyed the field in the old way of searching for library sources and reports and writing to contributors

to the field, there was little application to social endeavors. Rather, the literature focused primarily on infrastructural projects; defense; and a few attempts to incorporate regression-focused models on crime, health, and education. To say the least, the field was underdeveloped, and few had attempted to apply it to evaluation. What struck me most was that the measurement of costs was chaotic. Most CE or benefit-cost (BC) studies were vague or silent about methods and sources of costs or even definitions of what was meant by costs. Others simply reported budgetary expenditures without explaining how they had analysed budgets designed for accounting purposes into cost evaluations of specific projects or interventions. Thus, the 1975 effort focused on establishing a general method for determining cost based upon economic concepts and the integration of that model with how costs were financed, two separate analyses. Less attempt was made to elaborate on how to measure effectiveness (experiments were favored) or how benefits were measured.

Although a few evaluators took interest in the topic, many asked for more detail on procedures. So, in 1983, I published the first edition of this book, attempting to assist evaluators to undertake cost analysis, using the ingredients approach. Although the book sold well, we found few new studies in the literature. In the middle 1990s at Stanford, I encountered a wonderful student, Patrick McEwan, who took great interest in the subject. He agreed to be the coauthor of a second edition, which would expand the analysis with special attention to the measurement of effectiveness and benefits. The second edition was published in 2000 (copyright 2001), some 17 years after the first edition, and it received increased attention.

In 1999, I moved to Teachers College, Columbia University, and continued to undertake research on CE and BC analysis in education. In 2000, I was joined by Clive Belfield in our National Center for the Study of Privatization in Education, and we decided that with the additional focus we had on CE and BC, we would start the Center for Benefit-Cost Studies of Education (CBCSE) in 2007. Although Clive accepted a position in the Department of Economics of Queens College, City University of New York, we continued to collaborate on cost analysis in educational evaluation. At this time, we were also joined by Brooks Bowden and later by Rob Shand, both PhD students in educational policy and economics of education. Since 2001, there was a flowering of developments in economics and other disciplines on the estimation of effectiveness in education, particularly the use of randomized controlled trials and quasi-experimental studies. At the same time, our second edition was approaching the 17-year length of publication of the first edition.

Given the flow of new ideas and applications and the steady increase in new applications of CE and BC studies in education, we decided as a group to prepare a third edition of the book, which would encompass progress in cost estimation and both measurement and estimation of effectiveness and benefits. We have attempted that in this new edition.

It is my pleasure to thank Clive for coordinating this effort as Patrick took the lead on the second edition. To a large degree, this is a thankless task of process, particularly with multiple authors. But, in both cases, the key coauthors made substantive improvements in presentation and content. In addition, our new additions, Brooks Bowden and Rob Shand, shared insights and content from their own studies and polish that was missing from earlier editions. For an older author, it is nice to know that such competent and strong colleagues will carry on the tradition, perhaps to a fourth edition in 2034.

I also wish to thank Fiona Hollands, who took the lead in enabling us to bring forth our computer platform to assist evaluators in doing their own cost analysis. Although Clive and I began this project with others, the ability to move it along to a user stage and procedures is due to Fiona's leadership and care. We hope that readers of the third edition will use *CostOut* to do their own cost analyses. We also appreciate the constant support of Emma Garcia, Yilin Pan, Barbara Hanisch Cerda, Meridith Friedman, Henan Cheng, Viviana Rodriguez Andrade, Atsuko Muroga, Anyi Wang, Amra Sabic-El-Rayess, Maya Escueta, and many others who have contributed to the work conducted by CBCSE.

Finally, as in all my work, I must thank my wife, Pilar Soler, for tolerating my preoccupation with this project and encouraging me. And I am grateful to my son, Jesse Levin, for his support and professional insight and suggestions derived from so many projects that he undertook in both the Tinbergen Institute and University of Amsterdam and at the American Institutes for Research.

FROM A. BROOKS BOWDEN ●

Alyshia Brooks Bowden wishes to dedicate this edition to her mentor, former professor, and friend, Professor Rebecca Maynard. In her roles as an expert in rigorous evaluation, an economist, a professor, a scholar, a mother, and a person, Professor Maynard is an exemplary human being. Her instruction, feedback, support, and encouragement have been invaluable.

● FROM ROBERT SHAND

Robert Shand would like to dedicate this edition to his teachers, from whom he learned the potent combination of boundless curiosity and logical empiricism. He hopes this book contributes in some small way to employing those values in the service of educating future generations.

About the Authors

Henry M. Levin is the director of the Center for Benefit-Cost Studies of Education (CBCSE), the William H. Kilpatrick Professor of Economics and Education at Teachers College, Columbia University, and the David Jacks Professor of Higher Education and Economics, Emeritus, at Stanford University. He has been engaged in cost-effectiveness (CE) and benefit-cost (BC) studies in education and other fields since 1970. He is the author of 22 books and about 300 scholarly articles on these topics as well as others in the economics of education and educational policy.

Patrick J. McEwan is a professor of economics at Wellesley College and the director of Latin American Studies at Wellesley College. His research interests include the impact and cost evaluation of education and social policy in Latin America, especially Chile and Honduras. His work has been published in the *American Economic Review*, the *Journal of Public Economics*, *Educational Evaluation and Policy Analysis*, and other journals of economics and education policy. For more information on his research, visit www.patrickmcewan.net.

Clive Belfield is a professor in the Department of Economics at Queens College, City University of New York. He is also principal economist at the Center for Benefit-Cost Studies of Education (CBCSE) at Teachers College, Columbia University, faculty member for The Evaluators' Institute at Claremont Graduate University, and a research affiliate at the Community College Research Center, Teachers College, Columbia University. He received his PhD in economics from the University of Exeter, England. His research interests are economic evaluation of education programs. He has authored three books and more than 75 articles in the field of the economics of education.

A. Brooks Bowden is an assistant professor of methods and policy in the Educational Leadership, Policy, and Human Development department at North Carolina State University. She is the director of Training and associate director at the Center for Benefit-Cost Studies of Education (CBCSE) at Teachers College, Columbia University. She received her PhD in education policy with a specialization in economics from Columbia University. She specializes in program evaluation and economic analysis, focusing on applications and methodology of the ingredients method of cost analysis. She recently coauthored publications for the *American Journal of Evaluation*, the *Journal of Research on Educational Effectiveness*, the *Journal of Benefit-Cost Analysis*, and *Educational Evaluation and Policy Analysis*.

Robert Shand is the Novice G. Fawcett postdoctoral researcher in educational studies at The Ohio State University. He completed his PhD in economics and education at Teachers College, Columbia University. As a former K–12 teacher, his research focuses on how educational practitioners use evidence on effectiveness and costs to improve decision-making and how teachers improve over time through formal training and learning from colleagues.