#### The Cambridge Handbook of Healthcare

Healthcare is inextricably bound to productivity, efficiency, and economic development. Although many methods for analyzing productivity and efficiency have been extensively covered, there has been relatively little focus on how those methods can be applied to healthcare in a coherent and comprehensive manner. *The Cambridge Handbook of Healthcare* outlines current foundations and states of the art on which future research can build. It brings together experts in this growing field to cover key sources and aspects of human wellbeing: productivity, efficiency, and healthcare. Each chapter is dedicated to a particular topic and delivered by international experts on that topic. The authors of the chapters provide theory, models, insights and empirical examples from various national perspectives that are relevant to leaders of the healthcare industry, regulators, and academicians.

SHAWNA GROSSKOPF is Professor Emerita of Economics at Oregon State University. She is an associate editor of the *Journal of Productivity Analysis* and has an honorary doctorate from Gothenburg University. She was ranked 107th in the US in 2022 World's Best Economics and Finance Scientists and was appointed by the Swedish Parliament to the Kersten Hesselgren chair in 1996.

VIVIAN VALDMANIS is a retired professor with more than 30 years of experience in health economics. She has published more than 80 papers and chapters on hospital ownership as well as on productivity, efficiency, and plant capacity of hospitals and long-term care facilities. She has held affiliations with IPSE Studies (The Netherlands), the University of the Sciences in Philadelphia, the London School of Hygiene and Tropical Medicine, and Western Michigan University.

VALENTIN ZELENYUK is a professor at the School of Economics at The University of Queensland, where he was also an Australian Research Council Future Fellow (2017–2022) and Director of the Centre for Efficiency and Productivity Analysis (2015–2018). He is an elected member of the Conference on Research in Income and Wealth of NBER as well as an associate editor of the *Journal of Productivity Analysis*. He has coauthored more than 70 publications in journals and books.

# The Cambridge Handbook of Healthcare

Productivity, Efficiency, Effectiveness

Edited by SHAWNA GROSSKOPF Oregon State University

VIVIAN VALDMANIS IPSE Studies

**VALENTIN ZELENYUK** *The University of Queensland* 





Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

103 Penang Road, #05-06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org Information on this title: www.cambridge.org/9781009483773

DOI: 10.1017/9781009483766

© Cambridge University Press & Assessment 2024

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press & Assessment.

When citing this work, please include a reference to the DOI 10.1017/9781009483766

First published 2024

A catalogue record for this publication is available from the British Library

A Cataloging-in-Publication data record for this book is available from the Library of Congress

ISBN 978-1-009-48377-3 Hardback

Additional resources for this publication at www.cambridge.org/grosskopf

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

### Contents

Lis	t of Boxes pa	<i>ige</i> vii
Co	ntributors	ix
SH	roduction and Overview AWNA GROSSKOPF, VIVIAN VALDMANIS, AND VALENTIN ZELENYUK	Ι
I	Overview of Performance Analytics for Healthcare with Examples in R ZHICHAO WANG AND VALENTIN ZELENYUK	19
2	Cost-Effectiveness Analysis for Healthcare: From Theory to Practice to Problems and Solutions STEPHEN BIRCH AND AMIRAM GAFNI	65
3	Capabilities, QALYs, and COVID HAN BLEICHRODT AND JOHN QUIGGIN	88
4	The Economic Efficiency of Policies to Reduce Ill Health Involving Environmental Factors CLEMENT A. TISDELL	110
5	Health in the National Accounts PAUL SCHREYER	136
6	Healthcare as Social Infrastructure: Productivity and the UK National Health Service During and After COVID-19 DIANE COYLE	160
7	Health, Human Capital, and Its Contribution to Economic Growth WULONG GU	185
		v

© in this web service Cambridge University Press & Assessment

vi	Con	tents
8	What Do We Know from the Vast Literature on Efficiency and Productivity in Healthcare? A Review and Bibliometric Analysis KOK FONG SEE, SHAWNA GROSSKOPF, VIVIAN VALDMANIS, AND VALENTIN ZELENYUK	217
9	Brief Overview of Production Theory for Analyzing Healthcare Performance ROLF FÄRE AND SHAWNA GROSSKOPF	260
10	Modeling Production of Well-Being from an Intermediate Medical Intervention: With an Empirical Demonstration RIKARD ALTHIN, ROLF FÄRE, SHAWNA GROSSKOPF, AND MARCUS SCHMITT-EGENOLF	287
II	Data Envelopment Analysis Applications and US Hospital Policy VIVIAN VALDMANIS, SHAWNA GROSSKOPF, VALENTIN ZELENYUK, AND GARY D. FERRIER	306
12	New Tools for Evaluating the Performance of Healthcare Providers Using DEA and FDH Estimators LÉOPOLD SIMAR AND PAUL W. WILSON	351
13	Stochastic Frontier Analysis for Healthcare, with Illustrations in R ROBIN C. SICKLES, ZHICHAO WANG, AND VALENTIN ZELENYUK	404
14	A Review of US Stochastic Frontier Studies of Hospital Efficiency Published After 2008 MICHAEL ROSKO	445
15	A Nonparametric Journey through Conditional Frontier Models LUIZA BĂDIN, CAMILLA MASTROMARCO, AND RAFFAELE LAGRAVINESE	493
16	Measuring Health and Healthcare Efficiency: Revised Guidelines for Measurement BRUCE HOLLINGSWORTH	545
17	A Brief Introduction to Causal Inference in Healthcare SCOTT CUNNINGHAM AND JONATHAN A. SEWARD	553
18	Dynamic Assignment of Patients to Primary and Secondary Inpatient Units: Is Patience a Virtue? SOROUSH SAGHAFIAN, DERYA KILINC, AND STEPHEN J. TRAUB	612
Ina On	lex line appendices are available at www.cambridge.org/grosskopf	657

#### Boxes

13.1	R code snippet for ALS77	<i>page</i> 409
13.2	R code snippet for SS84	411
13.3	R code snippet for PL81	412
13.4	R code snippet for CSS90	414
13.5	R code snippet for BC92	415
13.6	R code snippet for Go5	416
13.7	R code snippet for KLH14	419
13.8	R code snippet for KGM91/BC95	421
13.9	R code snippet for SVKZ	423
16.1	General minimum checklist	549
16.2	Underlying considerations for those undertaking the work	550
16.3	Underlying considerations for those commissioning the work	551

## Contributors

Rikard Althin, Swedish Institute for Health Economics

Luiza Bãdin, Bucharest University of Economic Studies and "Gheorghe Mihoc – Caius Iacob" Institute of Mathematical Statistics and Applied Mathematics of the Romanian Academy

Stephen Birch, The University of Queensland
Han Bleichrodt, University of Alicante
Diane Coyle, University of Cambridge
Scott Cunningham, Baylor University
Rolf Färe, Oregon State University
Gary D. Ferrier, University of Arkansas
Amiram Gafni, McMaster University
Shawna Grosskopf, Oregon State University
Wulong Gu, Statistics Canada
Bruce Hollingsworth, Lancaster University
Derya Kilinc, LexisNexis Risk Solutions
Raffaele Lagravinese, University of Bari Aldo Moro
Camilla Mastromarco, University of Queensland

Michael Rosko, Widener University

## CAMBRIDGE

х

Cambridge University Press & Assessment 978-1-009-48377-3 — The Cambridge Handbook of Healthcare Shawna Grosskopf , Vivian Valdmanis , Valentin Zelenyuk Frontmatter <u>More Information</u>

List of Contributors

Soroush Saghafian, Harvard University Marcus Schmitt-Egenolf, Umeå University Paul Schreyer, Organization for Economic Cooperation and Development Kok Fong See, Universiti Sains Malaysia Jonathan A. Seward, Baylor University Robin C. Sickles, Rice University Léopold Simar, Université Catholique de Louvain Clement A. Tisdell, The University of Queensland Stephen J. Traub, Mayo Clinic Zhichao Wang, The University of Queensland Paul W. Wilson, Clemson University Vivian Valdmanis, IPSE Studies Valentin Zelenyuk, The University of Queensland