# THE ECONOMICS OF EDUCATION

## A COMPREHENSIVE OVERVIEW

# SECOND EDITION

Edited by Steve Bradley Colin Green



# Contents

Contributors xiii Foreword xv

### l

### Overview

1. Empirical methods in the economics of education GUIDO SCHWERDT AND LUDGER WOESSMANN Introduction 3 From correlation to causation 3 Explicit randomization 5 Randomized controlled experiments 5 Lotteries of oversubscribed programs 7 Natural experiments 9 Instrumental-variable approach 9 Regression-discontinuity approach 10 Methods using panel data 13 Difference-in-differences approach 13 Fixed-effects approach 15 Conclusions 17 References 17

 Behavioral economics and nudging in education: evidence from the field METTE TRIER DAMGAARD AND HELENA SKYT NIELSEN
 Behavioral economics of education 21 Self-control 21 Limited attention and cognitive ability 22 Loss aversion 22 Default bias 22 Social preferences 23 Biased beliefs 23
 Education interventions involving nudging 23 Defaults 25 Framing 25 Peer group manipulations 26 Deadlines 26 Goal setting 27 Reminders 28 Informational nudges 28 Boosting skills to alleviate self-control problems 30 Social comparison nudges 30 Social belonging, identity activation and mindset nudges 31 Conclusion 32 References 32 Further reading 35

### Π

# Private and social returns to education

3. Returns to education in developed countries MORLEY GUNDERSON AND PHILIP OREOPOLOUS

Glossary of terms 39 Introduction 39 Estimating returns to education via schooling equations 40 Basic schooling equation 40 Hourly wages versus measures that include hours of work 41 Measurement error in schooling 42 Ability bias, omitted variables and selection bias 42 Heterogeneous returns 45 Annual returns, signaling, and sheepskin effects 46 Non-pecuniary benefits and social benefits 47 Trends and some international evidence 48 Summary 49 References 49 Further reading 50

#### 4. Returns to education in developing countries HARRY ANTHONY PATRINOS AND GEORGE PSACHAROPOULOS

Introduction 53 Estimation procedures 54 Global estimates 56 Low-income countries 56 Vocational education 57 Preschool 59 Causality 60 Cognitive ability 61 Conclusions and policy considerations 62 References 62 Further reading 63

### 5. Returns to education quality MARK HOEKSTRA

Education quality and student outcomes 65 Assessing the causal returns to education quality 67 Benefits to attending more selective middle and high schools 68 Returns to college quality 70 References 71

6. Heterogeneity in the returns to higher education IAN WALKER

Introduction 75 The economic value of degrees 78 Estimating the college premium 79 Student choice and heterogeneity in the returns to degrees 83 Conclusion 89 References 89

### 7. Parental education and children's health throughout life MATHIAS HUEBENER

Glossary 91 Introduction 91 Theoretical considerations 93 Immediate effects of education 93 Intergenerational effects of education 93 Insights across children's lifecycle 94 Prenatal influences and health at birth 94 In childhood 95 In adolescence 96 In adulthood 97 In late life 98 Evidence from developing countries 99 Implications and outlook 100 References 101 Further reading 102

### 8. Education and civic engagement T.S. DEE

The civic returns to educational attainment 103 Comparisons of public and private schools 105 Summary and future directions 107 See also 107 References 107 Further reading 108

9. Education and crime LANCE LOCHNER

Introduction 109

The economics of education and crime 109 Evidence on education, school quality, and crime 110 Effects of educational attainment on crime 110 Effects of education on female crime 113 Effects of school choice and quality on crime 113 Contemporaneous schooling and crime 114 Brief comment on measures of criminality 115 The effects of arrest and incarceration on education 115 Conclusions and policy lessons 116 References 116

### 10. Education and inequality

JO BLANDEN

Introduction 119 Inequalities in educational outcomes 119 Inequalities by social background 119 Inequalities by race, ethnicity and immigrant status 122 Inequalities by gender 123 Education and economic outcomes 125 Changes over time 128 Conclusions 130 References 130

#### Contents

### 11. Race earnings differentials M. CARNOY

Glossary 133
Race and ethnic earnings differences in the United States 134
A model for explaining earnings differences 136
Explaining earnings differences with cross-section data 137
Earnings differences for minority women 139
Do ability/educational quality differences explain race/ ethnic earnings differences? 140
What are the sources of the black/white test-score gap? 142
Explaining changes in earnings differences over time 143
Comparing results for Brazil and Israel 145
See also 146
References 146

### 12. The economics of high school dropouts RUSSELL W. RUMBERGER

Introduction 149 Who drops out of high school? 149 What are the consequences? 151 Why do students drop out? 152 Individual factors 152 Institutional factors 153 What can be done? 155 Conclusions 157 References 157 Further reading 157

### III

### Production, costs and financing

13. Education production functions ERIC A. HANUSHEK

Glossary 161 Overview 161

- Measuring skills and human capital 161
- Basic production function estimates 163
- Measured school inputs 164

Study quality 165

- More recent studies 166
- Do teachers and schools matter? 167

Benefits and costs 168 Some conclusions and implications 168 References 169 Further reading 170 14. Education, knowledge capital, and economic growth ERIC A. HANUSHEK AND LUDGER WOESSMANN Early studies of schooling quantity and economic growth 172 Early evidence on the quality of education and economic growth 173 Recent evidence on the importance of cognitive skills for economic growth 174 Causality in brief 176 The interaction of educational quality with economic institutions 178 Simulating the impact of educational reform on economic growth 178 Summary 180 References 180

### 15. Education production functions: updated evidence from developing countries PAUL GLEWWE, SYLVIE LAMBERT AND OIHUI CHEN

Introduction 183 Education in developing countries 183 The education production function 188 Estimation of education production functions 194 Evidence of policy impacts from developing countries 196 Demand-side interventions 196 Supply-side policies 203 Conclusions and suggestions for future research 210 References 211

16. Schooling inputs and behavioral responses by families BIRGITTA RABE

Introduction 217 Conceptual framework: education production and input interactions 218 Extensions 219 Methodological approaches to estimation 220 Empirical findings 221

#### viii

#### Contents

Factors driving heterogeneous results 223 Multiple inputs and agents 224 Test score impacts 225 Conclusions 225 References 226

> 17. The economics of early childhood interventions M. NORES

The economic rationale 229 Market failures 230 Equity and redistribution 230 Human capital formation 231 Types of early childhood interventions 231 Cognitive and academic outcomes 233 Noncognitive outcomes 234 Indirect effects: female labor supply 235 Economic returns 236 Conclusions 236 See also 236 References 237 Further reading 238

18. Parental socioeconomic status, child health, and human capital J. CURRIE AND J. GOODMAN Glossarv 239 Introduction 239 Does parental socioeconomic status affect child health? 240 External benefits of parental SES 240 Evidence 240 Does child health affect future outcomes? 242 Possible channels 242 Evidence 243 Can health account for gaps in Children's educational outcomes? 247 See also 247 References 247 Further reading 248

19. Monetary and non-monetary incentives for educational attainment: design and effectiveness H. SCHILDBERG-HÖRISCH AND V. WAGNER

Introduction 249 Monetary incentives 250 Sensitivity to cash size 250 Who should be rewarded? 252 Non-monetary incentives 253 Types of non-monetary incentives 253 Selection of non-monetary incentives 254 Effectiveness of non-monetary incentives 257 Non-monetary incentives for students 257 Non-monetary incentives for parents and teachers 263 Discussion and conclusion 264 Acknowledgments 266 References 266 Further reading 268

20. Educational mismatch in developing countries: A review of the existing evidence H. BATTU AND K.A. BENDER Introduction 269 271 Measurement issues General findings 272 The degree of mismatch 273 Rates of overeducation and undereducation 273 Brazil 273 Russia (and post-communist transition economies) 273 India 274 China 274 Low-income countries 276 Explanations for mismatch 277 Introduction 277 Informality 278 Quality of education 280 Other factors 281 Consequences of mismatch 282 Brazil 282 Russia and post-communist countries 282 India 283 China 283 Low-income countries 283

Policy, conclusions and reflection 284 References 285

21. Peer effects in education: recent empirical evidence

ALFREDO R. PALOYO

Introduction 291

Recent empirical evidence 293 Deliberate random assignment 293 Regression-discontinuity design 295 Instrumental variable 297 Fixed effect 298 Variance restriction 300 Nonlinearity and heterogeneity 300 Conclusion 302 References 303

22. The role of teacher quality in education production BJARNE STRØM AND TORBERG FALCH

Introduction 307
Estimating teacher quality 307
The value added approach 308
The between subject approach 310
What explains teacher quality variation? 311
Individual teacher characteristics 311
Teacher labor market variables 313
Use of teacher quality measures in pay and evaluation systems 315
Summary and the way forward 316
References 317

# 23. The economics of class size D.W. SCHANZENBACH

Introduction 321 Why class size might matter 321 Empirical approaches to studying the impact of class size 322 Nonexperimental research 322 Experimental research 323 Checks for randomization 325 Achievement results 326 Additional caveats 328 Quasi-experimental research 329 Policy-induced variation 329 Discussion 330 See also 330 References 330 Further reading 331

24. School finance: an overview JENNIFER KING RICE, DAVID MONK AND JIJUN ZHANG Introduction 333 School finance in context 333 Raising revenue: multiple and evolving roles 335 Distributing resources: multiple and competing goals 337 Mechanisms for distributing revenue across school districts 337 Challenges to state funding systems 338 Utilization of resources: current policy issues for school finance 340 Teacher compensation 340 Expanding the scope of educational services 341 References 341

25. The economics of tuition and fees in American higher education R.G. EHRENBERG

Glossary 345 Introduction 345 Tuition keeps rising in private higher education 347 Tuition keeps rising at public institutions 349 Graduate and professional program tuition and fees 350 Concluding remarks 351 References 351 Further reading 352

### IV

### Teacher labour markets

26. Teacher labor markets: An overview JESSALYNN JAMES AND JAMES WYCKOFF

Introduction 355 Constrained teacher labor markets 356 Methodological challenges 359 Recruiting effective teachers 360 Retaining effective teachers 363 Developing an effective teacher workforce 365 Looking forward 366 References 366 x

#### Contents

27. Teachers in developing countries PAUL GLEWWE, RONGIIA SHEN, BIXUAN SUN AND SUZANNE WISNIEWSKI Introduction to review of literature on teachers in developing countries 371 Methods for literature selection and categorization 372 Analysis of teacher interventions that increase time in school 372 Impacts of teacher inputs on time in school 372 Impacts of pedagogy interventions on time in school 373 Impacts of teacher-related governance interventions on time in school 373 Analysis of teacher interventions that improve learning outcomes 374 Impacts of teacher inputs on learning 374 Impacts of pedagogy interventions on learning 378 Impacts of teacher-related governance interventions on learning 381 Analysis of interventions that improve teacher outcomes 383 School input interventions 384 Pedagogy interventions 384 Governance interventions 384 Conclusion 386 References 387

# 28. Teacher supply PETER DOLTON

The labor market for teachers 391 The demand for teachers 394 The supply of teachers 396 Teachers' pay 399 Summary 401 References 402 Further reading 402

### 29. Economic approaches to teacher recruitment and retention S. LOEB AND I. MYUNG

Introduction 403 The supply of teachers 404 Wages 404 Working conditions 404 Psychic benefits and costs 405 School location 405

Barriers to entry 406 The demand for teachers 406 Student enrollment and teacher retirement 406 Reduction in student-to-teacher ratios 407 Hiring processes 407 Institutional constraints 407 Recruitment and retention policies to date 408 Partnerships between districts and local colleges 408 Monetary incentives 408 Changes in entry requirements 409 Teacher induction and mentoring 409 Performance-based pav 410 Career differentiation through ladders 410 Improving hiring practices 411 Reform of due process 411 Conclusion 412 See Also 412 References 412 Further reading 414

# 30. Compensating differentials in teacher labor markets

#### LI FENG

Compensating wage differentials through empirical studies using hedonic wage regression 417 Method 417 Data 417
Findings 417
Compensating wage differentials through empirical studies of teacher attrition and retention 423
Compensating wage differentials using policy interventions 423
Quasi-experimental evidence 424
Random assignment evidence 428
Findings and future directions 428
References 428

### 31. Teacher incentives 431 L. SANTIBAÑEZ

Background on incentive programs 432 Advantages of incentive programs 432 Individual incentives *Efficiency and productivity* 432 Recruitment and retention of qualified teachers 435 Group incentives *Efficiency and productivity* 435 Summary of key findings 436 Disadvantages and criticisms 436

#### Contents

Adverse and unintended consequences of teacher incentive programs 439 Conclusions 439 See also 440 References 440 Further reading 441

### V

# Education markets, choice and incentives

32. The economic role of the state in education D.N. PLANK AND T.E. DAVIS

Glossary 445

Constructing education systems 446 Economics and the State's role 446 Is education a public good? 446 Market failure in the market for education 447 Externalities 447 Information asymmetry 448 Uncertainty and risk aversion 449 Economies of scale 449 Equity and equal opportunity 449 Critique of state provision 450 Public choice and government failure 450 Inefficiency in production 450 Inequity in opportunities and outcomes 451 Standardization and enforced mediocrity 451 Rent-seeking and corruption 451 A role for the state? 451 Education and the shrinking state 452 See also 453 References 453

33. Quasi-markets in education: the case of England STEVE BRADLEY

Introduction 455 How could markets in education operate? 457 Alternative approaches 457 Quasi-markets in England 458 Evaluating the effects of Quasi-markets on educational outcomes 462 The effects of complementary and contradictory educational policies 465 Conclusions and future research 467 References 468

34. Tiebout sorting and competition THOMAS J. NECHYBA

Residential mobility, capitalization and household preferences for education 472
Tiebout sorting and the rationing of school inputs 472
Tiebout competition to enhance productive efficiency 475A partial divorce between competition and tiebout 476
Conclusion 477
References 478

35. Economic approaches to school efficiency GERAINT JOHNES

Introduction 479 Models of efficiency 480 Data envelopment analysis 480 Stochastic frontier analysis 482 More advanced models 483 Non-parametric models 483 Parametric models 486 Conclusions 487 References 487

36. School competition and the quality of education

FRANCESCA FOLIANO AND OLMO SILVA

Glossary 491 Introduction 491 Empirical evidence 496 England 496 US 499 Sweden 501 Chile 503 Conclusions 504 References 505

> 37. The economics of catholic schools W. SANDER AND D. COHEN-ZADA

Glossary 509 Introduction 509 Overview 509 History and enrollment 509

#### xii

Contents

Teachers 510 Students 510 Location 510 Tuition and costs 511 Market served 511 School practices 511 Vouchers 511 Catholic schools in other countries 511 Demand 512 Effects 513 Academic achievement and educational attainment 513 Bad behavior 514 Civic participation and altruism 515 Economic effects 515 Other effects 515 The effect of catholic school attendance in other countries 515 Conclusions 516 See also 516 References 516 Further reading 517

### 38. Private schools: choice and effects FRANCIS GREEN

Introduction 519 Theory 520 Evidence on choice 522 Evidence on effects 524 Methods 524 Findings 526 Conclusion 527 References 528

# 39. The economics of charter schools ADAM KHO, RON ZIMMER AND RICHARD BUDDIN

Glossary 531

- Introduction 531
- Policy questions 532
- What types of students do charter schools serve? 532
- Are charter and traditional schools receiving comparable funding? 534
- How do charter schools affect the performance of charter students? 535
- Is charter school competition improving the performance of traditional public schools? 538

Conclusion 539 References 540

40. The economics of vocational training SAMUEL MUEHLEMANN AND STEFAN C. WOLTER
Introduction 543
Costs and benefits of training investments for firms 544 Why firms pay for general training 544 Costs and benefits of apprenticeship training 545 Cross-country comparisons 546
Benefits of apprenticeships for individuals 548
Fiscal returns to apprenticeship training 552
Conclusions 553
References 553

#### 41. Student incentives

#### ERIC R. EIDE AND MARK H. SHOWALTER

Introduction 555 Student incentives in K-12 education 555 Financial incentives 555 Non-financial or mixed incentives 556 Incentives in developing countries 557 Teacher incentives in K-12 education 559 Individual teacher incentives 559 Group incentives for teachers 560 Teacher-student aligned incentives 561 Higher education incentives 561 Scholarships, grants, and cash awards 561 Student loans 562 Conclusion 563 References 563 Further reading 564

## 42. The economics of school accountability D.N. FIGLIO AND H.F. LADD

Glossary 567 The rationale for school-based accountability 568 Designing school accountability systems 569 The evidence on student achievement 571 Evidence on unintended consequences 572 References 573 Further reading 575

Index 577