## Contents

1 An Introduction to the Econometrics of Program Evaluation .......... 1
   1.1 Introduction .................................................................. 1
   1.2 Statistical Setup, Notation, and Assumptions ................. 7
      1.2.1 Identification Under Random Assignment ............. 13
      1.2.2 A Bayesian Interpretation of ATE Under
          Randomization .................................................. 14
      1.2.3 Consequences of Nonrandom Assignment and Selection
          Bias . .................................................................. 17
   1.3 Selection on Observables and Selection on Unobservables ..... 18
      1.3.1 Selection on Observables (or Overt Bias) and Conditional
          Independence Assumption ................................. 19
      1.3.2 Selection on Unobservables (or Hidden Bias) ......... 21
      1.3.3 The Overlap Assumption .................................... 22
   1.4 Characterizing Selection Bias ...................................... 24
      1.4.1 Decomposing Selection Bias ................................ 27
   1.5 The Rationale for Choosing the Variables to Control for ...... 29
   1.6 Partial Identification of ATEs: The Bounding Approach ....... 33
   1.7 A Guiding Taxonomy of the Econometric Methods for Program
       Evaluation ............................................................ 37
   1.8 Policy Framework and the Statistical Design for Counterfactual
       Evaluation ............................................................ 40
   1.9 Available Econometric Software ................................. 43
   1.10 A Brief Outline of the Book ....................................... 44
       References .................................................................. 45

2 Methods Based on Selection on Observables ........................... 49
   2.1 Introduction ............................................................ 50
   2.2 Regression-Adjustment .............................................. 51
      2.2.1 Regression-Adjustment as Unifying Approach Under
          Observable Selection ......................................... 51
2.2.2 Linear Parametric Regression-Adjustment:
The Control-Function Regression ................. 56
2.2.3 Nonlinear Parametric Regression-Adjustment .... 61
2.2.4 Nonparametric and Semi-parametric Regression-Adjustment ............ 63
2.3 Matching .................................. 67
2.3.1 Covariates and Propensity-Score Matching ........ 68
2.3.2 Identification of ATEs Under Matching .......... 70
2.3.3 Large Sample Properties of Matching Estimator(s) .... 72
2.3.4 Common Support .......................... 76
2.3.5 Exact Matching and the “Dimensionality Problem” .... 76
2.3.6 The Properties of the Propensity-Score .......... 78
2.3.7 Quasi-Exact Matching Using the Propensity-Score ... 80
2.3.8 Methods for Propensity-Score Matching .......... 83
2.3.9 Inference for Matching Methods ............... 88
2.3.10 Assessing the Reliability of CMI by Sensitivity Analysis .............. 94
2.3.11 Assessing Overlap ........................ 96
2.3.12 Coarsened-Exact Matching .................. 98
2.4 Reweighting .................................. 100
2.4.1 Reweighting and Weighted Least Squares ......... 100
2.4.2 Reweighting on the Propensity-Score
Inverse-Probability .............................. 105
2.4.3 Sample Estimation and Standard Errors for ATEs .... 110
2.5 Doubly-Robust Estimation ........................ 113
2.6 Implementation and Application of Regression-Adjustment ... 114
2.7 Implementation and Application of Matching .......... 126
2.7.1 Covariates Matching ........................ 126
2.7.2 Propensity-Score Matching ........................ 128
2.7.3 An Example of Coarsened-Exact Matching
Using cem ........................................ 142
2.8 Implementation and Application of Reweighting .......... 146
2.8.1 The Stata Routine treatrew .................. 146
2.8.2 The Relation Between treatrew and Stata 13’s
teffects ipw .................................... 151
2.8.3 An Application of the Doubly-Robust Estimator .......... 154
References ...................................... 157
3 Methods Based on Selection on Unobservables .......... 161
3.1 Introduction .................................. 161
3.2 Instrumental-Variables .......................... 163
3.2.1 IV Solution to Hidden Bias .................. 164
3.2.2 IV Estimation of ATEs ........................ 166
3.2.3 IV with Observable and Unobservable
Heterogeneities .................................. 172
3.2.4 Problems with IV Estimation .................. 175
Econometric Evaluation of Socio-Economic Programs
Theory and Applications
Cerulli, G.
2015, XIII, 308 p. 48 illus., Hardcover