# Contents |

Introduction and Overview 1

### 1 | Basic Channels 11

- 1 Background 11
  - 1.1 Productivity and Cost of Private Inputs 11
  - 1.2 Complementarity Effect on Private Investment 14
  - 1.3 Crowding-Out Effects 15
- 2 The Economy 16
  - 2.1 Households 17
  - 2.2 Firms 20
  - 2.3 Government 23
  - 2.4 Market-ClearingConditions 25
- 3 Equilibrium and the Balanced Growth Path 26
  - 3.1 The Case Where  $\mu = 1$  27
  - 3.2 The Case Where  $\mu < 1$  28
- 4 Growth Effects of Public Policy 32
- 5 Optimal Fiscal Policy 34
- 6 Extensions 37
  - 6.1 Indirect Taxation 37
  - 6.2 Complementarity Effect 38
  - 6.3 Public Capital and Household Utility 39
  - 6.4 Partial Depreciation and Maintenance 40
    - 6.4.1 Partial Depreciation 40
  - 6.4.2 The Investment-Maintenance Trade-Off 41
- Appendix: Optimal Policyunder Welfare Maximization 45

#### 2 | Public Capital and Education 49

- 1 Background 49
- 2 The Economy 51
  - 2.1 Households 51
  - 2.2 Production of Goods 52
  - 2.3 Production of Human Capital 53
  - 2.4 Government 54
  - 2.5 Savings-Investment Balance 55
- 3 Equilibrium and the Balanced Growth Path 55
  - 3.1 The Case Where  $\mu = 1$  57
  - 3.2 The Case Where  $\mu < 1$  59

- 4 Sensitivity of Education Technology 62
- 5 Public Policy 63
  - 5.1 Increase in Public Spending 63
  - 5.2 Optimal Expenditure Allocation 64
- 6 Extensions 65
  - 6.1 Endogenous Rearing Costs 65
  - 6.2 Time Allocation and Infrastructure 66
  - 6.3 Schooling Quality 67

Appendix: Stability Conditions and Steady-State Effects with  $\mu < 1$  69

## 3 | Public Capital and Health 72

- 1 Background 73
  - 1.1 Health and Economic Growth 73
  - 1.2 Infrastructure and Health 75
  - 1.3 Health Persistence 78
- 2 A Two-Period Framework 79
  - 2.1 Households 79
  - 2.2 Production of Goods 81
  - 2.3 Health Status and Productivity 81
  - 2.4 Government 83
  - 2.5 Savings-Investment Balance 83
- 3 Time Allocation and Growth Dynamics 84
- 4 Public Spending, Growth, and Human Welfare 88
- 5 Optimal Spending Allocation 89
- 6 A Three-Period Framework with Endogenous Fertility 91
- 7 Endogenous Life Expectancy 100
- 8 Interactions between Health and Education 104
  - 8.1 Impact of Health on Education 104
  - 8.2 Impact of Education on Health 106
  - 8.3 Magnification Effect 107

Appendix: Stability Conditions with Health Persistence 110

#### 4 | Public Capital and Innovation 111

- 1 Background 112
- 2 The Economy 113
  - 2.1 Households 114
  - 2.2 Production of the Final Good 114
  - 2.3 Production of Intermediate Goods 116
  - 2.4 Human Capital Accumulation 117
  - 2.5 Research and Development Sector 117
  - 2.6 Government 119
  - 2.7 Savings-Investment Balance 119
  - 2.8 Labor Market 119

- 3 Balanced Growth Path 120
- 4 Public Policy 121
  - 4.1 Basic Intuition 121
  - 4.2 Numerical Illustration 122
- 5 From Imitation to True Innovation 124

Appendix: Dynamic System and the Steady State 128

# 5 | Public Capital and Women's Time Allocation 132

- 1 Background 133
  - 1.1 Women's Time Allocation Constraints 133
    - 1.1.1 Transportation 134
    - 1.1.2 Water and Sanitation 134
    - 1.1.3 Electricity 135
  - 1.2 Intergenerational Health Externalities 136
    - 1.2.1 Mothers' Health Status and Child Development 136
    - 1.2.2 Mothers' Educational Status and Child Development 137
  - 1.3 Analytical Implications 139
- 2 The Economy 139
  - 2.1 Family's Utilityand Income 141
  - 2.2 Home Production 143
  - 2.3 Market Production 143
  - 2.4 Human Capital Accumulation 144
  - 2.5 Health Status and Productivity 145
  - 2.6 Government 146
  - 2.7 Savings-Investment Balance 147
- 3 Women's Time Allocation and Fertility 148
- 4 The Balanced Growth Path 150
- 5 Public Policy 154
- 6 Women's Labor Supply and Development 156
- 7 Extensions 158
  - 7.1 Public Capital and Gender Gaps 158
  - 7.2 Nonunitary Household Framework 158

Appendix: Solution, Stability Conditions, and Steady-State Effects 163

# 6 | Public Capital and Poverty Traps 174

- 1 Background 174
- 2 The Economy 177
  - 2.1 Individuals 177
  - 2.2 Firms 177
  - 2.3 Government 178
  - 2.4 Savings-Investment Balance 178
- 3 Balanced Growth Path 178
- 4 Network Externalities 179

- 5 The Big Push 182
- 6 Other Channels 184
  - 6.1 Time Allocation 184
  - 6.2 Health-Induced Poverty Traps 184
  - 6.3 Technology Choice 186
- 7 Aid Volatility and Time to Build 188

## 7 | Research Perspectives 192

- 1 Heterogeneous Infrastructure Assets 192
- 2 Political Economy of Government Spending Allocation 193
- 3 Excludable Public Goods 195
- 4 Debt, Public Capital, and Fiscal Rules 196
- 5 Spatial Dimensions of Public Capital 203
- 6 Infrastructure and Trade 206
- 7 Public-Private Partnerships 207
- 8 Public Capital and Income Distribution 209
- 9 Negative Externalities 212
- 10 Testing for the Impact of Public Capital on Growth 215

## Lessons for Public Policy 219

References 225 Index 247