

## CONTENTS

### VOLUME I

<b>Fundamental Economics</b>	<b>1</b>
<i>Mukul Majumdar, Cornell University, USA</i>	

1. Introduction and Overview
2. Macroeconomics of Demand and Supply
3. Partial Equilibrium: the Marshallian Approach
4. Productive Efficiency
  - 4.1. Efficiency and the Marginal Conditions
  - 4.2. The Ricardian Theory of Comparative Advantage
  - 4.3. Efficiency and Koopmans-Kantorovitch Prices
5. General Equilibrium
  - 5.1. The Miniature Models: A Keynesian System
  - 5.2. The Leontief Model: A Labor Theory of Value
  - 5.3. The Walras-Pareto Theory of Value
6. Market Failure
7. Cournot-Nash Equilibrium
8. Dynamic Analysis
  - 8.1. Growth: The Harrod-Domar Model
  - 8.2. Intertemporal Efficiency and Optimality

<b>Walrasian and Non-Walrasian Microeconomics</b>	<b>26</b>
<i>Anjan Mukherji, Center for Economic Studies and Planning, Jawaharlal Nehru University, New Delhi, India</i>	

1. Introduction
  - 1.1. Decision Makers, Economic Agents and Markets
  - 1.2. Walrasian and Non-Walrasian Approaches
  - 1.3. Overview
2. Walrasian Transactions: Excess Demand
  - 2.1. Demand
    - 2.1.1. Individual Demand Functions and their Properties
    - 2.1.2. Market Demand Functions
  - 2.2. Supply
    - 2.2.1. The Competitive Firm
    - 2.2.2. The Supply Function
    - 2.2.3. The Market Supply
  - 2.3. Excess Demand Functions and their Properties
  - 2.4. Walrasian Equilibrium
    - 2.4.1. Definition
    - 2.4.2. Existence of Equilibrium
    - 2.4.3. Uniqueness of Equilibrium
    - 2.4.4. Stability of Equilibrium
    - 2.4.5. Optimality of Competitive Equilibria
3. Non-Walrasian Transactions: Effective Demand
  - 3.1. Introduction: A Two Commodity Example
    - 3.1.1. Non-Tatonnement Processes
  - 3.2. Non-Walrasian Equilibria
    - 3.2.1. Younes Equilibria
    - 3.2.2. Equilibrium with Rationing: Dreze Equilibria
    - 3.2.3. The Notion of Effective Demand: Benassy Equilibria
  - 3.3. Optimality of Non-Walrasian Equilibria

4. Applications
  - 4.1. Stability Reconsidered
  - 4.2. Unemployment Equilibria
    - 4.2.1. The Effective Demand for Labor
    - 4.2.2. The Effective Demand for Output
    - 4.2.3. The Walrasian Temporary Equilibrium
    - 4.2.4. Rigid Prices: Non-Walrasian Equilibria

**Strategic Behavior**

**65**

Prajit K. Dutta, *Department of Economics, Columbia University, New York, NY 10027*

1. Examples of Games
2. The Strategic Form
3. Nash Equilibrium
4. The Tragedy of the Commons

**The Economics of Bargaining**

**83**

Abhinav Muthoo, *University of Essex, UK*

1. Introduction
2. Bargaining Situations and Bargaining
  - 2.1. An Outline of this Article
3. The Nash Bargaining Solution
  - 3.1. An Application to Bribery and the Control of Crime
  - 3.2. Asymmetric Nash Bargaining Solutions
4. The Rubinstein Model
  - 4.1. The Alternating-Offers Model
  - 4.2. The Unique Subgame Perfect Equilibrium
  - 4.3. Properties of the Equilibrium
    - 4.3.1. Relationship with Nash's Bargaining Solution
    - 4.3.2. The Value and Interpretation of the Alternating-Offers Model
5. Risk of Breakdown
6. Outside Options
7. Inside Options
  - 7.1. An Application to Sovereign Debt Renegotiations
8. Asymmetric Information
  - 8.1. The Case of Private Values
  - 8.2. The Case of Correlated Values
9. Repeated Bargaining Situations
  - 9.1. The Unique Stationary Subgame Perfect Equilibrium
  - 9.2. Small Time Intervals Between Consecutive Offers
10. Concluding Remarks

**Economic Externalities**

**116**

David A. Starrett, *Professor (Emeritus) at Stanford University, USA*

1. Introduction
2. Direct Externalities
  - 2.1. Externalities and Inefficiency
  - 2.2. Internalizing Externalities Through Markets
  - 2.3. Externalities and Collective Goods
  - 2.4. Market Allocation of Collective Goods
  - 2.5. Correction for Externality
3. Indirect Externalities
  - 3.1. Externalities Through Price Change

- 3.2. Externalities Through Market Activity Levels
- 4. Measuring Externalities
  - 4.1. Mechanism Design
  - 4.2. Hedonic Identification

**Public Goods** **130**

Donald E. Campbell, *Department of Economics, College of William and Mary, Williamsburg VA, USA*

- 1. Introduction
- 2. What are Public Goods?
- 3. Voluntary Contributions
- 4. The Model
- 5. Efficient Public Projects
- 6. Inefficiency of Competitive Equilibrium
- 7. Inefficiency of Benefit Taxation
- 8. Groves Mechanisms
- 9. Extensions

**Macroeconomics** **155**

S. Ortigueira, *Department of Economics, Cornell University, USA*

- 1. Introduction
- 2. Stylized Facts on Economic Growth
- 3. A basic model of physical and human capital accumulation
  - 3.1. Transitional Dynamics
    - 3.1.1. The Speed of Convergence
    - 3.1.2. The Behavior of Human Capital
- 4. Non-convexities and the role of initial conditions
- 5. Taxation policies and economic growth
- 6. Expectations and economic growth
- 7. Conclusion

**Macroeconomics: A Historical Perspective** **183**

Dipankar Dasgupta, *Indian Statistical Institute, Calcutta*

- 1. Scope of Macroeconomics
- 2. The Keynesian View of Unemployment
  - 2.1. A Simple Keynesian Model
  - 2.2. Extension of the Simple Keynesian Model: A Capital Scarce, Labor Surplus Economy
  - 2.3. Further Extension: Industry and Agriculture
- 3. Money, Keynes, and the Classics
  - 3.1. The Classical Theory of Employment
  - 3.2. The Keynesian Revolution
  - 3.3. Friedman's Counter-revolution
- 4. New Classical Macroeconomics
  - 4.1. Friedman and Monetarism
  - 4.2. Rational Expectations
- 5. Other Developments
  - 5.1. Real Business Cycle Theory
  - 5.2. New Keynesian Economics
- 6. Concluding Remarks

**The New Growth Theory** **218**

Yaw Narco, *New York University, USA*

1. Introduction
2. What is Knowledge?
  - 2.1. Literacy or Years of Schooling
  - 2.2. Productivity
  - 2.3. Knowledge "On" a Given Activity or Technology
  - 2.4. Basic Versus Applied Knowledge
  - 2.5. General Purpose Technologies
3. The Adoption Models
  - 3.1. The Leader Follower Model
  - 3.2. The Model Where New Technologies Are Embodied in New Equipment
  - 3.3. The Model Where Adoption Costs Are Explicitly Modeled
4. Invention Models
  - 4.1. Exogenous Growth Models
  - 4.2. Endogenous Growth Models
    - 4.2.1. The AK Models
    - 4.2.2. Models With Human Capital
    - 4.2.3. Learning-By-Investing and Knowledge Spillovers
    - 4.2.4. Preference For Variety
    - 4.2.5. Improvements in the Quality of Products
  - 4.3. The Knowledge and Growth Question
  - 4.4. The Scale Effects Debate
5. Education and Growth
6. Conclusion

### **Overlapping Generations Models**

240

Joan Esteban, *Institut d'Anàlisi Econòmica, CSIC, Bellaterra, Spain*

1. Introduction
2. Samuelson's canonical example of an OLG model
3. Existence and efficiency of competitive equilibria
4. Competitive equilibria with fiat money
5. Intergenerational transfers and trust
6. Concluding remarks on future research

### **Money: In Transactions and Finance**

270

Ross M. Starr, *Department of Economics, University of California, San Diego, USA*

1. Introduction
2. The Scope of this Article
3. What is Money?
4. What Money Does
  - 4.1. Medium of Exchange
  - 4.2. Store of Value
  - 4.3. Unit of Account
  - 4.4. Standard of Deferred Payment
5. Efficiency and Exchange
6. An Economy without Money
  - 6.1. Trade in a Central Marketplace
  - 6.2. Futures Contracts
  - 6.3. Uncertainty: Contingent Commodity Contracts
  - 6.4. Whats Wrong with this Picture?
7. Medium of Exchange
  - 7.1. Decentralization of the Trading Process and the Absence of Double Coincidence of Wants
  - 7.2. The Prehistoric Origin of Money and Sustaining a Monetary Equilibrium
  - 7.3. Uniqueness of Money
8. Store of Value

- 8.1. Monetary Equilibrium where Money is a Store of Value
- 8.2. Monetary Equilibrium
- 8.3. The Rate of Interest
- 8.4. Liquidity
- 9. Properties of the Monetary Instrument
  - 9.1. Fiat Money—Government and Money
  - 9.2. Resource Cost of Commodity Money
  - 9.3. Paradox of Positivity of Value of Fiat Money
  - 9.4. Taxation and the Value of Fiat Money
  - 9.5. Fiat Money as "Non-Interest-Bearing Debt"
- 10. Banks and Banking: Monetization of Capital
  - 10.1. Financial Markets and Financial Intermediaries
- 11. Central Banking
- 12. Conclusion

### Financial Markets

300

Rose Anne Dana, *Professor, Ceremade, Universite Paris-Dauphine, Place du Marechal De Lattre de Tassigny, Paris Cedex, France; Visiting CORE, Universite catholique de Louvain, Belgium.*

Monique Jeanblanc, *Professor, Laboratoire d'Analyse et probabilites, Universite d'Evry, Boulevard François Mitterrand, Evry Cedex, France*

- 1. Introduction
- 2. Pricing and Hedging
  - 2.1. Discrete Time
    - 2.1.1. Binomial Approach
    - 2.1.2. Two Dates, Several Assets and Several States of the World
    - 2.1.3. Multiperiod Discrete Time Model
  - 2.2. Continuous Time Model
    - 2.2.1. Hedging Contingent Claims
    - 2.2.2. European Options
    - 2.2.3. Exotic Options
    - 2.2.4. More General Models
    - 2.2.5. Incomplete Markets
- 3. Optimal Portfolio-Consumption Choice
  - 3.1. Two Period Model
  - 3.2. Multiperiod Discrete Time Model
  - 3.3. Continuous Time Models
    - 3.3.1. A Continuous Time Two Assets Model
    - 3.3.2. The Martingale Method
    - 3.3.3. The Dynamic Programming Method
    - 3.3.4. Generalization
- 4. Financial Markets Equilibria
  - 4.1. Two Dates Equilibrium Models
    - 4.1.1. C.A.P.M.
    - 4.1.2. Representative Agent Pricing
  - 4.2. Multi-Period Discrete Time Dynamic Equilibria
  - 4.3. Equilibria in Continuous Time
- 5. Term Structure
  - 5.1. Yield Curve, Forward Interest Rate
  - 5.2. Discrete time
  - 5.3. Spot Rate Models
  - 5.4. Heath-Jarrow-Morton Model
  - 5.5. Derivative Products on Yield
- 6. Conclusion

### Decision Making Under Uncertainty

332

David Easley, *Department of Economics, Cornell University, USA*  
 Mukul Majumdar, *Department of Economics, Cornell University, USA*

1. Introduction
2. Expected Utility
  - 2.1. Objective Expected Utility
  - 2.2. Risk Aversion
  - 2.3. Subjective Expected Utility
3. Sequential Decision Making
  - 3.1. Discounted Dynamic Programming
  - 3.2. Characterization of Optimal Policies
  - 3.3. Learning
4. Games as Multi-Person Decision Theory
  - 4.1. Nash Equilibrium
  - 4.2. Bayes Nash Equilibrium
5. Uses and Extensions

**Game Theory**

**344**

Joachim Rosenmüller, *University of Bielefeld, Institute of Mathematical Economics IMW, D-33615 Bielefeld, Germany*  
 Walter Trockel, *University of Bielefeld, Institute of Mathematical Economics IMW, D-33615 Bielefeld, Germany*

1. Introduction
2. Foundations of Non-cooperative Game Theory
  - 2.1. The Normal Form
  - 2.2. The Extensive Form
  - 2.3. Strategies, Equilibria, Refinements
3. NTU-Games
  - 3.1. The Coalitional Function
  - 3.2. Solutions
4. TU-Games
  - 4.1. Classification of games
  - 4.2. Solutions
5. The Equivalence Principle
  - 5.1. Walrasian Equilibrium
  - 5.2. Walrasian Equilibria and Cooperative Solutions
  - 5.3. Approximate and Weak Equivalence
  - 5.4. The Nash Program
6. Mechanism Theory
  - 6.1. Historical Background
  - 6.2. Implementation of Social Choice Rules
  - 6.3. The Revelation Principle
7. Repeated Games
  - 7.1. Evaluations
  - 7.2. Folk Theorems
  - 7.3. Repeated Games with Incomplete Information
8. Evolution and Learning in Games
  - 8.1. Introduction
  - 8.2. Evolutionary Stable Strategies
  - 8.3. Learning in Social Contexts
9. Experimental Games
  - 9.1. Introduction
  - 9.2. Repeated Prisoners' Dilemma
  - 9.3. Coordination Games
  - 9.4. Bargaining Games
  - 9.5. Optimistic Conclusion

10. Concluding Remarks

**International Economics** **390**

Bharat R. Hazari, *School of Economics, Deakin University, Melbourne, Australia*  
 Pasquale M. Sgro, *School of Economics, Deakin University, Melbourne, Australia*

1. Introduction
2. Trade Models
3. Economies of Scale
  - 3.1. Economies of Scale with Perfect Competition
  - 3.2. A Model of Monopolistic Competition
4. Factor Movements
  - 4.1. Direct Foreign Investment and Multinational Firms
  - 4.2. Portfolio Investment and Labor Migration
5. Economic Integration
6. Foreign Exchange Markets

**International Factor Mobility** **411**

Bharati Basu, *Department of Economics, Central Michigan University, Mt. Pleasant, Michigan, USA*

1. Introduction
2. Labor Mobility
  - 2.1. Different Types of Migration
  - 2.2. Emigration and the Welfare of Those Left Behind
  - 2.3. Unemployment and Emigration
  - 2.4. Government Policies in the Presence of Permanent Emigration
    - 2.4.1. Presence of External Effects
    - 2.4.2. Temporary Migration and Guest Workers
  - 2.5. Brain Drain
  - 2.6. Illegal Migration
  - 2.7. Learning by Doing and International Migration
3. Capital Mobility
  - 3.1. Capital Transfer
  - 3.2. Factor Mobility and National Advantage
  - 3.3. Trade and Capital
  - 3.4. Capital Mobility and Production Patterns
  - 3.5. Tariffs and Capital Movement
    - 3.5.1. The Small-Country Case
    - 3.5.2. The Large-Country Case
  - 3.6. Multinational Firms

**Biophysical Constraints To Economic Growth** **432**

Cutler J. Cleveland, *Department of Geography and Center for Energy and Environmental Studies, Boston University, USA*

1. Introduction
2. The Standard Model of Economic Growth
3. The Ecological-Economic View of the Economy
4. Limits of the Market and Technology
  - 4.1. The Role of Energy in Technical Change
  - 4.2. Do Rising Incomes Improve Environmental Quality?
  - 4.3. Countervailing Forces: Rising Affluence and the Rebound Effect
  - 4.4. Thermodynamics Limits Substitution
  - 4.5. Complementarity Limits Substitution
  - 4.6. Physical Interdependence and Scale Limits Substitution

- 4.7. Irreversibility Limits Substitution
- 4.8. Market Signals Aren't Always a Reliable Compass
- 4.9. Uncertainty, Ignorance, and the Unintended Side Effects of Technology
- 5. Is There a Carrying Capacity of the Earth For Humans?
  - 5.1. Indicators of Scale and Carrying Capacity
- 6. Alternative Models of Production, Wealth and Utility
  - 6.1. Will resource depletion limit growth?
  - 6.2. Will the environment's ability to process wastes limit economic growth?
  - 6.3. To what degree can human-made capital substitute for natural capital?
  - 6.4. To what degree can an educated work force substitute for natural capital?
- 7. The Search for Prometheus III
- 8. Conclusions

**Index** **451**

**About EOLSS** **457**

## VOLUME II

**Development Economics** **1**

Clive Bell, *Südasien Institut der Universität Heidelberg, Germany*

- 1. Defining Development
- 2. The Solow–Swan Model
  - 2.1. The Assumptions
  - 2.2. Steady States
  - 2.3. Transitional Dynamics
  - 2.4. Produced and Non-Produced Factors
  - 2.5. Discussion
- 3. Pioneers and Latecomers in Historical Perspective
  - 3.1. "Latecomers": The Advantages of Backwardness
  - 3.2. The Spread of Growth to the Third World
- 4. Growth and its Sources since 1950
  - 4.1. The Statistical Record
  - 4.2. The Sources of Growth
- 5. Climate and Development
- 6. The Long-term Prospects

**Sustainable Growth** **35**

Santanu Roy, *Florida International University, Miami, FL, USA*

- 1. Sustainable Growth: Concepts and Framework
  - 1.1. Economic Growth
  - 1.2. Sustainable Development
  - 1.3. Sustainable Growth
  - 1.4. Economic Growth Theory as a Framework for Analyzing Sustainable Growth
- 2. Economic Growth Without Environmental Factors: A Basic Model
  - 2.1. The Model
  - 2.2. Sustainable Growth in the Basic Model
  - 2.3. Technological Change
- 3. Sustainable Growth With Nonrenewable Resources
  - 3.1. Production Economy With No Capital Formation: The Grim Scenario
  - 3.2. Technological Progress and Sustainable Growth
  - 3.3. Production With Capital and Nonrenewable Resources: Role of Substitution Possibility

4. Sustainable Growth With Environmental Decay
  - 4.1. Growth With Pollution
  - 4.2. Technological Progress
  - 4.3. Growth With Pollution and Abatement
  - 4.4. Bell-shaped Relationship Between Output and Pollution
5. Alternative Criteria for Intertemporal Optimality

### **Environmental Economics and Global Warming**

61

Hirofumi Uzawa, *The Japan Academy, Japan*

1. Introduction
  - 1.1. Two International Conferences on the Environment
  - 1.2. Economic Theory and the Environment
2. Global Warming
3. Global Warming and Economic Theory
4. Global Warming and Intergenerational Equity
  - 4.1. Dynamic Optimality
  - 4.2. Intergenerational Equity
  - 4.3. Intergenerationally Equitable levels of Consumption and Investment
5. The International Fund for Atmospheric Stabilization
6. Social Overhead Capital
  - 6.1. Dynamically Optimum Allocation of Social Overhead Capital
  - 6.2. Externalities
7. Natural Environment as Social Overhead Capital
  - 7.1. Theory of the Commons
  - 7.2. Tragedy of the Commons
8. Optimum Provisions of Social Overhead Capital
  - 8.1. Natural Environment as Social Overhead Capital
  - 8.2. Social Infrastructure as Social Overhead Capital
9. Sustainability and the Agricultural Commons

### **Environmental Issues for Developing Economies**

90

Ramprasad Sengupta, *Centre for Economic Studies and Planning, School of Social Sciences, Jawaharlal Nehru University, New Delhi, India*

1. Introduction
2. Economy—Environment Relationship
3. Environmental Capital Base and Environmental Crisis
4. Population and Environment
  - 4.1. Population, Environmental Resource Base and Poverty
  - 4.2. Human Population Growth
  - 4.3. Overcoming the Constraints of Carrying Capacity: Technology, Trade, and Migration
  - 4.4. Urbanization, Poverty, and Environmental Stress
  - 4.5. Institutional Failure versus Poverty as cause of Environmental Degradation
5. Economic Growth and Environmental Quality
6. Development Process and Sustainability of Environmental Resource Base in Developing Economies: Soil, Water, Forestry, and Biodiversity
  - 6.1. Land and Food Security
  - 6.2. Unsustainable Agricultural Practices and Land Degradation
  - 6.3. Water Resource Balance
  - 6.4. Water Pollution and Water Management
  - 6.5. Forests
  - 6.6. Biodiversity
7. Exhaustible Resources and Sustainability of Development Process in Developing Economies
  - 7.1. Fossil Fuels
  - 7.2. Alternative Energy Sources

- 7.3. Energy Conservation
- 7.4. Non-Energy Materials
- 8. Sink Limitation
  - 8.1. Wastes and Pollution Problems
  - 8.2. Global Warming and Climate Change
- 9. Trade and the Environment
  - 9.1. North-South Trade, Development, and the Environment
  - 9.2. Trade policy and Environmental Control
- 10. The Concept of Sustainable Resource Use: Sustainable Accounting and Collective Action
- 11. Conclusion

**Economics of Environmental Regulation** **127**  
 William A. Brock, *University of Wisconsin, USA*

- 1. Introduction
- 2. A Lake Management Problem
- 3. Uncertainty, Values, Political Considerations, Regulatory Costs
- 4. Conclusions

**Renewable Resource Management** **146**  
 Jon M. Conrad, *Cornell University, USA*

- 1. Introduction
  - 1.1. Resource Dynamics
  - 1.2. Management Objectives
  - 1.3. Sustainability and Adaptive Management
- 2. Four Bioeconomic Models
  - 2.1. A Continuous-Time, Deterministic Model
  - 2.2. A Discrete-Time, Deterministic Model
  - 2.3. A Discrete-Time, Stochastic Model
  - 2.4. A Continuous-Time, Stochastic Model
- 3. Special Cases: Fisheries, Forestry, and Groundwater
  - 3.1. Fisheries Management: The Linear Model
  - 3.2. Forest Management: The Faustmann Model
  - 3.3. Groundwater
  - 3.4. The Stochastic Forest
  - 3.5. The Stochastic Fishery: Discrete Time
  - 3.6. The Stochastic Fishery: Continuous Time
- 4. Impediments to Resource Management
  - 4.1. Common Property, Open Access, and Missing Shadow Prices
  - 4.2. Poverty
  - 4.3. Information
  - 4.4. Incomplete Institutions

**Natural Resources, Economic Growth And Sustainability: A Neoclassical Perspective** **186**  
 Jeffrey A. Krautkraemer, *Department of Economics, Washington State University*

- 1. Introduction
- 2. Neoclassical Models of Economic Growth
  - 2.1. Capital-growth Model
  - 2.2. "Cake-eating" Model
  - 2.3. Capital-resource Substitution
  - 2.4. Technological Progress
  - 2.5. Renewable Resources
- 3. Resource Amenities

- 3.1. Resource Amenities: Non-commodity Goods and Services
- 3.2. Resource Amenities in Growth Models
- 3.3. Pollution and Growth Models
- 4. Intergenerational Equity and Social Welfare Functions
  - 4.1. Maximized Present Value
  - 4.2. Rawlsian Maxi-min Criterion
  - 4.3. Chichilnisky Criterion
  - 4.4. Non-decreasing Utility, Weak and Strong Sustainability
- 5. Conclusion

### **Perspectives On Discounting The Future**

209

Colin Price, *School of Agricultural and Forest Sciences, University of Wales, Bangor, Gwynedd, UK*

- 1. Introduction
- 2. Derivation from investment economics
- 3. Behavior and discounting
- 4. Time preference
  - 4.1. Inconsistencies
  - 4.2. Inverted Time Preference
  - 4.3. Reinterpreted Time Preference
- 5. Technological advance and diminishing marginal utility
  - 5.1. Diminishing Marginal Utility and People
  - 5.2. Diminishing Marginal Utility and Environmental Products
  - 5.3. Diminishing Marginal Utility of Money
  - 5.4. Diminishing Marginal Utility and Life
- 6. Threat, risk and uncertainty
- 7. Concluding comments

### **Sustainability And National Accounting**

233

Iain Fraser, *AEBM, Kent Business School, University of Kent, UK*

Michael Harris, *Agriculture and Resource Economics, University of Sydney Australia*

- 1. Introduction
  - 1.1. Sustainable Development and Economic Welfare
  - 1.2. The Semantics of Sustainability
  - 1.3. The Connection between Welfare (Standards of Living) and Sustainability
  - 1.4. Two Classifications of Sustainability
- 2. National Output and the History of the National Accounts
  - 2.1. Criticisms and Policy Failings Surrounding Conventional Accounting
- 3. Concepts of Income
  - 3.1. Depreciation and Net Product
  - 3.2. Beyond Depreciation Adjustments
- 4. Theoretical Underpinnings
  - 4.1. Growth Theory, Natural Resource Accounting and Sustainability
- 5. Applications – Unofficial Measures and Official Revisions
  - 5.1. Applications: Theory into Practice
    - 5.1.1. Government and Statistical Agency Activity
    - 5.1.2. The 2003 Integrated Environmental and Economic Accounts
    - 5.1.3. Assessing the 2003 SEEA
    - 5.1.4. Stock and Flow Accounts (Balance Sheets)
  - 5.2. Academic Research
    - 5.2.1. Non-renewable Resource Depletion
    - 5.2.2. Renewable Resource Depletion
    - 5.2.3. Non-Market Values
    - 5.2.4. Defensive Expenditures and Environmental Damage
    - 5.2.5. Open Economy

- 5.2.6. Regional NRA
- 5.2.7. Aggregate Sustainability Studies
- 6. Conclusions

### **Economics Of Sustainable Development: International Perspectives**

268

Mario Cogoy, *Department of Economics, University of Trieste, Italy*

Karl W. Steininger, *Department of Economics, University of Graz, Austria*

- 1. Introduction
- 2. Global and Transboundary Environmental Problems
  - 2.1. Economic Analysis of Global and Transboundary Environmental Problems
    - 2.1.1. Optimization analysis
    - 2.1.2. Game theory analysis
  - 2.2. Stratospheric Ozone Depletion
  - 2.3. Climate Change
  - 2.4. Biodiversity Loss
- 3. International Distribution of Environmental Burdens
  - 3.1. Climate Change
  - 3.2. Local impacts of global problems
  - 3.3. Emission reductions and equity
  - 3.4. Western lifestyles
  - 3.5. Biodiversity
  - 3.6. The role of scientific institutions
- 4. International Trade and Foreign Direct Investment
  - 4.1. The opening up to trade (economic integration) and its environmental implications
  - 4.2. Environmental policy in an open economy
  - 4.3. International regulation
  - 4.4. The Environmental Kuznets Curve and international trade
  - 4.5. International trade versus foreign direct investment
    - 4.5.1. Empirical findings
- 5. Overview of Topic-Related Articles
  - 5.1. International trade, the environment and sustainable development
  - 5.2. North-South trade, capital flows, and the environment
  - 5.3. International cooperation to resolve international pollution problems
  - 5.4. International environmental agreements and the case of global warming
  - 5.5. Environmental Conflicts and Regional Conflict Management
- 6. Conclusions

### **Financial Aspects Of Human Resource Development**

295

Richard A. Swanson, *Professor of Human Resource Development, University of Minnesota, USA*

- 1. Introduction
- 2. Framework for Understanding Financial Aspects of HRD
- 3. Historical Framework
- 4. General Findings Related to HRD Financial Analysis Methods
- 5. Early HRD Financial Analysis Classics
- 6. From Financial Analysis of Methods (FAM) to Forecasting Financial Benefits (FFB)
- 7. Recent Financial Analysis Research in HRD
- 8. Financial Assessment of the HRD Function and Organization-wide Efforts
- 9. Conclusion

### **Economic Foundation Of Human Resource Development**

306

Oscar A. Aliaga, *Professor of Human Resource Development, University of Minnesota, USA*

Richard A. Swanson, *Professor of Human Resource Development, University of Minnesota, USA*

1. Introduction
2. Defining HRD and Theoretical Foundations
3. Economic Theory as Theoretical Foundation of HRD
4. The Theories of Human Capital and of the Firm and the Human Resource Development Discipline
5. Human Capital and the Individual: Training and HRD
6. Human capital: a form of capital
7. Education and human capital formation
8. Human capital and training
9. The Theory of the Firm: Training and HRD
10. General training
11. Firm-specific training
12. Human Capital and HRD: The Organization Development Strand
13. Education and training
14. Conclusion

### **Economic Development And Government**

**323**

Michael W. Donnelly, *University of Toronto, Toronto, Canada*

1. Introduction: Economic Development as Interplay of Markets and Government
2. The Idea of Mercantilism
3. Adam Smith's Moral Economy and Self-regulating Markets
4. Socialist Critiques of Capitalism
5. Governments and Markets in a Polarized Age
6. Recent Theories of Economic Development
7. From Economic Growth to Human Development
8. Political Science on Markets and Government
9. The Study of Economic Development as Moral and Political Economy

### **Economics Of Fisheries And Aquaculture**

**343**

Ragnar Arnason, *Department of Economics, University of Iceland, and European Commission Joint Research Centre (Agriculture and Fisheries Unit)*

1. Introduction
2. Fisheries and Fish Farming in a Historical Context
3. Fisheries and Fish Farming in Modern Times.
4. Global Fisheries Inefficiency: The Common Property Problem
5. Future Fish Supply: The Expansion of Fish Farming
6. Some Important Issues in the World's Fisheries

### **Ecological Economics**

**363**

Brian Czech, *Center for the Advancement of the Steady State Economy, 5101 South 11th Street, Arlington, Virginia 22204, USA*

1. Historical Development of Ecological Economics
2. Approach and Philosophy of Ecological Economics
  - 2.1. Transdisciplinarity
  - 2.2. Ends, Means, and a Normative Stance
3. Themes and Emphases of Ecological Economics
  - 3.1. The Scale Issue
  - 3.2. Distribution of Wealth
  - 3.3. Allocation of Resources
4. Policy Implications of Ecological Economics
  - 4.1. Sustainable Scale
  - 4.2. Fair Distribution
  - 4.3. Efficient Allocation

5. Future Directions and Challenges for Ecological Economics
  - 5.1. Reinforcing the Primacy of Sustainable Scale
  - 5.2. Clarifying the Ecological Implications of Money Volumes and Flows
  - 5.3. Conceivable Need for De-Growth
6. Conclusion

**Sustainability Concepts In Ecological Economics 395**

John M. Gowdy, *Department of Economics, Rensselaer Polytechnic Institute, Troy, New York, USA*  
 Marsha Walton, *New York State Energy Research and Development Authority, Albany New York, USA*

1. Introduction
2. Weak Sustainability
3. Varieties of Strong Sustainability
4. Sustainability and Market Prices
5. Discounting and the Commensurability of Wants
6. Sustainability, Consilience, and the Role of Institutions
7. Strengthening Strong Sustainability

**Identification Of Ecological Economics Issues 408**

John Proops, *School of Politics, International Relations and the Environment, Keele University, Staffs, UK*

1. Introduction
2. Conceptual Issues
  - 2.1. Ethical B the Limits and Degree of Moral Considerability
    - 2.1.1. Future Generations
    - 2.1.2. Other Species
  - 2.2. Epistemological B Limits to our Understanding of the World
    - 2.2.1. Risk and Uncertainty
    - 2.2.2. Ignorance Through Novelty and Chaos
  - 2.3. Social B the Nature of Human Motivation
    - 2.3.1. Consumer versus Citizen
  - 2.4. Ecological B Living Nature and Social Action
    - 2.4.1. Biodiversity and its Definition
    - 2.4.2. Ecosystem Resilience
  - 2.5. Physical B Non-living Nature and Social Action
    - 2.5.1. Laws of Thermodynamics as Constraints on Human Action
3. Practical Issues
  - 3.1. Evaluation Techniques B Conventional and Alternative Methods
    - 3.1.1. Limits to Contingent Valuation
    - 3.1.2. Evaluation of > Natural= Prices
    - 3.1.3. Social Evaluation with Citizens= Juries
  - 3.2. Modeling B Types of Modeling and their Applications
    - 3.2.1. Input-output Applications
    - 3.2.2. Greening of Accounting and Macroeconomics
  - 3.3. Implementing Sustainability B Moving from Concept to Practice
    - 3.3.1. Indicators
    - 3.3.2. Technologies
  - 3.4. International Relations and the Environment B the Effects of Trade
    - 3.4.1. Ecological Footprints
    - 3.4.2. International Trade and the Environment

**Political Arithmetick: Problems With GDP As An Indicator Of Economic Progress 421**

Geoff Edwards, *Department of Politics and Public Policy, Griffith University, Queensland, Australia*

*Dedicated to Professor John Kenneth Galbraith, who in The Affluent Society in 1958 brought the consequences of consumer-led growth to the attention of the world.*

1. Introduction
  - 1.1. Three Dimensions
  - 1.2. Relevance to this Encyclopedia
  - 1.3. Scope of the Article
2. Background economics
  - 2.1. The Assumptions
  - 2.2. Theories of Growth
3. Kuznets to Keuning
  - 3.1. History of GDP
  - 3.2. Satellite Accounts
  - 3.3. How GDP is Calculated
4. The Arithmetical Dimension: Is GDP a Satisfactory Measure of Current Economic Activity?
  - 4.1. Statistical Aspects
  - 4.2. Deliberate Exclusions
  - 4.3. Globalisation
  - 4.4. Aggregation
5. The Diagnostic Dimension: Is GDP a Satisfactory Measure of Future Beneficial Economic Activity?
  - 5.1. Rundown of Capital Resources
  - 5.2. The Price Mechanism is Broken
  - 5.3. Defensive Expenditures
  - 5.4. Consumption vs Production
  - 5.5. Consumption vs Investment
  - 5.6. Sharemarket Activity is Not Wealth Creation
  - 5.7. Is Industrialisation Necessary for Growth?
6. The Political Dimension: is GDP a Satisfactory Measure of Economic Justice?
  - 6.1. Growth is a Political Objective
  - 6.2. Disparages Government
  - 6.3. Disregards Distribution
  - 6.4. Economic Activity – To What End?
  - 6.5. Is it GDP or the Way it is Used?
7. Conclusions
  - 7.1. Growth, Development and GDP
  - 7.2. Hidden Assumptions
  - 7.3. Adequacy Depends on Definition of ‘Progress’

**Index** **449**

**About EOLSS** **455**