

Contents

A.	Overview: Economic Growth and International Trade with Capital Goods.....	1
B.	Economic Reasoning on Trade and Growth.....	4
I.	The Old and the New Gains from International Trade.....	4
1.	Historical Origins of Theories of International Trade	4
2.	Basic Elements of the New and Old Theories of International Trade.....	7
a.	The Gains from Trade in the Old Theories of International Trade	8
b.	The Gains from Trade in the New Theories of International Trade	9
II.	International Trade in Solow–Ramsey Growth Models	16
1.	The One-Sector Solow–Ramsey Model: Intertemporal Trade	16
a.	The Setup of the Solow–Ramsey Model.....	16
b.	The Autarky Steady State in the Solow–Ramsey Model	19
c.	The Free-Trade Steady States in the Solow–Ramsey Model	22
2.	Trade Policy and the Price of Capital in the Solow–Ramsey Model.....	31
III.	International Trade in Models of Endogenous Growth.....	34
1.	Growth and International Integration: The Rivera-Batiz–Romer Model.....	34
a.	The Requirements for Endogenous Growth.....	34
b.	The Analysis of the Dynamic Implications of International Integration	38
2.	Comparative Advantage for Growth? The Grossman–Helpman Analysis	48
3.	Immobile Knowledge and Structural Hysteresis: The Worst Case Scenario for Growth? On Low-Tech and High-Tech Traps	54
a.	Structural Hysteresis in the Grossman–Helpman Model	55
b.	Structural Hysteresis in the Rivera-Batiz–Romer Model.....	58

IV. Summary: Theoretical Interrelationships of International Trade and Economic Growth	77
1. The Results of the Theoretical Analysis	77
2. Implications for the Empirical Analysis	80
 C. Empirical Findings on Economic Growth and International Trade with Capital Goods	81
I. The Time Series Behavior of Economic Growth	81
1. Just Good Luck or Does Policy Matter?	81
a. Low or High Persistence? The Easterly–Kremer–Pritchett–Summers Analysis.....	82
b. Testing for Unit Roots — Econometric Strategies.....	86
c. The Results of Unit Root Tests for Individual Countries	88
d. The Results of the Levin–Lin Panel Data Unit Root Test.....	92
e. Do Structural Breaks Explain the Differences of Subperiod Growth Rates?.....	93
f. Mean Reversion to What Mean?.....	95
g. Lessons from the Time Series Behavior of Economic Growth	96
2. Do Trade Reforms Cause Structural Breaks in the Time Series Behavior of Economic Growth?	98
a. Trade Liberalization Episodes and Growth Performance — The Results of a World Bank Study.....	99
b. Time Series Tests for the Long-Run and Short-Run Impact of Trade Liberalization Episodes on Economic Growth.....	101
c. Test for an Unknown Structural Break	105
II. The Impact of International Trade with Capital Goods on Economic Growth	116
1. The Impact of Capital Goods Import Tariffs on Capital Accumulation.....	116
a. Stylized Facts on International Trade with Capital Goods	116
b. A Simple Solow–Swan Model with Differentiated Capital Goods.....	123
c. Measures of Import Restrictions on Capital Goods	128
d. The Estimation Results	136

2. The Impact of International Trade with Capital Goods on Total Factor Productivity	147
a. Theoretical Framework and Empirical Implementation.....	147
b. Data and Estimation Procedure.....	148
c. Estimation Results.....	150
d. The Quantitative Impact of the R&D Activities of G7 Countries	155
D. Conclusions: The Role of International Trade with Capital Goods in Economic Development	158
E. Appendices.....	162
Appendix 1: Determination of the Technical Elasticity of Substitution for Differentiated Goods.....	162
Appendix 2: Determination of First-Order and Second-Order Effects of a New Input in a General Neoclassical Function	163
Appendix 3: The Solow–Ramsey Growth Model	164
Appendix 4: The Rivera-Batiz–Romer Model under Different Assumptions Concerning International Patent Protection and International Mobility of Techno-logical Knowledge	172
Appendix 5: Trade Hysteresis in the Rivera-Batiz–Romer Model.....	185
Appendix 6: Results of Section C.I.1	201
Appendix 7: How Important Are Mean Reverting Growth Rates if the Level of Per Capita GDP Follows a Random Walk?	210
Appendix 8: Bayesian Criticism on Classical Unit Root Tests	216
Appendix 9: Results of Section C.I.2	220
Appendix 10: A Solow–Swan Model with Differentiated Capital Goods	222
Appendix 11: Results of Section C.II.1	231
References.....	239
Index.....	245

List of Tables

Table 1 —	Growth and International Integration in the Rivera-Batiz–Romer Model.....	42
Table 2 —	Correlation Coefficients of Real Per Worker GDP Growth Rates, 1960–1970/1970–1980 and 1970–1980/1980–1988	84
Table 3 —	Test Statistics for the Country-Specific Unit Root Tests.....	90
Table 4 —	Levin–Lin Panel Data Unit Root Test for GDP Per Worker Growth Rates, 1960–1985	93
Table 5 —	Annual Real GDP Growth Rate Before and After a Trade Liberalization Period	100
Table 6 —	Tests for the Long-Run Impact of Trade Liberalization Episodes on the Time Series Behavior of Real Per Worker GDP Growth Rates	102
Table 7 —	Sustainability of Liberalization Episodes	104
Table 8 —	Cross-Country OLS Regression of Relative Capital Goods Price Index on Import Tariffs and Quantitative Restrictions	130
Table 9 —	Cross-Country OLS Regression of Relative Input Mix Value on Import Tariffs and Quantitative Restrictions, 1965–1985....	132
Table 10 —	Cross-Country OLS Estimation Results for the Transitional Version of a Solow–Swan Model Based on the Macroversion of Ψ_i	138
Table 11 —	Cross-Country OLS Estimation Results for the Transitional Version of a Solow–Swan Model Based on the Microversion of Ψ_i	140
Table 12 —	Levin–Lin Panel Data Unit Root Tests for all Variables.....	149
Table 13 —	Pooled Panel Cointegrating Regressions for 22 OECD Countries	151
Table 14 —	Pooled Panel Cointegrating Regressions for 16 OECD Countries	152
Table 15 —	Estimates of the Elasticities of Total Factor Productivity with Respect to R&D Capital Stocks in the G7 Countries, 1990	156

Table A.6.1 — Results of the Unit Root Tests for 120 Countries of the Summers–Heston World Table, 1950–1988	202
Table A.6.2 — Test Results for the Long-Run Equilibrium Growth Rate of 120 Countries of the Summers–Heston World Table, 1950–1988	207
Table A.7.1 — Levin–Lin Panel Data Unit Root Test for Per Worker GDP, 1960–1985	211
Table A.7.2 — Drift/Shock Ratios of Real Per Worker GDP, 1960–1985	213
Table A.9.1 — Immediate Effects of Trade Liberalization Episodes on Economic Growth	220
Table A.11.1 — Estimation Results for the Steady-State Version of a Solow–Swan Model Based on the Macroversion of Ψ_t ,	234
Table A.11.2 — Estimation Results for the Steady-State Version of a Solow–Swan Model Based on the Microversion of Ψ_t ,.....	235
Table A.11.3 — Indicators of Import Tariffs and Quotas on Capital Goods and Relative Capital Goods Prices and Input Ratios.....	236

List of Figures

Figure 1 — The Geometry of the New Gains from Trade.....	11
Figure 2 — The Standard Solow–Ramsey Model with Exogenous Productivity Growth.....	17
Figure 3 — The Autarky Steady States in Country A and B.....	20
Figure 4 — Free-Trade Transition Path with Out-of-Steady-State Starting Position of Country B.....	24
Figure 5 — Free-Trade Transition Path with Out-of-Steady-State Starting Position of Country A and B.....	26
Figure 6 — Free-Trade Steady State with Out-of-Steady-State Starting Position of Country A	27
Figure 7 — Free-Trade Steady State with Higher Rate of Time Preference in Country A	29
Figure 8 — The Rivera-Batiz–Romer Model of Endogenous Growth	39
Figure 9 — The Grossman–Helpman Model of Dynamic Comparative Advantage.....	49
Figure 10 — The Grossman–Helpman Model of Structural Hysteresis	56
Figure 11 — A Rivera-Batiz–Romer-Type Model of Hysteresis	59
Figure 12 — Steady State (1): North and South Perform Manufacturing and R&D	62
Figure 13 — Steady State (2): The North Performs Manufacturing and R&D, the South Is Specialized in Manufacturing	66
Figure 14 — Steady State (3): The North Is Specialized in R&D, the South Is Specialized in Manufacturing	68
Figure 15 — Steady State (4): The North Is Specialized in R&D, the South Performs Manufacturing and R&D	69
Figure 16 — Steady State (2): Ratio of Per Capita GDP North versus South Depending on Labor Force Size	74
Figure 17 — Steady State (3): Ratio of Per Capita GDP North versus South in Dependence of the Labor Force of the South.....	75
Figure 18 — Growth Rates of Per Worker GDP, 1960–1973 versus 1974–1988	84
Figure 19 — Paradigmatic Types of Time Series Behavior of Economic Growth, 1951–1985.....	90
Figure 20 — Mean Deviation and Posterior Probability of Structural Breaks in Per Worker GDP Growth in Trade Reform Countries, 1950–1985	107

Figure 21 — Structure of World Trade with Capital Goods, 1970–1990.....	117
Figure 22 — Structure of World Production of Capital Goods, 1970–1990 ...	119
Figure 23 — Shares of World R&D Expenditures, 1980, 1985, and 1990	120
Figure 24 — Average Shares of Capital Goods Net Imports in Domestic Capital Goods Absorption, 1970–1990	121
Figure 25 — Intraindustry Trade with Capital Goods, 1965–1990	122
Figure 26 — Import Tariffs on Capital Goods and Relative Capital Goods Prices, 1985	134
Figure 27 — Import Tariffs on Capital Goods and Relative Input Mix Values, 1985	135
Figure 28 — Estimates of the 1985 GDP Components Based on the Average Actual Capital Goods Import Tariff	143
Figure 29 — Estimates of 1985 GDP Components Based on a Hypothetical 100 Percent Capital Goods Import Tariff	144
Figure 30 — Industry Shares in Total R&D Expenditures of the Eight Largest OECD Countries, 1980–1990 Averages.....	154
Figure 31 — National Shares in Total OECD R&D Expenditures, 1980–1990 Averages	155

Figure A.6.1 — Growth Rates of Per Capita GDP, 1960–1973 versus 1974–1988	201
Figure A.8.1 — Probability Density Functions for $\hat{\rho}$ under $\rho = 0.9$ and $\rho = 1$ and Posterior Probability Density for ρ under $\hat{\rho} = 0.95$	217
Figure A.8.2 — Probability Density Functions for $\hat{\rho}$ under $\rho = 0.9$ and Posterior Probability Density for ρ under $\hat{\rho} = 0.95$	219
Figure A.11.1 — Import Tariffs on Capital Goods and Relative Input Mix Values, 1980	231
Figure A.11.2 — Import Tariffs on Capital Goods and Relative Input Mix Values, 1975	231
Figure A.11.3 — Import Tariffs on Capital Goods and Relative Input Mix Values, 1970	232
Figure A.11.4 — Import Tariffs on Capital Goods and Relative Input Mix Values, 1965	232
Figure A.11.5 — Import Tariffs on Capital Goods and Relative Capital Goods Prices, 1980	233