

FRONTIERS OF ECONOMICS AND GLOBALIZATION VOLUME 11

ECONOMIC GROWTH AND DEVELOPMENT

Edited by

Olivier de La Grandville

*Department of Management Science and Engineering,
Stanford University, Stanford CA*



United Kingdom – North America – Japan
India – Malaysia – China

CONTENTS

ABOUT THE SERIES: FRONTIERS OF ECONOMICS AND GLOBALIZATION	v
ABOUT THE EDITOR	vii
LIST OF CONTRIBUTORS	ix
FOREWORD	xxiii
CHAPTER 1 HOW GROWTH CAN UNDERMINE GROWTH: THREE EXAMPLES	1
<i>Kenneth J. Arrow</i>	
1 The Impact of Medical Progress	2
2 Technological Progress in Weapons	4
3 The Anthropocene Age	5
CHAPTER 2 COMMODITY PRICE VOLATILITY, DEMOCRACY, AND ECONOMIC GROWTH	9
<i>Rabah Arezki and Thorvaldur Gylfason</i>	
1 Introduction	9
2 Data	13
2.1 Nonresource GDP (NRGDP)	13
2.2 Commodity price index and volatility	13
2.3 Democracy	14
3 Empirical results	14
3.1 Estimation strategy	14
3.2 Economic growth	15
3.3 Saving	18
4 Robustness checks	21
5 Summary and conclusion	22
Acknowledgments	22
References	23

CHAPTER 3 GROWTH, COLONIZATION, AND INSTITUTIONAL DEVELOPMENT: IN AND OUT OF AFRICA	25
<i>Graziella Bertocchi</i>	
1 Introduction	25
2 Growth, history, and institutions	26
3 Growth in Africa	27
4 History and colonization	29
5 State fragility	32
6 Slavery	35
7 Conclusion	36
Acknowledgments	37
References	38
CHAPTER 4 ON THE RELATION BETWEEN INVESTMENT AND ECONOMIC GROWTH: NEW CROSS-COUNTRY EMPIRICAL EVIDENCE	43
<i>Michael Binder and Susanne Bröck</i>	
1 Introduction	44
2 The PVAR/PVECM framework	47
3 Estimation under cross-sectional independence	50
3.1 The mean group estimator	51
3.2 The pooled mean group estimator	52
4 Estimation under cross-sectional dependence	53
5 Hypothesis testing	56
5.1 Unit root tests	56
5.2 Tests for cross-sectional independence	57
5.3 Tests for cointegration	58
5.4 Tests for long-run parameter homogeneity	60
5.5 Tests for weak exogeneity/long-run causality	61
5.6 Impulse responses and persistence profiles	62
6 The relationship between investment in physical capital and output: Empirical evidence	63
6.1 Data	63
6.2 Replicating Blomström, Lipsey, and Zejan	63
6.3 Estimation and hypothesis testing results	66
7 Conclusion	83
Acknowledgments	84
References	84

CHAPTER 5 VINTAGE CAPITAL GROWTH THEORY: THREE BREAKTHROUGHS	87
<i>Raouf Boucekkine, David de la Croix and Omar Licandro</i>	
1 Introduction	87
2 Vintage capital models: seminal theory	89
2.1 The Johansen vintage capital model	89
2.2 The Solow vintage capital model	91
2.3 The vintage capital model with fixed factor proportions	93
3 The embodiment debate and implications for empirical growth: the accounting breakthrough	94
3.1 The embodiment controversy: Solow (with the help of Gordon) strikes back	94
3.2 Growth accounting under embodiment	96
4 Optimal vintage capital growth models: The optimal control breakthrough	97
4.1 The mathematical peculiarity of vintage capital models	97
4.2 Vintage capital optimal growth models	98
4.3 Vintage capital with endogenous growth	100
5 Vintage human capital: the third breakthrough	103
5.1 Vintage human capital and technology diffusion	103
5.2 Vintage human capital and inequality	105
5.3 Demographic vintage human capital models	107
6 Conclusion	112
Acknowledgment	112
References	113
 CHAPTER 6 ADAPTIVE ECONOMIZING, CREATIVITY, AND MULTIPLE-PHASE EVOLUTION	 117
<i>Richard H. Day</i>	
1 Adaptive economizing	118
2 Cooperation, enterprise, and markets	123
3 Imagination, creativity, and imitation	127
4 Multiple-phase evolution	128
Appendix A	129
A.1 Multiple-phase dynamics	129
A.2 An abstract adaptive society	132
A.3 Viability	133
A.4 Multiple-phase dynamics	136
A.5 Endogenous priorities	137
A.6 Discussion	137
References	138

CHAPTER 7 AN EXPLICIT NONSTATIONARY STOCHASTIC GROWTH MODEL	141
<i>Robert Feicht and Wolfgang Stummer</i>	
1 Introduction	141
2 The economy model	143
3 Exploratory simulation analyses	149
Acknowledgments	191
Appendices	191
A.1 Derivation of the capital stock dynamics	191
A.2 Distributions	193
A.3 Consumption (5) within a Ramsey-type setup	196
References	200
 CHAPTER 8 GROWTH VOLATILITY AND THE STRUCTURE OF THE ECONOMY	203
<i>Davide Fiaschi and Andrea Mario Lavezzi</i>	
1 Introduction	203
2 The estimation of growth volatility	206
2.1 The methodology	206
2.2 A look at the estimated growth volatilities	210
3 Empirical analysis	212
3.1 The dataset	214
3.2 GAM estimation	224
4 Concluding remarks	241
Acknowledgment	242
Appendix	242
References	244
 CHAPTER 9 STABILITY OF GROWTH MODELS WITH GENERALIZED LAG STRUCTURES	247
<i>Donald A.R. George</i>	
1 Introduction	247
2 Stability, asymptotic stability, and convergence	248
3 Economic growth with a variable production lag	250
4 Economic growth with an accelerator investment function	255
5 Time-varying parameters	257
6 Conclusions	258
Acknowledgments	259
References	259

CHAPTER 10 ON THE TRACK OF THE WORLD'S ECONOMIC CENTER OF GRAVITY	261
<i>Jean-Marie Grether and Nicole Andréa Mathys</i>	
1 Introduction	261
2 Measuring the world's economic center of gravity	262
2.1 Mean direction and mean concentration on a sphere	262
2.2 From land to population and from population to production	264
3 Tracking the centers of gravity	265
3.1 Moving eastward: mean direction trends 1950–2008	266
3.2 Mean concentration decomposition 1950–2008	270
3.3 Education and R&D	274
4 Conclusion	276
Acknowledgments	277
Appendix A	278
Appendix B	280
B.1 How is a center of gravity measured?	280
B.2 Location on a sphere: polar and Cartesian coordinates	281
B.3 Descriptive statistics on a sphere	282
B.4 Specific cases	284
References	287
CHAPTER 11 HOMOTHETIC MULTISECTOR GROWTH MODELS	289
<i>Bjarne S. Jensen and Ulla Lehmijoki</i>	
1 Introduction	289
2 Structure of homothetic multisector economies	292
2.1 CES sector technologies and cost functions	292
2.2 CES preferences and consumer demands	294
2.3 Factor endowments, allocation fractions, and GDP	296
3 Walrasian equilibrium of two-factor-multisector economies	298
4 Dynamics and evolution of homothetic multisector economies	300
5 Solving the multisector growth – (2×10) – model	302
5.1 CES parameter sets of $U(Y_2, \dots, Y_{10})$ and $F_i(L_i, K_i)$	302
5.2 MSG time paths of the CES 10-sector growth model	303
6 Final comments	314
Acknowledgment	314
Appendix: CES isoquant map	315
References	315

CHAPTER 12	MEDIUM-TERM GROWTH: THE ROLE OF POLICIES AND INSTITUTIONS	319
	<i>Michał Jerzmanowski and David Cuberes</i>	
1	Introduction	320
2	Lack of growth persistence	324
3	Growth transitions	326
4	Growth regimes	337
5	Policies, institutions, and regime switching	343
6	Conclusions	360
	References	362
CHAPTER 13	MODELING PARAMETER HETEROGENEITY IN CROSS-COUNTRY REGRESSION MODELS	367
	<i>Andros Kourtellos</i>	
1	Introduction	367
2	Econometric methodology	370
3	Data	371
4	Empirical results	373
	4.1 Unconditional models	373
	4.2 Conditional models on population growth and investments	376
5	Conclusion and directions for future research	381
	Acknowledgments	382
	Appendix	383
	References	385
CHAPTER 14	HOW MUCH SHOULD A NATION SAVE? A NEW ANSWER	389
	<i>Olivier de La Grandville</i>	
1	A model of optimal growth	391
	1.1 The production process	391
	1.2 Choosing an optimality criterion	392
	1.3 The surprises of competitive equilibrium	392
2	Optimal growth paths for the economy	394
	2.1 Case $\sigma \leq 1$ ($p \leq 0$)	395
	2.2 Case $\sigma > 1$, $p > 0$	410
3	Qualifications and extensions	410
4	Conclusion	413
	Acknowledgments	414
	References	414

CHAPTER 15	AGGREGATION, THE SKILL PREMIUM, AND THE TWO-LEVEL PRODUCTION FUNCTION	417
	<i>Miguel A. León-Ledesma, Peter McAdam and Alpo Willman</i>	
1	Introduction	417
2	The normalized two-step four-factor CES production function	420
3	Data	422
4	Estimation results	426
	4.1 Overview	426
	4.2 Discussion	431
5	Conclusions	432
	Acknowledgment	433
	Appendix Normalization: A primer	434
	References	435
CHAPTER 16	FACTOR SUBSTITUTION AND BIASED TECHNOLOGY WITH BALANCED GROWTH	437
	<i>Miguel A. León-Ledesma and Mathan Satchi</i>	
1	Introduction	437
2	Related literature	439
3	CES and the choice of production technique	442
4	Dynamics and calibration	445
5	Conclusions	451
	Acknowledgment	452
	References	452
CHAPTER 17	ILLEGAL IMMIGRATION, FACTOR SUBSTITUTION, AND ECONOMIC GROWTH	455
	<i>Theodore Palivos, Jianpo Xue and Chong K. Yip</i>	
1	Introduction	456
2	A model of illegal immigration with one type of domestic labor	457
	2.1 The model	457
	2.2 Steady-state equilibrium	461
	2.3 Changes in wealth, income, and consumption	462
	2.4 Transitional dynamics	465
3	The general framework	466
	3.1 The comparative static results of factor substitution	468
	3.2 Steady-state analysis	471
4	The distribution of wealth	473
5	Concluding remarks	478

Acknowledgment	480
Appendix. Normalization procedure of the two-level nested CES production function	480
References	481
CHAPTER 18 INVESTMENT, TECHNICAL PROGRESS, AND THE CONSEQUENCES OF THE GLOBAL ECONOMIC CRISIS	483
<i>John Pawley and Ernst Juerg Weber</i>	
1 Decomposition of forecast-error-variances	486
2 Impulse responses	489
3 Conclusion	490
Acknowledgments	491
References	491
CHAPTER 19 MARKET POWER, GROWTH, AND UNEMPLOYMENT	493
<i>Pietro F. Peretto</i>	
1 Introduction	493
2 The model	495
3 Wages, prices, and R&D at the firm level	499
4 General equilibrium	505
5 Implications for the analysis of reforms	510
5.1 Labor market reforms	511
5.2 Product market reforms	514
6 Conclusion	518
Acknowledgments	519
Appendices	519
A.1 The bargaining problem	519
A.2 The reduced-form revenue function	520
A.3 Proof of Proposition 1	520
A.4 A condition for \tilde{m} decreasing in N	523
References	524
CHAPTER 20 OPTIMAL ABATEMENT INVESTMENT AND ENVIRONMENTAL POLICIES UNDER POLLUTION UNCERTAINTY	527
<i>Enrico Saltari and Giuseppe Travaglini</i>	
1 Introduction	527
2 The model	529
2.1 The value of the firm	531
2.2 Investment, rents, and the value of firm	532
3 Environmental policy	534
3.1 Taxes	534

3.2 Subsidies	535
4 Conclusion	536
Appendix	538
References	540
CHAPTER 21 ROBOTICS AND GROWTH	543
<i>Erling Steigum</i>	
1 Introduction	543
2 The model	544
3 The special case of perfect substitutes	546
3.1 Optimal growth	547
3.2 The optimal saving rate is increasing when $n > 0$	549
3.3 Tax and subsidy policy	549
3.4 How fast does the rate of growth approach the asymptotic growth rate?	550
3.5 An exogenous gross investment share	551
4 The case of imperfect substitution between robots and labor	552
4.1 A steady state exists ($r_\mu < \rho$)	552
4.2 Endogenous growth ($r_\mu > \rho$)	553
4.3 The special case $r_\mu = \rho$	553
5 Discussion	553
Acknowledgment	554
Appendix	554
References	555
CHAPTER 22 GOVERNMENT AND GROWTH: FRIEND OR FOE?	557
<i>Milad Zarin-Nejadan</i>	
1 Introduction	558
2 Long-term public sector growth	558
2.1 Measuring the size of the public sector	559
2.2 Long-term growth of the State: stylized facts	560
3 Factors behind public sector growth	562
3.1 Economic explanations	562
3.2 Explanations from the public-choice literature	564
4 Government's impact on growth	565
4.1 Growth-theoretical underpinnings	565
4.2 Impact of public expenditure on growth	566
4.3 Impact of public revenues on growth	569
4.4 Government's own inefficiencies	573
5 Evidence from empirical studies	573
6 Conclusion	576
Acknowledgments	578
References	578