

Contents

Preface	ix
1 Introduction to economic growth	1
1.1 The field	1
1.1.1 Economic growth theory	1
1.1.2 Some long-run data	3
1.2 Calculation of the average growth rate	4
1.2.1 Discrete compounding	4
1.2.2 Continuous compounding	6
1.2.3 Doubling time	7
1.3 Some stylized facts of economic growth	7
1.3.1 The Kuznets facts	7
1.3.2 Kaldor's stylized facts	9
1.4 Concepts of income convergence	10
1.4.1 β convergence vs. σ convergence	10
1.4.2 Measures of dispersion	12
1.4.3 Weighting by size of population	13
1.4.4 Unconditional vs. conditional convergence	14
1.4.5 A bird's-eye view of the data	15
1.4.6 Other convergence concepts	17
1.5 Literature	19
2 Review of technology and factor shares of income	23
2.1 The production technology	23
2.1.1 A neoclassical production function	24
2.1.2 Returns to scale	27
2.1.3 Properties of the production function under CRS	32
2.2 Technological change	35
2.3 The concepts of representative firm and aggregate production function*	40
2.4 Long-run vs. short-run production functions*	43

2.5	The neoclassical theory of factor income shares	45
2.6	The elasticity of factor substitution*	48
2.7	The CES production function	50
2.8	Literature notes	55
2.9	References	56
3	Continuous time analysis	59
3.1	The transition from discrete time to continuous time	59
3.1.1	Multiple compounding per year	59
3.1.2	Compound interest and discounting	61
3.2	The allowed range for parameter values	62
3.3	Stocks and flows	63
3.4	The choice between discrete and continuous time formulation	65
3.5	Appendix A: Growth arithmetic in continuous time	66
3.6	Appendix B: Solution formulas for linear differential equations of first order	67
4	Skill-biased technical change. Balanced growth theorems	69
4.1	The rising skill premium	70
4.1.1	Skill-biased technical change in the sense of Hicks: An example	70
4.1.2	Capital-skill complementarity	71
4.2	Balanced growth and constancy of key ratios	72
4.2.1	The concepts of steady state and balanced growth	73
4.2.2	A general result about balanced growth	74
4.3	The crucial role of Harrod-neutrality	76
4.4	Harrod-neutrality and the functional income distribution	80
4.5	What if technological change is embodied?	82
4.6	Concluding remarks	84
4.7	References	84
5	Growth accounting and the concept of TFP: Some limita- tions	87
5.1	Introduction	87
5.2	TFP growth and TFP level	87
5.2.1	TFP growth	89
5.2.2	The TFP level	91
5.2.3	Accounting versus causality	93
5.3	The case of Hicks-neutrality*	94
5.4	Absence of Hicks-neutrality*	95
5.5	A warning regarding cross-country TFP growth comparisons	97

5.6	Summing up	100
5.7	References	100
6	Transitional dynamics. Barro-style growth regressions	103
6.1	Point of departure: the Solow model	103
6.2	Do poor countries tend to approach their steady state from below?	106
6.3	Within-country convergence speed and adjustment time	107
6.3.1	Convergence speed for $\tilde{k}(t)$	108
6.3.2	Convergence speed for $\log \tilde{k}(t)^*$	110
6.3.3	Convergence speed for $y(t)/y^*(t)^*$	110
6.3.4	Adjustment time	112
6.4	Barro-style growth regressions*	114
6.5	References	118
7	Why the Malthusian era must come to an end	119
7.1	The general model	119
7.2	Law of motion	121
7.3	The inevitable ending of the Malthusian regime when $\mu > 1$.	122
7.4	Closing remarks	124
7.5	Appendix	125
7.6	References	125
8	Choice of social discount rate	127
8.1	Basic distinctions relating to discounting	128
8.1.1	The unit of account	128
8.1.2	The economic context	131
8.2	Criteria for choice of a social discount rate	132
8.3	Optimal capital accumulation	135
8.3.1	The setting	135
8.3.2	First-order conditions and their economic interpretation	137
8.3.3	The social consumption discount rate	138
8.4	The climate change problem from an economic point of view .	142
8.4.1	Damage projections	142
8.4.2	Uncertainty, risk aversion, and the certainty-equivalent loss	143
8.4.3	Comparing benefits and costs	147
8.5	Conclusion	149
8.6	Appendix: A closer look at Arrow's estimate of the certainty loss	149
8.7	References	151