
Contents

1	The importance of long-run growth analysis	1
1.1	Frequent forecast failures	1
1.2	Strong demand - but little supply	3
1.3	Plan of work	6
1.3.1	Choosing a sensible theoretical model	6
1.3.2	Choosing the best econometric technique	8
2	Assessment of growth theories	9
2.1	The search for a dynamic model	9
2.2	The basic neoclassical model	10
2.2.1	Application in cross-country analysis	12
2.3	Focus on convergence	13
2.3.1	Tests for conditional convergence	15
2.4	Models with deeper insights	16
2.4.1	Including human capital (Lucas)	17
2.4.2	Modeling barriers to riches (Parente & Prescott)	18
2.5	Opening the theories further	19
2.5.1	Models with scale effects	20
2.5.2	Evolutionary models of growth	21
2.5.3	Open-system models	24
2.6	General critique of the standard approach	25
2.6.1	Production function cannot be estimated	25
2.6.2	Aggregate production function does not exist	28
2.6.3	The concept of TFP is not helpful	29
2.6.4	Beyond neoclassical economics	29
2.7	The augmented Kaldor model	30
3	The dependent variable: GDP growth	35
3.1	Choosing the appropriate data source	36

4	Labor input	43
4.1	Population growth is endogenous	43
4.2	Hours worked per capita are important	46
4.3	Age structure of the population	48
5	Physical capital	51
5.1	Measuring capital accumulation	52
5.1.1	Investment and changes in capital stocks	52
5.1.2	Different databases - different investment ratios	53
5.1.3	Capital stocks from perpetual inventory	54
5.2	Main insights on capital accumulation	56
5.2.1	Investment ratios are not constant	56
5.2.2	Investment ratios do not differ much across countries ..	56
5.2.3	Investment ratios are not proportional to changes in the capital stock	60
5.2.4	Investment ratios are not proportional to levels of the capital stock	61
5.2.5	Capital productivity does not correlate with income ...	61
5.2.6	Capital accumulation is not exogenous	63
5.3	Proper modeling of capital accumulation	63
6	Human capital	67
6.1	Micro- and macroeconomic theory	69
6.1.1	Microeconomic analysis: labor economics	70
6.1.2	Macroeconomic models with different conclusions	71
6.2	Measures and empirical analysis	74
6.2.1	Best measure: years of education	75
7	Openness	81
7.1	Theory: higher efficiency	83
7.1.1	Extent of the market and specialization	84
7.1.2	Good macro polices and more competition	84
7.1.3	Additional influences of trade on income	86
7.2	Measuring openness	86
7.2.1	Black market premium and tariffs	87
7.2.2	The openness dummy	87
7.2.3	Best measure: adjusted trade share	88
7.3	Empirical debate: levels versus growth	90
8	Spatial linkages	95
8.1	Spatial economics - location matters	97
8.1.1	Absolute location: latitude and climate	97
8.1.2	Relative location: rich neighbors	97
8.2	Constructing spatial GDP	98
8.3	Sum: Spatial linkages not much help	101

9	Other determinants of GDP	103
10	The theory of forecasting	105
10.1	The benefits of forecast experiments	106
10.2	The characteristics of good forecasts	106
10.3	Intercept correction and forecast combination	109
11	The evolution of growth empirics	113
11.1	Still widely used: cross-section	114
11.2	Weaknesses of cross-section regressions	116
11.2.1	Same production function assumed	117
11.2.2	Long-run growth path assumed to be constant and the same across countries	117
11.2.3	Same pace of conditional convergence assumed	118
11.2.4	Errors are assumed uncorrelated with the explanatory variables	118
11.2.5	Right-hand side variables assumed exogenous	118
11.2.6	In sum: many assumptions are violated	119
11.3	The climax of cross-section	119
11.4	Advantages of panel techniques	121
11.4.1	Initial technology can differ across countries	123
11.4.2	Dealing with endogeneity bias	123
11.4.3	Addressing lagged dependent bias	124
11.4.4	Modeling heterogeneous technological progress	125
11.4.5	Summary of results from panel regressions	125
11.5	Non-stationary panel techniques	126
11.5.1	Pooled mean group technique	126
11.5.2	Testing unit roots and cointegration in panels	128
11.5.3	Panel unit root tests	129
11.5.4	Panel cointegration tests	131
11.6	A two-stage estimation method	134
12	Estimation results	137
12.1	Correlation analysis	137
12.2	Panel unit root tests	139
12.3	Panel cointegration test	142
12.4	The short-run forecasting models	146
13	Forecast competitions and 2006-2020 forecasts	151
13.1	Forecast competition 2001-2005	151
13.2	Forecast combination	154
13.3	Forecast competition 1996-2005	155
13.4	Forecasts for 2006-2020	155
13.5	Other long-run forecasting models	160

XII Contents

14 Conclusion and outlook	163
List of figures	165
List of tables	167
References	169