Contents

	List	of figur	es	<i>page</i> ix
	List	of table	25	xi
	List	of symb	pols	xiii
	List	of defin	itions	XV
	List	of prop	ositions	XVI
Intr	oduct	ion		1
	PAF	RT ON	E DIFFERENTIAL FERTILITY	7
1	Ben	chmarl	k model	9
	1.1	The m	iodel	9
	1.2	Introd	ucing a lump sum transfer	16
	1.3	Nume	rical illustration	17
2	Imp	lication	ns for the growth–inequality relationship	20
	2.1	The m	odel economy	22
	2.2	Theor	etical results	25
		2.2.1	The tradeoff between the quality and quantity of	
			children	25
		2.2.2	The balanced growth path	28
		2.2.3	The dynamics of individual human capital	31
		2.2.4	Extension with endogenous child rearing time	33
	2.3	Comp	utational experiments	35
		2.3.1	Calibration	35
		2.3.2	Initial inequality, fertility, and growth	39
		2.3.3	The dynamics of inequality, fertility, and growth	41
	2.4	Concl	usion	46

vi

3 Understanding the forerunners in fertility decline 48 3.1 Rouen and Geneva data 49 3.2 A simple model of fertility 52 3.3 Numerical experiments - calibration 58 3.4 Numerical experiments - comparative statics 60 3.5 Additional data 63 3.6 Conclusion 65 PART TWO EDUCATION POLICY 67 4 Education policy: private versus public schools 69 4.1 The model 72 4.1.1 The set-up with private education 72 4.1.2 Fertility and education choices under private education 74 4.1.3 The set-up with public education 75 4.1.4 Fertility and policy choices under public education 76 4.2 Comparing private and public education 77 4.2.1 Long-run dynamics 77 4.2.2 Implications for growth 81 4.3 Growth and inequality over time 84 4.3.1 Calibration 85 4.3.2 Initial conditions and growth 85 4.3.3 Human capital accumulation and inequality dynamics 87 4.4 Conclusion 89 5 **Education politics and democracy** 91 93 5.1 The model economy Preferences and technology 93 5.1.1 5.1.2 Timing of events and private choices 94 5.1.3 The political mechanism 97 The equilibrium 5.1.4 100 5.2 Comparing the education regimes 102 Political power and multiple equilibria 5.3 106 5.4 Alternative timing assumptions 112 5.4.1 Outcomes with full government commitment 112 5.4.2 Outcomes with partial government commitment 114 5.5 A dynamic extension 116 5.5.1 The model economy 116 117

Contents

5.5.2 Private choices CAMBRIDGE

		Contents	vii
		5.5.3 The political mechanism	117
		5.5.4 The equilibrium	118
		5.5.5 Comparing the education regimes	119
		5.5.6 The dynamics of education regimes	123
	5.6	Extensions to an ethnic dimension	128
	5.7	Conclusion	129
6	Em	130	
	6.1	Inequality, fertility, and schooling across US states	130
	6.2	Determinants of fertility and public versus private	
		schooling at the household level	134
	6.3	Schooling over time	138
	6.4	Inequality, fertility, and schooling across countries	141
	6.5	Public education spending and democracy	147
	6.6	Conclusion	149
	PAI	RT THREE SUSTAINABILITY	151
7	Env	Environmental collapse and population dynamics	
	7.1	Historical evidence	155
	7.2	The model	158
		7.2.1 Preferences and technology	159
		7.2.2 The bargaining problem	161
		7.2.3 The fertility choice	164
		7.2.4 Dynamics	171
	7.3	Numerical simulations and robustness analysis	173
		7.3.1 The Nash Equilibrium	173
		7.3.2 Resources and population dynamics	175
		7.3.3 Simulation of transition paths	177
	7.4	Extension to the sustainability of diverse	
		societies	178
	7.5	Conclusion	180
	7.6	Additional material – concave utility	181
8	Pro	duction, reproduction, and pollution caps	184
	8.1	The model	186
		8.1.1 Production and pollution	186
		8.1.2 Households	187
		8.1.3 Aggregate dynamics	189
	8.2	Pollution cap and tradable rights	191
		8.2.1 Households	191

viii

Contents

		8.2.2 Equilibrium	193
		8.2.3 Dynamics	194
	8.3	Numerical experiment	198
		8.3.1 Calibration	198
		8.3.2 Simulation	200
	8.4	Conclusion	203
9	Population policy		205
	9.1	Procreation entitlements	207
	9.2	Implementing tradable procreation rights	208
	9.3	Effects on inequality	218
	9.4	Effects on education	226
	9.5	Moving from national to global level	228
	9.6	Conclusion	232
10	Conclusion: endogenous fertility matters		233
	Bibl	iography	235
	Auth	nor index	245

Figures

1.1	Fertility as a function of parents' human capital	page 13
1.2	Construction of the Gini coefficient with two groups	14
1.3	Calibrated fertility and education relationships	18
2.1	Completed Fertility of Married Mothers, USA 1990	21
2.2	Steady state human capital as a function of τ	32
2.3	The relationship of inequality and growth with endogenous	
	fertility (solid), exogenous fertility (dashed), and in Barro's	
	regression (dotted)	40
2.4	Growth, fertility, inequality, and differential fertility for $\tau = 0.0$)5
	(solid) and $\tau = 0.2$ (dashed)	42
2.5	Density functions after eighteen periods	44
2.6	Exogenous versus endogenous growth: $\kappa = 1 - \tau$ (solid),	
	$\kappa = 0.1$ (dashed), data (dots)	45
3.1	Fertility as a function of human capital when $\theta > \epsilon > 0$	58
3.2	Fertility rates: calibration and simulation	60
3.3	Literacy rates: calibration and simulation	61
3.4	Fertility of aristocrats versus whole population	64
4.1	Private education and rural inequality circa 2000 across	
	Indian states	70
4.2	Private education and growth circa 2000 across Indian states	70
4.3	Initial conditions for which growth is higher with public	
	education	86
4.4	Dynamics with public (solid) and private (dashed)	
	education over time – $\tau = 0.22$	87
4.5	Public (solid) and private (dashed) education over time	
	$-\tau = 0.5$	88
5.1	Probabilistic voting versus median voter	98
5.2	The fixed point with $\sigma = 0.5$ (left) and $\sigma = 0.8$ (right)	102

х

List of figures

5.3	The fixed point with multiple equilibria ($\sigma = 0.5, \bar{x} = 0.7$)	110
5.4	The education regimes	123
5.5	Example of a period-2 cycle	126
6.1	Education spending per capita versus share of private education	
	across states	133
6.2	Education spending per student versus share of private education	
	across states	134
6.3	Share of public education over time – declining cases	139
6.4	Share of public education over time – high and constant cases	139
6.5	Share of public education over time – increasing cases	140
6.6	Inequality and education systems across countries	141
6.7	Density of public education spending (percent of GDP)	148
7.1	Population of Easter Island and Tikopia	156
7.2	Forest coverage on Easter Island	157
7.3	Easter Island and Tikopia	158
7.4	Fertility reaction functions (r_1, r_2) and comparative statics	167
7.5	Fertility reaction functions: case I (solid); case II (dashed)	174
7.6	Collapse zones as a function of parameters	176
7.7	Simulation for environmental collapse and no collapse	178
8.1	Steady state population with pollution cap	195
8.2	Income and population dynamics in the examples	202
9.1	Solution to the individuals problem: regimes R1 to R4	215
9.2	Fertility as a function of income and procreation price	216
9.3	Redistributive nature of tradability	223
9.4	Fertility as a function of income and procreation price in the	
	example. Unskilled (solid line) and skilled (dashed)	227
9.5	The procreation price in the example. Anti-natalist (dots), neutral	
	(short dashes), pro-natalist (long dashes)	227
9.6	The ratio of unskilled to skilled. Anti-natalist (dots), neutral (short	
	dashes), pro-natalist (long dashes)	228

Tables

1	Total fertility rates by education	page 2
1.1	Estimation results on global data	19
2.1	Calibration: a summary	36
2.2	Initial growth with endogenous and exogenous fertility	39
3.1	Data for Rouen	50
3.2	Data for Geneva	51
3.3	Global trends in forerunners' fertility	52
3.4	Forerunners' fertility and differential fertility	52
3.5	Forerunners' reproduction rates and differentials	52
3.6	Results of the calibration procedure	59
4.1	Calibration: a summary	85
5.1	Share of private resources in total education funding, 2003	92
5.2	Typology of education regimes	103
5.3	Education regimes with two types of households	119
6.1	Public schooling across US states: correlations	132
6.2	Estimation results: households' fertility behavior	136
6.3	Estimation results: households' education behavior	137
6.4	PISA data: education, fertility, and social status (1)	143
6.5	Statistics for countries with different education regimes	146
6.6	Public education spending and the democracy index	148
6.7	Public education spending in democracies and non-democracies	148
7.1	Benchmark parameterization of the population race model	173
7.2	Outcome for generation born at t , cases I and II	174
7.3	Risk aversion (ξ), fertility rates and bargained shares	182
8.1	Calibration: a summary	198
8.2	Benchmark simulation – world economy 1983–2208	200

xii

List of tables

8.3	Simulation with a constant pollution cap – 1983–2208	201
8.4	Simulation with an increasing pollution cap – 1983–2208	203
9.1	Implementation sequence of procreation entitlements	
	for a country	209