

POPULATION DYNAMICS

A New Economic Approach

C. Y. CYRUS CHU

New York Oxford
Oxford University Press
1998

Contents

1. Introduction, 3
 - 1.1 Classical and Modern Population Theory, 3
 - 1.2 Gaps Between Malthus and Becker, 4
 - 1.3 Restrictions of Age-Specific Models, 5
 - 1.4 Outline of this Book, 6
 - 1.5 Readership Background, 9

I: STEADY STATES

2. Demographic Models and Branching Processes, 13
 - 2.1 Background, 13
 - 2.2 Preliminaries, 14
 - 2.3 Evolution of the Type Distribution, 15
 - 2.4 Projection Matrices and Functions, 15
 - 2.5 Steady States of Branching Processes, 17
 - 2.6 Verifying Positive Regularity, 19
 - 2.7 Meaning of the Dominant Eigenvalue, 22
 - 2.8 General Population Models in Previous Literature, 23
3. Age-Specific Population Models:
Steady States and Comparative Statics, 24
 - 3.1 Steady-State Age Distribution, 24
 - 3.2 Calculating Variable Means, 26
 - 3.3 Welfare Impact of Population Growth: Consumption-Loan
Model, 27
 - 3.4 Welfare Impact of Population Growth:
Neoclassical Growth Model, 28

- 3.5 Welfare Impact of Population Growth:
Income Inequality, 30
- 3.6 Extensions and Comments, 31
- 4. Income-Specific Population Models:
Steady States and Comparative Dynamics, 32
 - 4.1 Background, 32
 - 4.2 Household Fertility Decision, 33
 - 4.3 Verifying Positive Regularity, 35
 - 4.4 Income-Specific Stable Population, 37
 - 4.5 Comparative Dynamics of Income Distribution, 38
 - 4.6 Comparative Statics of Growth Rate, 42
 - 4.7 Empirical Estimation of the Transition Matrix, 43
- 5. Lineage Extinction and Inheritance Patterns, 46
 - 5.1 Background, 46
 - 5.2 Economic Decisions to Reduce Extinction Probability, 47
 - 5.3 Probability of Lineage Extinction, 49
 - 5.4 Lineage Preservation Decisions, 52
 - 5.5 Some Analytical Examples, 54
 - 5.6 Empirical Observations in History, 56
- 6. Sex Preferences and Two-Sex Models, 59
 - 6.1 Background, 59
 - 6.2 Two-Sex Models, 60
 - 6.3 Fertility Decisions and Sex Preferences, 64
 - 6.4 Micro Sex Preferences and Macro Sex Ratios, 66
 - 6.5 Unequal Resource Division, 70

II: CYCLES AND TRANSITIONS

- 7. Cyclical Patterns of Human Population:
Summary of Previous Research, 75
 - 7.1 Background, 75
 - 7.2 Stationary Branching Processes, 76
 - 7.3 Time-Variant Branching Processes, 77
 - 7.4 Age-Specific Density Dependency, 80
 - 7.5 Hopf Bifurcation and Cycles, 81
 - 7.6 Predator-Prey Models, 85
 - 7.7 Remarks, 86
- 8. Attitude-Specific Population Models:
Dynamic Custom Evolution, 88
 - 8.1 Background, 88
 - 8.2 The Critical-Mass Model, 90
 - 8.3 Dynamic Custom Evolution, 92

- 8.4 Trying to Change the Custom, 95
- 8.5 Individual Interactions and Custom Cycles, 98
- 9. Occupation-Specific Population Models: Population and Dynastic Cycles, 99
 - 9.1 Background, 99
 - 9.2 Occupation Switching and Population Dynamics, 102
 - 9.3 Empirical Analysis, 106
 - 9.4 Dynamics of Population Composition Under Anarchy, 111
 - 9.5 Remarks on Individual Choices and Institutional Changes, 114
- 10. Easterlin Cycles: Fertility and the Labor Market, 116
 - 10.1 Background, 116
 - 10.2 Theoretical Modeling, 119
 - 10.3 Estimation and Statistical Tests, 122
 - 10.4 Endogenous Easterlin Cycles, 125
 - 10.5 Alternative Explanations of Easterlin Cycles, 129
- 11. Demographic Transition and Economic Development, 131
 - 11.1 Background, 131
 - 11.2 Demographic Transition and Economic Growth, 133
 - 11.3 Demographic Transition and Public Pension, 138
 - 11.4 Intergenerational Transfers and Life-Cycle Consumption, 141
 - 11.5 Composition Distortion of Inequality Measurement, 143
 - 11.6 Demographic Transition and the Savings Rate, 146
- 12. Age-Distribution Dynamics During Demographic Transitions, 148
 - 12.1 Background, 148
 - 12.2 Comparative Dynamics of Population Aging, 149
 - 12.3 Applications of the Density-Pivoting Results, 155
 - 12.4 Alternative Aging Indexes, 159
 - 12.5 Summary of Results, 163

III: POPULATION DYNAMICS IN THE PAST AND IN THE FUTURE

- 13. Population Size and Early Development, 167
 - 13.1 Background, 167
 - 13.2 Some Stylized Evidence, 171
 - 13.3 From Primitive to Market Economy: The Role of Population Size, 174
 - 13.4 Infrastructure and the Division of Labor, 175
 - 13.5 Population Size and the Division of Labor, 177
 - 13.6 Discussion, 179
- 14. Population Dynamics in the Very Long Run, 181
 - 14.1 Background, 182

- 14.2 Nerlove's Model, 182
- 14.3 Ecology, Ethnology, and Economic Activities, 186
- 14.4 Toward a Mathematical Formulation, 190
- 15. Epilogue, 195

Notes, 199

References, 205

Index, 221