

Wei-Bin Zhang

An Economic Theory of Cities

Spatial Models with Capital, Knowledge,
and Structures



Springer

Contents

1 Introduction.....	1
1.1 Von Thunen's Theory.....	1
1.2 Classical Location Theory.....	3
1.3 The Alonso Model and its Extensions.....	5
1.4 Imperfect Competition.....	11
1.5 Spatial Agglomeration.....	12
1.6 Spatial Structures with Population and Knowledge.....	13
1.7 City Systems.....	14
1.8 Nonlinear Spatial Economic Dynamics.....	16
1.9 The Purpose and Structure of the Book.....	17
2 Urban Growth with Housing and Spatial Structure.....	21
2.1 Urban Growth with Housing Production.....	21
2.2 The Dynamics in the Terms of $K(t)$	29
2.3 Equilibrium and Stability.....	31
2.4 The Impact of the Population on Economic Geography.....	35
2.5 The Propensity to Hold Wealth and the Equilibrium Structure.....	37
2.6 On Extensions of the Basic Model.....	40
Appendix.....	40
A.2.1 Proving Proposition 2.1.....	40
3 Spatial Pattern Formation with Capital and Knowledge.....	42
3.1 The Urban Dynamics.....	43
3.2 Equilibrium and Stability.....	48
3.3 The Knowledge Accumulation Parameters.....	50
3.4 The Impact of Government Intervention in Research.....	52
3.5 The Working Conditions of Scientists.....	55
3.6 On Knowledge Creation and Spatial Economic Evolution.....	55
Appendix.....	56
A.3.1 Expressing the Variables in Terms of K and Z	56
A.3.2 The Proof of Proposition 3.2.1.....	59
4 Urban Structure with Growth and Sexual Division of Labor.....	61
4.1 Growth with Sexual Division of Labor and Location.....	62

4.2 The Spatial Equilibrium Structure.....67
 4.3 Sexual Productivity Differences and Economic Structure.69
 4.4 Remarks.....72
 Appendix.....72
 A.4.1 Proving Proposition 4.2.1.....72

5 Dynamic Urban Pattern Formation with

Heterogeneous Population.....76

5.1 The Urban Growth with Two Groups.....77
 5.2 Separation of the Groups' Residential Location.83
 5.3 Economic Equilibrium and Stability.....86
 5.4 The Impact of Savings Rates.....89
 5.5 The Impact of Human Capital.....92
 5.6 On Urban Evolution with Multiple Groups.....93
 Appendix.....94
 A.5.1 Proving Lemma 5.3.1.....94
 A.5.2 Proving Lemma 5.3.2.....97

6 Two-Group Spatial Structures with Capital and Knowledge 100

6.1 The Spatial Economy with Heterogeneous Population.100
 6.2 Temporary Urban Pattern.....105
 6.3 Long-Run Equilibria and Stability Conditions.....108
 6.4 The Impact of Creativity.....109
 6.5 The Impact of the Population.....113
 6.6 On Urban Evolution with Heterogeneous Population.114
 Appendix.....114
 A.6.1 Proving Lemma 6.2.2.....114
 A.6.2 Proving Proposition 6.3.1.....116

7 Urban Growth and Pattern Formation with

Preference Change.....118

7.1 The Model.....118
 7.2 Properties of the Dynamic System.....126
 7.3 Human Capital and the Economic Structure.....129
 7.4 On Preference Change and Urban Pattern.....132
 Appendix.....133
 A.7.1 Proving Lemma 7.2.1.....133

8 Urban-Rural Division of Labor with Spatial Amenities 135

8.1 The Spatial Structure with Urban-Rural Areas.135
 8.2 Spatial Equilibria.....140
 8.3 Amenities and Economic Geography.....141
 8.4 On Spatial Equilibrium Structure.....144
 Appendix.....145
 A.8.1 Proving Proposition 8.2.1.....145

9 Spatial Equilibrium with Multiple Cities.....	150
9.1 The Model.....	151
9.2 Urban Equilibria.....	156
9.3 The Impact of Amenities upon the Urban Structure.....	159
9.4 Concluding Remarks.....	161
Appendix.....	162
A.9.1 Proving Proposition 9.2.1.....	162
10 Growth with International Trade and Urban Pattern Formation.....	166
10.1 The Model.....	167
10.2 The Dynamic Properties of the Trade System.....	172
10.3 Country 1's Propensity to Own Wealth.....	177
10.4 Country 1's Working Efficiency.....	181
10.5 On International Trade and Spatial Structures.....	181
Appendix.....	182
A.10.1 Proving Proposition 10.2.1.....	182
A.10.2 Proving Proposition 10.2.2.....	183
11 Nonlinear Dynamics of a Multi-City System.....	185
11.1 An Isolated Island Economy.....	186
11.2 Economic Geographic Cycles in the Isolated Island Economy	190
11.3 Aperiodic Oscillations in the J-Island Economy.....	195
11.4 On Spatial Chaos.....	198
Appendix.....	198
A.I.1.1 The Dynamics of Capital and the Population.....	198
12 Further Issues on Cities.....	201
Bibliography.....	204
Author Index.....	217