

Spatial Economics: Density, Potential, and Flow

MARTIN BECKMANN

Brown University, U.S.A.

and

Technische Universität,

München, F.R.G.

TÖNU PUU

University of Umeå, Sweden



NORTH-HOLLAND • AMSTERDAM • NEW YORK • OXFORD

Contents

1	Introduction	1
1.1	The von Thünen and Weber Schools of Location Theory	1
1.2	The Metric of Economic Space	2
1.3	The Background to This Study	7
1.4	The Plan of This Book	8
2	The Continuous Transportation Model	11
2.1	Economic Theory	11
2.2	Mathematical Aspects	30
2.3	Extensions: Boundary Conditions	41
2.4	Extensions: Metrics	49
2.5	Further Extensions	61
3	Short-Run Equilibrium and Stability	71
3.1	Partial Equilibrium of Spatial Markets	71
3.2	Land Use: Partial Equilibrium	82
3.3	A General Equilibrium Model	95
3.4	Dynamics	103
4	Long-Run Equilibrium of Trade and Production	115
4.1	Introduction	115
4.2	Production	118
4.3	Consumption	119
4.4	Trade and Equilibrium	123
4.5	How the Model Works	127
4.6	The Spatial Structure	130
4.7	Contradictions with Classical Location Theory	142
4.8	Structural Change	147

5	Planning Models	152
5.1	A Long-Run Model with Costless Relocation of Resources	152
5.2	Relocation Costs for Capital and Labor	169
5.3	Digression on the Weber and von Thünen Principles of Location and Land Use	174
6	Some Long-Run Location Theory	181
6.1	Classical Problems	181
6.2	Some Recent Developments	190
7	An Interaction Model	210
7.1	Introduction	210
7.2	Optimal Flows	212
7.3	Traffic	219
7.4	Communication Cost	224
7.5	Land Use and Equilibrium Settlement	229
8	Spatial Business-Cycle and Growth Models	233
8.1	Introduction	233
8.2	The Basic Model	234
8.3	Examples	238
8.4	The Regional Growth Model	248
8.5	A More General Case	251
8.6	Conclusion and Perspectives	253
9	Conclusion	254
	Appendix	256
	Bibliography	258
A	Location Classics	258
B	Current Literature on Spatial Economics and Theoretical Geography	258
C	Related Publications by the Authors	262
D	Mathematical Reference Works	264
	Name Index	267
	Subject Index	270