

Analytic Solutions to Models of Agglomeration and Related Numerical Approaches

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Abstract

Economic geography equilibria that represent spontaneous agglomeration in a featureless underlying geographic space have been solved only numerically, and the resulting spatial configurations were symmetric. This paper introduces a method of obtaining analytic solutions to similar models. In the case of continuum space, the multi-city equilibria are again symmetric. However, by working in discrete space it is possible to generate stable equilibria with multiple cities of various populations and spatial extent, asymmetrically distributed across space. The properties of these equilibria may be understood in terms of deterministic chaos theory. There are two qualitative predictions that may be empirically tested: (1) the stability of an isolated city does not depend on its precise position, and (2) if two cities are too close to each other, the configuration becomes unstable and the space between the cities is filled with newcomers, turning the two cities into a megalopolis.

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