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# Spatial period doubling, invariant pattern, and break point in economic agglomeration in two dimensions

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## Abstract

Mechanisms of an economic agglomeration of multiple places in a square lattice economy are elucidated by a comparative study with a racetrack economy. As a common mechanism to engender fewer larger agglomerations in both economies, doubling of their spatial period is advanced. The replicator dynamics in these economies accommodates characteristic agglomeration patterns that are solutions of the governing equation for any values of transport cost. A break point is used to index the onset of a bifurcation breaking uniformity as the transport cost decreases. Analytical formulas for this point that can synthetically encompass both economies are derived for an economic geography model.

*Keywords:* Bifurcation, Economic geography model, Group theory, Replicator dynamics, Spatial period doubling

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