A Theory of co-evolutive networked territorial systems : Exemplification of Network Necessity

Working Paper

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Abstract

Second part of theoretical paper developing a theory of co-evolutive networked territorial systems : application to simple models of urban growth for systems of cities.

1 Context and Objective

1.1 Literature review

[Bretagnolle et al., 2000] already propose a spatial extension of the Gibrat model (*detail*)
[Favaro and Pumain, 2011] is a more refined extension with economic cycles

1.2 Exemplifying Network Necessity

2 Model Description

2.1 From Gibrat to Marius : the dilemma of formulation

2.2 Model description

3 Results

3.1 Implementation

3.2 Model Exploration

3.3 Model Calibration

4 Discussion

5 Supplementary Materials

5.1 Integrating Gibrat

Analytical resolution is possible for some aspects of the Gibrat model. We detail here the computation for some.

Expectancies If working with expectancies, it makes no sense to proceed to Monte Carlo simulation as a direct resolution gives a deterministic recurrence relation on expectancies. Let $\mu_t = \mathbb{E}[P(t)]$

Covariance

Distribution

5.2 A Bayesian iterative approach

References

[Bretagnolle et al., 2000] Bretagnolle, A., Mathian, H., Pumain, D., and Rozenblat, C. (2000). Long-term dynamics of european towns and cities: towards a spatial model of urban growth. Cybergeo: European Journal of Geography.

[Favaro and Pumain, 2011] Favaro, J.-M. and Pumain, D. (2011). Gibrat revisited: An urban growth model incorporating spatial interaction and innovation cycles. Geographical Analysis, 43(3):261–286.