



ABSTRACT

Title: Modelling sustainable urban progress in megaregional urban networks

Autors: Joan Marull (a), Mercè Farré (b), Rafael Boix (c)

a Barcelona Institute of Regional and Metropolitan Studies, Autonomous University of Barcelona, E-08193 Bellaterra, Spain. Email: joan.marull@uab.cat

b Department of Mathematics, Autonomous University of Barcelona, E-08193

Bellaterra, Spain. Email: farre@mat.uab.cat

c Department of Economic Structure, University of Valencia, Avda. dels Tarongers, E-

46022 Valencia, Spain. Email: rafael.boix@uv.es

Subject area: Regional Economic Modelling.

Abstract:

In this paper, we analyse the relations between thermodynamics and megaregional city networks: an increase in the complexity and the organized information in such urban systems leads to less demand for resources and greater social cohesion, which overall makes them more efficient and more stable. The obtained indices enable us to evaluate the behaviour and dynamics of city networks in terms of three components of sustainable progress – economic activity, social cohesion and urban ecology – and help us understand the properties that a regional and megaregional economy must possess if it is to optimize the sustainability of the urban system. The results have implications for the development of pro-active policies, and for urban and territorial planning at supra-local level.

This paper aims to understand the socio-ecological implications of a new economic unit of analysis consisting of networks of cities at regional and megaregional scales. The proposed urban network sustainable progress indices, based on different conceptual scenarios, relies on three interrelated factors: economic activity, social cohesion and urban ecology. One of the most important concepts of the paradigm of sustainable progress is that economic activity is but one branch of this development and that social and ecological factors are also strategic elements of urban systems. Even though there are formal ways of measuring sustainable progress, the goal of this study is to propose a mathematical model derived from Eurostat databases and NASA satellite images capable of analysing different conceptual scenarios of urban development in Europe. To accomplish this objective, statistical methods are applied to infer empirical models from data. Subsequently, models are reconstructed according to conceptual information to detect the hidden relationships between variables, to provide a way of characterising



new unseen observations, and to study different scenarios. The indices allow us to track how urban networks evolve over time, which are influenced by the three above-mentioned factors of sustainable progress. This study contributes to the debate on the essential properties of a regional and megaregional economy, and the optimizing of socio-ecological performance at the level of city networks. Our main question is whether or not existing city networks will evolve sustainably. This question is relevant and has direct implications for pro-active policy and planning.

Keywords: Beyond GDP, sustainable progress, urban network, inclusive growth, Europe.