



Ceteris paribus, spatial complexity and spatial equilibrium An interpretative perspective

Peter Nijkamp *

Department of Regional Economics Free University Amsterdam, The Netherlands

Available online 12 April 2007

Abstract

This paper addresses the implications of the well-known *ceteris paribus* postulate for spatial–economic equilibrium analysis under conditions of complex (non-linear dynamic) interactions in open systems. Under ever changing (*e.g.*, evolutionary) conditions, there is a need for adjusting the standard tools in spatial–economic analysis, with more emphasis on evolutionary algorithms and computer simulations to offer a solid statistical underpinning of regional analysis.

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Keywords: *Ceteris paribus*; Complexity; Counterfactuals; Equilibrium; Evolutionary models; Networks; Spatial interaction; Value transfer

1. A new challenge

The space–economy is often interpreted as a standard well-functioning economic system enriched with the element of space. But space is not just an additional dimension of the economy; it forms an intrinsic feature of any geographic–economic system and leads to the emergence of complex non-linear and interactive behaviours and processes in space. A fascinating foundation for an interpretation of the space–economy as an interdependent complex set of economic relationships – at different geographic scale levels and with a variety of time dimensions involved – can be found in the first law of geography formulated by Tobler (1970) who stipulates that everything in space is related to everything else, but near things are more related than distant things. The depth of this law has received

* Tel.: +31 20 5986090; fax: +31 20 5986004.

E-mail address: pnijkamp@feweb.vu.nl.

insufficient attention in the methodology of regional economics – and geography as well – and needs to be reconsidered in the light of recent advances in complexity theory. This short paper aims to highlight some implications of modern complexity theory for regional analysis.

The very heart of reductionist and deductive thinking in economics – including regional economics – lies in the standard tool of economic analysis, namely the *ceteris paribus* postulate. Section 2 is devoted to a critical review of this concept and prompts the question on the validity of this concept in spatial–economic interaction. This issue is further highlighted in Section 3 from the perspective of open systems. The next section (Section 4) introduces the principal elements of complexity theory against the background of non-linear evolutionary approaches to the space–economy. Then the question arises what the relevance is of spatial economic equilibrium in the context of complex spatial systems when such systems are investigated under *ceteris paribus* assumptions. Section 5 is devoted to this fundamental problem. This issue creates obviously a research dilemma that calls for a novel methodology for quantitative analysis of regional economic phenomena. Section 6 provides some tentative pathways for alternative research lines on this methodological challenge, while it concludes with some retrospective and prospective ideas on future challenges faced by regional economic analysis.

2. *Ceteris paribus* and the space–economy

Scientific research means a fascinating discovery tour through an unknown complex world. In the search for generalisable knowledge applicable to other places, persons or times (reflected *inter alia* in the so-called value transfer question), it has become usual in economics to introduce simplifying assumptions so as to cope with place-specific, subject-specific or time-specific conditions. This implies essentially a reductionist approach by focussing attention on a few selected distinct features of a complex reality that serve as abstract descriptions of salient characteristics to be investigated. In particular the *ceteris paribus* condition has become a central tool in economic research to draw references on commonalities in behaviour of economic subjects or agents by assuming that certain contextual (or environmental) factors may be seen as constant across the objects of research under consideration. Such factors ensure a certain order or structure which allows for transferability (or even generalisation) in an otherwise chaotic world. This methodological approach means essentially an abstraction from a highly varied complex real-world economic system and allows for a focussed – but necessarily restricted – investigation of a certain relevant economic phenomenon in a broader system's context. Such a simplifying approach is formally or logically not strictly needed, but in an empirical system a limitation to a selected set of features is useful in order to distinguish in a consistent way between system-internal and system-external factors. Even though the distinction between system-internal and system-external factors may be somewhat arbitrary, such a simplification is essential in order to arrive at generalized knowledge on the basis of limited system's knowledge. For example, the wealth of current knowledge on complex economic phenomena might never have been achieved without the simplifying hypothesis of a *homo economicus* or its related concept of utility maximization (see Bal and Nijkamp, 2001, 2002).

The notion of interactive behaviours and processes that have emerged from modern complex network theory in open systems (see e.g. Capra, 1997; Nijkamp and Reggiani, 1998) challenges clearly the use of *ceteris paribus* conditions (especially in an interdisciplinary research context). However, it is clear that in a complex spatial–economic system we need certain key anchor points for scientific inference on relevant objects of research. From this perspective the *ceteris paribus* clause is a cornerstone for a deductive empirical economic discipline (see Störig, 1959; Rivett, 1970; Glymour, 1992).

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