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Fundamental sources of economic complexity. (English) Zbl 1401.91261
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Summary: This article analyses the basic sources and types of economic complexity: chaotic attractors and repellers, complexity catastrophes, coexistence of attractors, sensitive dependence on parameters, final state sensitivity, effects of fractal basin boundaries and chaotic saddles. Four nonlinear classic models have been used for this purpose: virtual duopoly model, model of a centrally planned economy, cobweb model with adaptive expectations and the business cycle model. The issue of economic complexity has not been sufficiently dealt with in the literature. Studies of complexity in economics usually focus on identifying the conditions under which deterministic chaos emerges in models as the main form of complexity, while analyses of other forms of complexity are much less frequent. The article has two objectives: methodological and explicative, which are to shed some new light on the issue. The first objective is to make as comprehensive a catalogue of sources of economic complexity as possible; this is to be achieved by the numerical calculations presented in this article. The issue of accumulation of complexity has been emphasized, which is a type of system dynamics which has its roots in coincidence and overlapping of complexity originating in different sources. The second objective involves an explanation of the role which is played in generating complexity by classic laws of economics. It appears that there is another overarching law, which is independent of the type of system or the level of economic analysis, which states that the long-term effect of conventional economic laws is an inevitable increase in the complexity of markets and economies. Therefore, the sources of complexity discussed in this article are called fundamental ones.

MSC:

- 91B55 Economic dynamics
- 91B62 Economic growth models
- 37N40 Dynamical systems in optimization and economics
- 37D45 Strange attractors, chaotic dynamics of systems with hyperbolic behavior

Keywords:

complexity catastrophe; parametric sensitivity; final state sensitivity; fractal basin boundaries; chaotic saddle; transient chaos

Software:

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