Lecture Notes in Economics and Mathematical Systems 652

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Emergent Results of Artificial Economics

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Preface

Now in its 7th year, the conference series in Artificial Economics is alive and kicking. A number of research topics are generating sustained interest. Others are emerging. We received 33 submissions, and based on almost 100 reviews (three per paper, on average), we now find 17 excellent papers in this volume that we called *Emergent Results of Artificial Economics*.

Artificial Economics can play a pioneering role in tackling precisely those issues that challenge the wider field of economics in general. In recent years, the international economy has repeatedly been shaken by crises that involve both the private and the public financial system on a worldwide scale. These crises take systems outside of their boundaries. In finding ways out, economists have to leave their comfort zones in which rational economic behaviour can be assumed. One can hear them speak of responsibility, of checks, of public control over the financial sector, of re-allocating risks. These are issues that impose challenges on economists, because they require both economic theory on markets and institutions, and deep understanding of human social behaviour. The practical issues to solve are at the nexus where these various areas meet. In order to address today's challenges, economists need to deal with the bigger picture.

Artificial economics is well poised to take on this challenge. Of necessity, artificial economists must integrate various bodies of knowledge into their models. The step to add another set of concepts, such as human social imitation behaviour, is not such a large one. Small improvements in modelling this kind of aspect can dramatically improve predictions of emergent system behaviour. This is the first reason why we included the word 'emergent' into the title of this volume. Through the use of models that integrate levels of aggregation, our field can build on existing knowledge and innovate at the same time. On the other hand, such advances do not come for free. Artificial Economics involves creatively developing new concepts for integrating into models. Then, extensive experimentation and painstaking validation of those models is required. When more elements are modelled together, the validation of the resulting models will be more intrinsically difficult. To really advance the field will require a lot of hard work. So far, some of that work is brought together in this volume. Hence the second reason why we liked to call it 'emergent results'.

The articles are grouped according to the following themes:

Humans in the system These contributions explicitly seek to include the modelling of human behaviours that might not be primarily economical in nature. This ranges from individual-based to social relationship-based. Jablonska and Kauranne simulate human emotions in econometric models of an electricity spot market. Thiriot, Lewkovicz, Caillou and Kant investigate the role of social networks on the labour market. Osinga, Kramer, Hofstede and Beulens model the pork cycle from farmer perspective and the potential of information management measures in the sector.

Financial markets Financial markets, a model for the most perfect of markets, are one of the better-researched areas in artificial economics. This area was also much affected by recent financial crises. Teglio, Raberto and Cincotti have captured this in an analysis of interactions among economic actors and their effects under varying leverage ratios of banks and at varying time horizons. Mallett extends existing work by including loan repayments into a model of a fractional reserve banking system. Hauser and LiCalzi study the evolution of trading strategies in unbalanced double auctions.

Organization design Artificial economics can also investigate the design of institutions such as departments, organizations or supply chains. Leitner and Wall are concerned with departmentalization and decision interdependencies in organizations, in relation to the desirability of stability or of discontinuity. McCain, Hamilton and Linnehan investigate whether one could have too many people in emergency departments. Valeeva and Verwaart model the adoption of food safety practices.

Macroeconomics This session assembles some issues that are fundamental to economics. Bersini and van Zeebroek address the 'hot topic' of inequalities in resource allocation. They do this in a model of a free market that can either be competitive or random. Desmarchelier, Djellal and Gallouj investigate the vicious historic cycle of growth by waste generation that has operated in the USA in the last half-century. Guerrero and Axtell assess the relative merits of neoclassical and computational models for exploring firm and labour dynamics.

Market dynamics Here we have another well-studied application of artificial economics. Garca-Daz and van Witteloostuijn investigate the starting conditions of a simulation of market structure. It turns out that these are of paramount importance for these markets' evolution. Fano and Pellizzari investigate the role of time constraints on optimality of order strategy in a continuous double auction. Provenzano presents a model of a wholesale electricity market and focuses on bilateral contracting.

Games The topic of games ranges from abstract game theory to actual simulation games involving human players. This session consists of an instance of both

flavours. Cotla investigates the role of spatial structure on the performance of a network of prisoner's dilemma agents. Meijer, Raghothama, King and Palavalli present a gaming simulation of the Indian mango chain that allows to mix agents and people in one game run.

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