Simulating Pure Capitalism: Experimental Evidence with Human Agents

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We present the analysis of three simulations of pure capitalism, with agents exchanging and producing to maximize profit, designed to contrast the empirical behavior of production systems described in the Leontiefâ€“Sraffaâ€“Von Neumann tradition.

The simulations involved 210 students who acted as economic agents over 49 sessions. In the simulations, agents exchange goods and select production processes with the goal of maximizing their final output. Each agent begins the process with an initial endowment of goods, exchanges with other agents, and then chooses a production process that transforms the available inputs into new products. This procedure is repeated successively, generating a dynamic of exchanges and production relations.

The main objective of the study is to compare the dynamics of the simulated economy with three theoretical frameworks: the Leontief input-output model equations, the Von Neumann growth model, and Long-Run Profit Maximization (LRPM). Input-output models constitute a special case of the Von Neumann model, which in turn is a special case of LRPM.

The simulations show remarkably similar behaviors. The trajectories of aggregate production resemble those of the LRPM and move toward the long-term Von Neumann growth trajectories, albeit with clear deviations. The relative rates of exchange also approximate the theoretical price relationships. At the same time, the simulations reveal systematic inefficiencies, cobweb-like oscillations, and a very strong concentration of wealth, while the production networks show increasing specialization and the formation of stable trade relationships. These aspects suggest that decentralized, profit-oriented, and market-linked production can function as a mechanism for economic coordination, but with significant inherent difficulties.

Our experiment is a rare example in economics. Most experiments in economics focus on specific microeconomic aspects. Furthermore, macroeconomic experiments typically analyze partial aspects and are usually conducted using computational agents. Our experiment examines the overall behavior of the economic system and uses human agents. It is also very uncommon to develop an explicit quantitative comparison between experimental observations and the equations of economic theory applied to capitalism as a whole, as we have done here.

This work expands on a previous contribution presented at the 10th Conference on Input-Output Analysis (GijÃ³n, 2024) and is part of a research and teaching project being developed at the Autonomous University of Barcelona. Simultaneously, the simulations allowed students to practically apply and assimilate fundamental economic concepts. Data and other additional information about the research can be found at: https://sites.google.com/view/manuelmuinhospaneng/capital-an-experiment