

Bounded Rational Heterogeneous Agents in Artificial Stock Markets: Literature Review and Research Direction

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Abstract : In this paper, we provided a literature survey on the artificial stock problem (ASM). The paper began by exploring the complexity of the stock market and the needs for ASM. ASM aims to investigate the link between individual behaviors (micro level) and financial market dynamics (macro level). The variety of patterns at the macro level is a function of the AFM complexity. The financial market system is a complex system where the relationship between the micro and macro level cannot be captured analytically. Computational approaches, such as simulation, are expected to comprehend this connection. Agent-based simulation is a simulation technique commonly used to build AFMs. The paper proceeds by discussing the components of the ASM. We consider the roles of behavioral finance (BF) alongside the traditionally risk-averse assumption in the construction of agent's attributes. Also, the influence of social networks in the developing of agents' interactions is addressed. Network topologies such as a small world, distance-based, and scale-free networks may be utilized to outline economic collaborations. In addition, the primary methods for developing agents learning and adaptive abilities have been summarized. These incorporated approach such as Genetic Algorithm, Genetic Programming, Artificial neural network and Reinforcement Learning. In addition, the most common statistical properties (the stylized facts) of stock that are used for calibration and validation of ASM are discussed. Besides, we have reviewed the major related previous studies and categorize the utilized approaches as a part of these studies. Finally, research directions and potential research questions are argued. The research directions of ASM may focus on the macro level by analyzing the market dynamic or on the micro level by investigating the wealth distributions of the agents.

Keywords : artificial stock markets, market dynamics, bounded rationality, agent based simulation, learning, interaction, social networks

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