The Analysis of Stock Market Bubbles Using Agent-Based Models

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The goal of this project is to analyze the stock market bubbles using agent-based models. A stock market bubble is the situation when prices of stocks rise and become overvalued by any measure of stock valuation. Large fluctuations in the market might have a significant impact on the economy and population wealth. For example, the dot-com bubble crash decreased market value of technology companies by \$5 trillion over the period 2000 through 2002. The bubbles distort the behavior of investors; therefore, the assets in the economy might be inefficiently allocated. Moreover, the collapse of the bubble resulted in bankruptcies of numerous companies and poorer performance of institutional investors such as mutual funds and pension funds. Therefore, the stock market bubbles as well as other bubbles in the economy such as a real estate bubble are always associated with negative consequences eventually despite the large initial returns.

In this context, the proposed research would enhance our knowledge about the formation of the bubbles in the presence of partially irrational agents. The study would cover the period from 1995 through 2009. During the period, two stock market bubbles are documented: 1998-2001 (dot-com bubble) and recent 2008-2009 bubble. To my knowledge, this paper would be the first to analyze this stock market anomaly using agent-based models. The latter method is superior against the standard financial theory that is based on the efficient market hypothesis and rational representative agent paradigm. Micro-founded models usually are based on the assumptions that: *a)* agents are rational, *b)* agents are homogeneous, *c)* agents make decisions over an infinite planning horizon. However, all these assumptions do not align with the real world. Agent-based models give researchers an opportunity to incorporate these assumptions in the analysis. Therefore, the proposed study is likely to be more comprehensive and would provide with more accurate and very intuitive results.

The proposed research will be carried out over 12-month period. The main steps of the project include: *a)* review of existing literature on irrational behavior of agents, *b)* review of existing literature on equity market, trading, and stock exchanges, *c)* data collection and initial analysis of data, *d)* model development

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(model selection, model calibration or estimation, model validation), *e*) programming and simulation, *f*) analysis of results, *g*) summary of results, *h*) publication in top journal.

The proposed research would provide with the alternative explanation regarding the evolution of stock market bubbles, the factors that influence the appearance and magnitude of the bubble, and the ways the authority could prevent the formation of stock market bubbles as well as the methods how to mitigate their sizes.