Evaluation of the effect of investor psychology on an artificial stock market through its degree of efficiency

Evaluación del efecto de la psicología del inversionista en un mercado bursátil artificial mediante su grado de eficiencia

Juan Benjamin Duarte Duarte, Leonardo Hernán Talero Sarmiento, Katherine Julieth Sierra Juárez

Universidad Industrial de Santander, Colombia

Received 5 January 2016; accepted 30 March 2016
Available online 5 September 2017

Abstract

The main objective of this article is to develop a Cellular Automaton Model in which more than one type of stockbroker interact, and where the use and exchange of information between investors describe the complexity measured through the estimation of the Hurst exponent. This exponent represents an efficient or random market when it has a value equal to 0.5. Thanks to the various proposals, it can be determined in this investigation that a rational component must exist in the simulator in order to generate an efficient behavior. © 2017 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

JEL classification: G140; G170; G190
Keywords: Cellular automaton; Complexity; Hurst exponent; Investor psychology

Resumen

El objetivo principal de este artículo es desarrollar un modelo automata celular en el que interactúen más de un tipo de agentes bursátiles, donde el uso y el intercambio de información entre los inversores describen la complejidad medida a través de la estimación del coeficiente de Hurst, que representa un mercado eficiente o aleatorio al tener un valor igual a 0.5. Gracias a las variantes propuestas en esta investigación se puede
determinar que debe existir un componente racional en el simulador con el fin de generar un comportamiento eficiente.

© 2017 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Códigos JEL: G140; G170; G190
Palabras clave: Autómata celular; Complejidad; Exponente de Hurst; Psicología del inversionista

Introduction

The capacity to find patterns and generate predictions is a natural behavior that has accompanied humanity since its origins, when the first people contemplated the universe in search of guidance and answers. Since ancient times and even up to this day, the increase in the level of certainty has conferred onto mankind a degree of satisfaction and advantage in their surroundings. Similarly, in the field of finances, the ability to decrease uncertainty and to find non-slanted patterns translates into an advantage at the time of investing, increasing the wealth of the investor.

Within the history of the stock market, different studies have been carried out with the purpose of understanding the behavior of the assets, going from deterministic to probabilistic approaches. However, it was not until the Efficient Market Hypothesis (EMH) proposed by Fama (1970)—which has endured for decades as a pillar of classic or rational finances—that a conceptual base was established, which provided evidence on the inability to take advantage in a market that provides the same opportunities to all of its agents. However, there is evidence that indicates that this hypothesis does not manage to explain the real behavior of the stock market.

With the objective of understanding the behavior of the stock market, Mandelbrot (1972) structures the Fractal Market Hypothesis (HMF), which contrasts with the EMH, as it proposes a memory or tendency level to replicate a behavior in the series of prices. This hypothesis was studied by Peter (1994) through a rescaled range analysis to explain the volatility of the real market and the efficiency of the same. On the other hand, a new financial study theory focused on the behavior of the investor and not on the information of the market is proposed by Shiller (2003) in the Theory of Behavioral Finance (TBF), which contrasts with the EMH.

Due to the different hypotheses used to explain the behavior of the series of prices, and in order to analyze the statistical behavior of the same, algorithms emerge in the so-called computational finances (Lebaron, 2006). These programs not only study historical behavior, but also generate new series that emulate a real behavior. Using this methodology, Fan, Ying, Wang, and Wei (2009) propose a Cellular Automaton Model (CAM) to study the flow of information and the manner in which the agents interact from the perspective of a behavioral market with fractal behavior.

The objective of this investigation is to evaluate the influence of investor behavior on an artificial stock market focused on the flow of information and the capability to imitate, anti-imitate or to be indifferent to the environment; said behavior is reflected on the theoretical efficiency of the market. For this, we depart from the CAM and generate scenarios or variables in which behavioral agents interact, changing the dynamic of supply and demand. Subsequently a CAM with rational agents is modeled by adapting Alexander’s filters, as well as a mixed CAM in which the agents are affected by the information in the market and the buying, retention or sale position of their neighbors.
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات

ISI Articles
مرجع مقالات تخصصی ایران