EMBRACING SOCIETY 5.0 WITH HUMANITY

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Embracing Society 5.0 with Humanity

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Society 5.0 is a concept presented by the Japanese as a core concept of their economic system. They believed that technology should not surpass the intelligent of men. As such, in society 5.0 the Japanese government would like to ensure that all technological things are designed to be a human-centered design. In fact, their ministry of education in 2018 has also been readily prepared the future generation through a change in their education system. For example, the minister explains that in Japan, or many parts of the world, university entrance are divided into two main concentrations, which are science and social science. The minister thought of changing the system, as society 5.0 is about creating a technology that is human centered. For instance, they gave an example on designer babies. If, people from hard science learn about philosophy, ethics, and humanities, they won't face such ethical concern when developing a product. This is what is being envision by the Japanese government for their younger generation. Collaboration between science and social science is necessary to build a better environment for our future children. Another example is the companies in Japan, such as Hitachi and Fujitsu has already been implementing this 5.0 by designing product that relied fully on technology but puts human at its center (Hitachi, 2017).

Likewise, it is currently a hot topic in Indonesia. Indonesia as a country with the 4th largest population in the world has not been implemented this concept. Our country is still on the industry 4.0. Yet, with the rising interest in AI, Blockchain, NFT, number of unicorn start-up. and all recent technological changes, our country are ready to compete with any other countries in Southeast Asia. Society 5.0 is coming, and we need to embrace it. To prepare with the society 5.0, It is not only the technological side. It is necessary for us to have a strong principle at hearts that based on our belief system. We, as an Indonesian have known to be religious that most of us believed in God. We also commonly practice our religion and tend to be kind to people because we know God would love our good deeds. I personally think that this will help us to move forward and live together with advanced technology.

Technology begets a very important leap in human's life journey. It is important to keep valued of the benefit but it's more important to look out for the human itself. As its purpose is smarter than us, to help us, it will be very ideal if we embrace the technology using our ability to be kind.

Malang, 21 Maret 2022

Diah Karmiyati

Daftar Isi

Reconstruction of agent-based model in predicting the risk of stock On Indonesian Stock Exchange (BEI)

Nursaid, Heru Cahyono, Muh. Fahrurrozi

Introduction

The capital market is an open system that contains various sub-systems. A stock market index reflects the changing stock price from time to time, and it is influenced by the intensity of the sale or purchase of shares at a specific price and time in the stock market (open system). As various elements influence the markets, market dynamics are formed, and asset prices securities and market index changes are inevitable. Later on, the dynamics of the market itself trigger system complexity in the capital market.

The system's complexity in the capital market causes the dynamics and stimulates irrational behaviors in the market, such as over-confidence, over-reaction, and under-reaction. To this day, scholars provide theories and frameworks that aim to understand the dynamics and complexity of the capital market. For example, arbitrage principle, capital assets pricing theory, efficient market hypothesis, and agency theory. Even though conventional financial theories are sufficient in explaining linear behavior in the stock market, the empirical studies showed contrast results. Investors demonstrate irrational behavior instead, and the conventional financial theories were questioned in terms of effectivity in grasping non-linear behavior in the capital market [1].

In responding to the above phenomenon, advanced financial theories are needed. Therefore, this study intends to advance financial framework that can describe the non-linear behaviors in the capital market by adopting the Agent-Based Model. Our study attempts to advance and reconstruct the Agent-Based Complex Adaptive System (CAS) framework originated from the science of complexity by [35], to predict the stock price.

Based on several existing literature [32], [5], [14], [13], and [3], our study particularly attempts to employ an experimental method using computational simulation model to examine the role of the basic attributes and also temporal attributes in predicting the stock price. Factors that are included in the basic attributes are the investment strategy and strength of agent influence. In contrast, factors included in the temporal attributes are capital, ownership of and risk expectation.

Besides offering an additional financial framework, this study also proposes a simulation method as an alternative to forecast market behavior. Some methods such as time series analysis [2] and [22], operation research [, or machine learning [15], [18] are well known and have been widely applied. However, these methods are limited in the context of forecasting the non-linearity of investor behavioral aspects. Therefore, this paper may provide investors with tools to predict the firms' stock price and minimize potential loss and risk caused by poor estimation.

Modern financial economics theory is built based on the assumption that market players act rationally in two points. *First*, in making a decision, the market player refers to the utility theory axiom. *Second*, there will be no unbiased forecast. Based on the assumption of rationality behavior, a market player naturally has a risk-averse attitude. Additionally, the utility function of a market player is a marginal utility towards the declining welfare, and the shape is concave. The price shaping of an asset happens because of the rationality attitude of an investor towards the equilibrium market, so it refers to the efficient market hypothesis function..

Experts make many attempts to understand the character of an asset or investment return. The attempts are managed so that the factors influencing investment return can be identified. For example, the statistic model from [20] framework explained the standard deviation of a return that is considered as a risk reflection of an asset. This model develops in stochastic data, such as the Markov model, price arbitrage principle from Miller and Modigliani, and the more specific one is the option price model by Fisher Black, Myron Scholes, and Robert Merton [17].

Referring to the efficient market hypothesis, the financial asset price should reflect all available information so that the accurate estimation of asset investment can be performed at any time. The implication of reasonable asset prices in an efficient market is that there will be a slight chance that an investor obtains abnormal returns without conveying risk [29]. Empirical researches about risk management are commonly performed, such as research by using various variables. Some other researchers used experimental methods such as [27], [33], [31], [6], [32].

Although scholars were determined to study market and risk in an efficient setting, the empirical reality of the stock market, especially in a foreign country from 1980 until 1990, shows that there were many irregular situations from the ideal efficient market. In

other words, there were a lot of irrational situations of an investor towards new information. Investors at that moment showed an overconfident and underreaction attitude toward new information, for instance, an initial public offering (IPO), merger, stock split, and spin-off [25]. Volatility clustering and fat tail distribution of asset returns are examples of these so-called stylized facts [7], [8], [11]. In the same period, information technology media sometimes gave biased information, thus causing inaccuracy in investment decisions [23].

The complexity of the capital market system stimulates irrational behaviors in the market. These irrational behaviors cause non-linear stock market financial data. The non-linear data could appear in several forms, such as excess kurtosis, fat-tail distribution, and multifractality [32], [5], [14], [13], and [3]. Conventional financial theories frequently build on the linearity approach. This linearity approach is less effective in grasping and accommodate dynamic and non-linear behavior in the capital market.

The ineffectiveness of conventional financial theory and financial risk studies is becoming a concern for many scholars [10]. The non-linear data characters promote financial theory advancement through behavioral finance theory in the 1990s. The theoretical concept of behavioral finance is formed based on two understandings, cognitive psychology and the limits of price arbitrage. Behavioral finance is likely to utilize the bottom-up approach in observing the stock market rather than a conventional top-down approach. In the bottom-up approach, the agent is believed to have a more significant role in the dynamic changes of the market (price and index). An agent's vital role is to uphold an alternative model using computing simulation, the Agent-Based approach. One of the models of the approach is the Agent-Based Model.

Agent-Based Model

Agent-based model as disaggregate model, starting the idea by constructing the computational devices (known as agents with some properties) and then simulating them in parallel to model the real phenomena. The process is emerging from the social system's lower (micro) level to the higher level (macro). The agent-based model's history can be traced back to the [34], a theoretical machine capable of reproduction. [34] proposed a device that would follow precisely detailed instructions to fashion a copy of itself. The finding

was a theoretical model with a reproductive ability developed by Von Neumann's partner, Stanislaw Ulam, a mathematician.

Agent-based modeling of human social behavior is an increasingly important research area. For example, it is critical to designing virtual humans, human-like autonomous agents that interact with people in virtual worlds. A critical factor in human social interaction is our beliefs about others. During social interaction, our models of communication can affect the delivery of messages. The actions we take are influenced by how we believe others will react. Even though the interaction is considered in computational models, the theory of mind is rather ignored.

In the Agent-Based Model, the social agent is viewed as an object. When the situation is considered as not well established and complex, it consistently relies on the fundamental value in the agent who has dynamic interaction like in the real world [30]. The agent is assumed to have intelligence, ability, and utility, but the agent cannot enrich the cognitive experience except by using game theory. The underlying game theory utilization is also reasoned from a space and time perspective faced by agents and agents' response towards the situation described in the computing algorithm as an agent's form of behavior [26].

Hypothesis development

The basic attributes consist of investment strategy and the power of the agent's influence. The investment strategy consists of three categories, which are fundamentalist, chartist, and noisy. Fundamentalist strategy is a strategy that always tends to keep the price in a definite value. Chartist strategy is a strategy in which the agent monitors the market's tendency based on historical data. The noisy strategy is buying randomly with 0,5 probability but just going to sell if the agent feels secured (for example, finding two other randomly selling agents). [36] found that investor strategy, either as fundamentalist, chartist, or noisy, may determine the investor decision and eventually determine the stock price. According to this finding, we predict that the investment strategy determines the investor behavior and eventually affects the stock price.

Agent influence power is defined as the influence of one agent on another agent in determining their decision to short futures, inactive, or long futures. [24] found that an agent's trading decision is based on sentiment. Consequently, the stock price process depends on the propagation of information among the interacting agents, budget

constraints, and market feedback. Based on [24] finding, we predict that agent influence power may become a predictor for the investor behavior and determine the stock price.

Meanwhile, the temporal attributes consist of capital, ownership, and risk expectation. Capital is stated as money and/or shares that will be invested later. Ownership is the number of shares owned by the investor in the market. Risk expectation is an alleged investment risk consisting of three possibilities: a) in the money, a situation where the strike price is lower than the cash price of the stock (market price); b) out of the money, a situation where the strike price is higher than the stock cash price (market price); and c) at the money, a condition where the strike price is equal to the cash price of the stock (market price). Previous literature shows that ownership is one predictor of stock price [16], while [19] found that risk perception affects an investment decision.

Hypothesis: The basic attributes (investment strategy and the power of agent's influence) and temporal attributes (capital, ownership, and risk expectation) determines the stock price.

Methods

Approach and data

This research utilized an experimental method with a computational simulation model [28]. This dynamic model is created in such a way, so it is not distinct significantly from the actual situation of the capital market. This research is explanatory because it explains the causal relationship between variables [9]. The research object is an investor's basic and temporal attributes, investment strategy, investment risk, and investment performance in the LQ-45 future index.

In this research, the alternative risk expectation is the suspected investment risk using the term on derivative security. This derivative security consists of three options: a) in the money, b) out of the money, and c) at the money, along with several reasons. First, the convenience to understand the term, second, the fact that futures only uses two alternative situations, which are normal backwardation when future price below spot desired spot price, and contango when future prices above desired spot price [17].

Data used in this research is categorized into two types[28]: (1) data from the control group, LQ-45 index data from 2002-2006; and (2) data from the experimental group or simulation of the LQ-45 index obtained from the agent-based model. This period of data was

chosen based on the assumption that the Indonesian economy is relatively stable at the period, so we can minimize the exogenous factors that affect our model. The simulation process is performed up to a minimal, and the convergent deviation between the control group and the experimental group is achieved. The obtained experimental data is created on various combinations of basic attributes, temporal attributes, and investment strategy between investors.

Variables and measurements

Basic attributes function as a first independent variable group, the basis, and the background of investors' behavior. This basic attribute consists of investment strategy and the power of the agent's influence. The investment strategy is the underlying investment strategy, consisting of three fundamentalist, chartist, and noisy. Fundamentalist strategy is a strategy that always tends to keep the price in a definite value. Chartist strategy is a strategy in which the agent monitors the market's tendency based on historical data. The noisy strategy is buying randomly with 0,5 probability but just going to sell if the agent feels secured (for example, finding two other randomly selling agents). Agent Influence Power is stated as the influence of one agent to another agent in determining their decision to short futures, inactive, or long futures.

The temporal attributes have a function as the second independent variable, which temporal attribute consists of capital, ownership, and risk Expectation. Capital is stated as money and/or shares that will be invested later. Ownership is the number of shares owned by the investor in the market. Risk expectation is an alleged investment risk consisting of three possibilities: a) in the money, a situation where the strike price is lower than the cash price of the stock (market price); b) out of the money, a situation where the strike price is higher than the stock cash price (market price); and c) at the money, a condition where the strike price is equal to the cash price of the stock (market price).

Results

Based on the simulation model, an alternative input iteration process is carried out by first determining the initial configuration. The number of agents or investors is set at 100 people. According to each alternative investment strategy, the composition of the number of agents is: selling (short-futures): inactive: buying (long-futures) = 30: 40: 30. Total futures contracts traded are 5. The base

price for each contract is set at IDR 1,000,000, while the initial capital owned by the investor is IDR 1,000,000,000. The distribution of initial capital, strategy, and power of influence for each agent is given randomly at the start of the simulation iteration.

Activation from the Agent-Based Model using the Netlogo software were conducted where each agent's behavior is formulated with following details. First, the basic attributes consist of investment strategy and the influence of agents. The investment strategy consists of three different types, namely fundamentalist, chartist, and noisy. In the simulation modeling, each investor character is given a different notation, namely for the type of "fundamental" investor is (?) while for the type of investor "chartist" is (☺), and for the type of investor "noisy" is (☺).

Based on the activation of the computational simulation model program using Netlogo software, the result shows a green color line graph visual. This line is a time harmonious data from the control group from 2000 to 2006 or during the data observation period 7-year transaction. It consists of 1694 observation data transaction days that are presented in Figure 1.

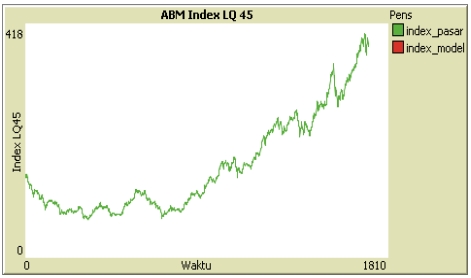

Figure 1.Data graphic of Index Simulation Model 2000-2006

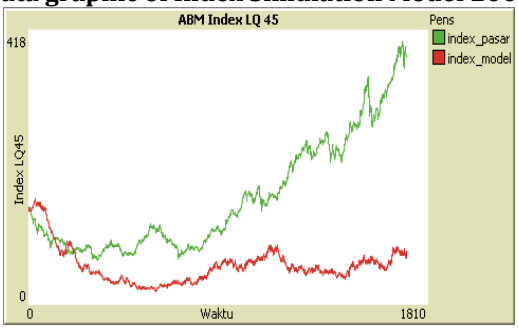

Figure 2.Data graphic of Index Simulation Model 2000-2006

According to the scenario (investor composition total 30: 40: 30, influence coefficient 0,5 and coefficient risk expectation 1- 10), the iteration process produces a graph that consists Meanwhile, the iteration process of changing variations in the composition of investors, the weight of the coefficient of influence, and the weight of the risk expectation coefficient, and the number and type of share ownership were conducted repeatedly. The result is presented in Figure 3.

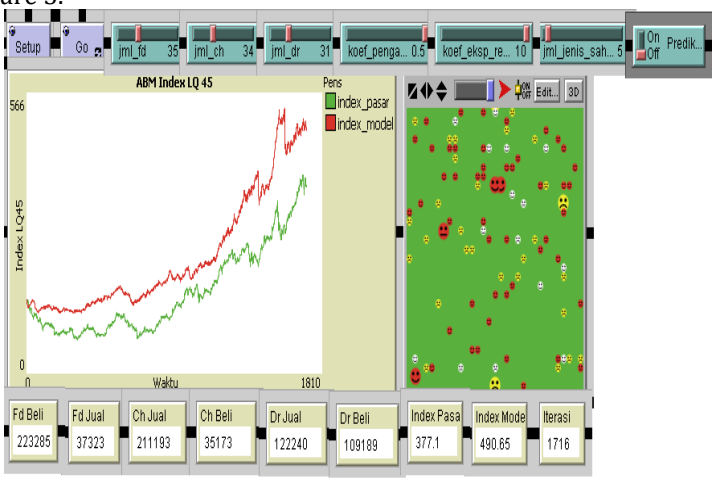

Figure 3.Data graphic of Index Simulation Model 2000-2006 (Source : processed data)

As shown in Figure 3, the green line shows the actual data LQ-45, while the red line represents the result from our model. Our model's line almost has an identic fluctuation compared to the actual data trend line after going through the iteration process manually setup the program thousands of times. This process takes place in a trial & error that reflects the model's weaknesses because there is no certainty (random) in iterations of several conditions close to the trend data patterns to the two populations converging.

Based on the iteration process, which is partly revealed in the figures, it can be summarized the results of the analysis of various model variants starting from a variant I (one) to variants of model XIII (thirteen), namely as follows: (1) the composition of investors as agents are 35 fundamental investors, with a frequency of buying transactions 223,285 times and selling transactions 37,323 times, and chartis types as many as 34 with a frequency of buying transactions 35,173 times selling transactions 211,193 times. While 31 investors

are noisy, total selling transactions carried out 122,240 times and 109,189 times buying transactions; and (2) during the model observation period, 370,756 times of selling transactions were accumulated and dominated by chartist investors. Buying transactions in the same period were 367,647 times dominated by fundamental type investors.

The coefficient of influence at position 0.5, which means the influence of agents on other agents in decision making (selling, buying, and or not active), is robust. The coefficient of risk expectation at a value of 10, which is meaningful of the total weight of investor decisions, the role of risk expectations of agents expects a negative difference situation. That is when the contract index is higher than the real index value (market price) or an out-of-the-money situation. Ownership of type and number of shares at a value of 5, which means the situation of ownership of type and number of shares by an agent or investor is relatively small when compared to the total spectrum of the value of ownership of type and number of shares which is as much as 45.

Discussion and conclusion

Our research objective is to reconstruct an Agent-Based Model to predict stock price. We argue that the basic attributes (investment strategy and the power of agent's influence) and temporal attributes (capital, ownership, and risk expectation) can become predictors of the stock price. Our findings that, in general, the trend of price stock resulted from our model is identic with the trend of the stock price from real data. Therefore, it provides support for our hypothesis, stated that basic attributes and temporal attributes might become a valid predictor for the stock price. Our findings also support previous literature, which found that investment strategy [36], the power of agent's influence [24], capital, ownership [16], and risk expectation [19] is a predictor of stock price. Furthermore, the finding suggests that our model may become a robust framework to predict investment behavior, mainly reflected in stock price.

From these findings, our research may contribute in several aspects. First, for the investors, our model provides an alternative to predict the stock price by considering behavioral aspects of investors. It is essential because it can minimize the potential loss and risk of investment behavior due to an incomprehensive estimation model. Second, for scholars in investment studies, our study contributes by reconstructing an Agent-based Model. However, despite its

contributions, our paper has a limitation. The most important limitation of this study is because we used context-specific data, which is only from Indonesia. Future studies may need to replicate this study on a broader context to increase the generalizability of our model.

References

[1] Al Mamun, M., Syeed, M. A., & Yasmeen, F. (2015). Are investors rational, irrational or normal?. *Journal of Economic & Financial Studies*, 3(04), 01-15.

[2] Bollerslev, T., Chou, R. Y., & Kroner, K. F. (1992). ARCH modeling in finance: A review of the theory and empirical evidence. *Journal of econometrics*, *52*(1-2), 5-59.

[3] Bouchaud, J. P., & Potters, M. (2000). *Theory of financial risks* (Vol. 4). From Statistical Physics to Risk Management: Cambridge University Press, Cambridge.

[4] Campbell, J. Y., Lettau, M., Malkiel, B. G., & Xu, Y. (2001). Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk. *The journal of finance*, *56*(1), 1-43.

[5] Canessa, E. (2000). Multifractality in time series. *Journal of Physics A: Mathematical and General*, *33*(19), 3637.

[6] Cetin, O. L., & Baydar, C. (2004). *Agent-based modelling for optimal trading decisions*. Accenture Working Papers.

[7] Cont, R. (2001). Empirical properties of asset returns: stylized facts and statistical issues. *Quantitative finance*, *1*(2), 223.

[8] Cont, R. (2007). Volatility clustering in financial markets: empirical facts and agent-based models. In *Long memory in economics* (pp. 289-309). Springer, Berlin, Heidelberg.

[9] Cooper, D. R., Schindler, P. S., & Sun, J. (2006). *Business research methods* (Vol. 9, pp. 1-744). New York: Mcgraw-hill.

[10] Cunningham, L. A. (1994). Capital Market Theory, Mandatory Disclosure, and Price Discovery. *Wash. & Lee L. Rev.*, *51*, 843.

[11] Dangl, T., Dockner, E. J., Gaunersdorfer, A., Pfister, A., Sögner, L., & Strobl, G. (2001). Adaptive erwartungsbildung und finanzmarktdynamik. *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung*, *53*(4), 339-365.

[12] El-Yaniv, R. (1998). Competitive solutions for online financial problems. *ACM Computing Surveys (CSUR)*, *30*(1), 28-69.

[13] Farmer, J. D., & Lillo, F. (2004). On the origin of power-law tails in price fluctuations. Quantitative Finance, 4(1), C7.

[14] Gabaix, X., Gopikrishnan, P., Plerou, V., & Stanley, H. E. (2003). A theory of power-law distributions in financial market fluctuations. *Nature*, *423*(6937), 267-270.
[15] Giles, C. L., Lawrence, S., & Tsoi, A. C. (2001). Noisy time series prediction using recurrent neural networks and grammatical inference. *Machine learning*, *44*(1), 161-183.
[16] Gul, F. A., Kim, J. B., & Qiu, A. A. (2010). Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: Evidence from China. *Journal of financial economics*, *95*(3), 425-442.
[17] Hull, J. C. (2003). *Options, Futures and Other Derivatives* (*Fifth Edition)*, Prentice-Hall Pearson Education., New Jersey.
[18] Kim, K. J. (2003). Financial time series forecasting using support vector machines. *Neurocomputing*, *55*(1-2), 307-319.
[19] Klos, A., Weber, E. U., & Weber, M. (2005). Investment decisions and time horizon: Risk perception and risk behavior in repeated gambles. *Management Science*, 51(12), 1777-1790.
[20] Markowitz, H. M. (1968). *Portfolio selection*. Yale university press.
[21] Mauboussin, M. J. (2002). Revisiting market efficiency: The stock market as a complex adaptive system. *Journal of Applied Corporate Finance*, 14(4), 47-55.
[22] Mikosch, T., & Stărică, C. (2004). Nonstationarities in financial time series, the long-range dependence, and the IGARCH effects. *Review of Economics and Statistics*, *86*(1), 378-390.
[23] Müller, U. A., Dacorogna, M. M., Davé, R. D., Olsen, R. B., Pictet, O. V., & Von Weizsäcker, J. E. (1997). Volatilities of different time resolutions—analyzing the dynamics of market components. *Journal of Empirical Finance*, *4*(2-3), 213-239.
[24] Pastore, S. , Ponta, L., & Cincotti, S. (2010). Heterogeneous information-based artificial stock market. *New Journal of Physics*, *12*(5), 053035.
[25] Poteshman, A. M. (2001). Underreaction, overreaction, and increasing misreaction to information in the options market. *The Journal of Finance*, *56*(3), 851-876.
[26] Raberto, M., Cincotti, S., Focardi, S. M., & Marchesi, M. (2001). Agent-based simulation of a financial market. *Physica A: Statistical Mechanics and its Applications*, 299(1-2), 319-327.
[27] Sallans, B., Pfister, A., Karatzoglou, A., & Dorffner, G. (2003). Simulation and validation of an integrated markets model. *Journal of Artifial Societies and Social Simulation*, *6*(4),p.1-35.

[28] Sekaran, U. (2000). *Research Methods for Business*, New York: John Wiley & Sons, Inc.
[29] Shiller, R. J. (2000). *Irrational Exuberance*., Princeton University Press, Princeton.
[30] Šperka, R., & Spišák, M. (2013). Transaction costs influence on the stability of financial market: agent-based simulation. J*ournal of Business Economics and Management,* 14(sup1), S1-S12.
[31] Srbljinović, A., & Škunca, O. (2003). An introduction to agent based modelling and simulation of social processes. *Interdisciplinary Description of Complex Systems: INDECS*, *1*(1-2), 1-8.
[32] Surya, Y., Situngkir, H., Hariadi, Y., & Suroso, R. (2004). *Aplikasi Fisika dalam AnalisisKeuangan: Mekanika Statistika Interaksi Agen*. Sumber Daya MIPA.
[33] Takahashi, H., & Terano, T. (2003). Agent-based approach to investors' behavior and asset price fluctuation in financial markets. *Journal of artificial societies and social simulation*, *6*(3).
[34] Von Neumann, J. (1981). The principles of large-scale computing machines. *Annals of the History of Computing*, 3(3), 263-273.
[35] Waldrop, M. M. (1993). *Complexity: The emerging science at the edge of order and chaos*. Simon and Schuster.
[36] Zhang, Y., & Li, H. (2011). Investors' risk attitudes and stock price fluctuation asymmetry. *Physica A: Statistical Mechanics and its Applications*, *390*(9), 1655-1661.

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