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Effectiveness of different trading strategies for price-takers

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Abstract

We introduce simulation models of stock exchange to explore which traders are successful and how their strategies influence to their wealth and probability of bankruptcy. The results of our experiments show that there is a critical level of agent's experience (or luck) such that agents with this or higher level almost sure will survive on the market on the long run. This critical level is just slightly higher 1/2 and such small value explains why so many people try to trade on the stock exchange. But if trader uses margin trading, the critical level is much higher and shows the risk of excessive losses.

Keywords: agent-based model; simulation; stock exchange.

1. Introduction

Last decades the agent-based simulation models were widely used in many research areas, including economics and finance. Such models were used to analyze the stock exchange behavior, e.g. to investigate the nature of asset price dynamics and speculative bubbles (see for example[2, 4, 8, 13, 16, 19]), to compare the efficiency of fundamental and technical analysis[2, 8, 9, 17] or to assess the impact the herding effect[4, 7, 10, 15, 18]. We would like to investigate the stock exchange processes from the viewpoint of an individual trader and find out which traders can 'survive' on the stock exchange and which traders will be driven out of the market.

We do not consider the most commonly used distinction of the trader as fundamentalist or chartist, where the former make investment decisions based on the financial reports and the latter forecast future prices using the observations of the past price movements. Instead of it we combine these types of strategy in one type and

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consider agent with one personal characteristic denoting the accuracy of her prediction of future asset price movements, as the financial result and the likelihood of trader's bankruptcy depend on this characteristic in both frameworks. It was shown[1] that if this probability of correct identification of market situation is slightly higher than 50%, it allows the trader to receive a positive average gain from trading.

Another considered here strategy is 'the follower' strategy. Such strategy is the simplest case of imitation behavior, and it was shown[7] that traders do have incentives to imitate and for some of them it turns out to be profitable. Indeed, making decisions based on available economic information analysis is costly and requires experience and one have to process a lot of information, so many traders take into account the available analytic reports or opinions of colleagues and friends. According to estimation[12], the proportion of informed orders is less than 10%.

Also trader can imitate either the market or any other traders. The first case refers to a situation when the trader follows the mood of the market, i.e. if everyone buys ('bull' market), then a trader would like to buy, and if everybody sells and the price falls ('bear' market), then the trader will also sell. In the second case we can assume that there are traders in the market (so called 'guru'), which other traders think to be more experienced, or lucky, or have access to restricted information (insiders). Investment decisions of these players are of great interest to other agents and for someone can be may be the only benchmark for decision making.

'The follower' strategy can be used by the newcomers or traders, who for some reason do not have the ability or desire to process information to make an independent decision, and even professional players are tempted to follow the euphoria of bullish or bearish trend, although the propensity to herd is lower for professional investors than for the amateur[6].

The follower strategy seem rational and appealing for the traders as an attempt to receive more information, but the reverse side of it is herding effect that can lead to the large losses, chaos and speculative bubbles on the market[4, 5, 14]. We will leave aside the question of how this herding effect causes bubbles and analyze if it is reasonable for small investors to use this strategy.

2. Model description

2.1. The description of market, agent and price data

In our model there is a market of one asset and a population of N agents. In the basic model the agents differ in only one personal characteristic p, that models the probability of the agent to correctly predict the direction of price movement at the next day. It is assumed that this characteristic does not change during the life of the agent, and at the same time we do not care of the basis of the agent decisions (it can be fundamental or technical approach). At the beginning of all experiments all agents have initial cash and do not have the securities.

We will explore a part of the market, which consists of small and medium-sized agents and assume that these agents do not have an impact on the asset price. We also assume that the market is sufficiently liquid and all the orders can be executed completely. All agents are speculators, so they are interested not in the asset as a long-term investment, but want to make a profit on price difference. Therefore, all orders are designed for short-term and agents trade on the daily price fluctuations. In addition, the agents in our model submit only market orders. Such order includes the volume and do not specify a price, so it is immediately executed at the current market price. The agents in our model do not submit more complex orders.