Modeling the Irrational

XUEDONG HE

Assistant Professor of Industrial Engineering and Operations Research

Fill a glass half way and some people will call it half filled and others half empty. Either way, the amount of liquid in the glass is the same. Our frame of mind—optimistic or pessimistic—imposes meaning on what we see.

Investors in financial markets are not any different, said Xuedong He. They all view the same financial data, yet they draw different conclusions from what they see. Irrational biases often play a role.

"Classical economic theory assumes that investors evaluate information correctly and make decisions rationally," he said. "In reality, though, they have biases. They may overemphasize or overlook certain types of information, and this affects how they manage their portfolio."

For example, investors often miscalculate the odds of an event because they put too much weight on recent data. One common bias is to go with someone on a winning streak. "Gamblers who win two or three times in a row think they have a hot hand and are more likely to win the next time. The odds are still against them, but they over emphasize their recent success," He said.

Other investors may assess the odds correctly, but hidden biases guide their actions. "Look at people who buy lottery tickets and insurance," he said. "A lottery ticket usually has an expected value lower than the selling price. Buyers know the probability of winning is very low, but take the risk for the reward. On the other hand, people know the probability of their house burning down is low, but they buy insurance because they are risk averse."

He builds mathematical models that show how these twin engines—hope and fear—drive investment strategies. "Hope and fear coexist in investors' minds. When stock prices surge, hope takes control, so investors are more likely to invest in stocks and gamble more. When the market turns down, fear dominates and investors quickly liquidate their portfolios," he said.

"In financial engineering, not much work has been done on irrational biases. We have developed a concrete model of these irrationalities based on extensive research. We want to understand how these biases affect investor behavior and strategies," he said.

He is one of the few financial engineers researching irrational motivations. By taking biases into account, he hopes to create models that better predict market behavior and perhaps even warn when investors are being carried away by irrational exuberance.

B.S., Peking University (China), 2005; D.Phil., University of Oxford (England), 2009