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Opinion

Financial Decision-Making: From Psychology and Behavior to Neuroscience

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A financial bubble pertains to a circumstance wherein the prices of assets escalate significantly beyond their economic fundamentals-derived intrinsic values, only to experience a sharp decline back to their inherent worth [1]. The eventual trigger of the financial crisis was the bursting of financial foam. In the last century, many financial crises have transpired, with the 2008 global financial crisis caused by the bursting of the US real estate bubble having the most profound impact, resulting in a four-year recession that affected the world economy. Given the increased economic interdependence and concerns about a potential recession, it is crucial to comprehend the dynamics of market bubbles and crashes. The academic community has taken a prominent role in examining financial markets from economic, political, and legal perspectives, intending to comprehend and elucidate the root causes of the economic crisis. Despite there is no widely accepted theory of how financial bubbles begin and end, there is a rising idea that the bubbles are manifest as a result of the behavioral choices made by financial traders, and their eventual collapse is a consequence of the economy and the majority of traders losing trust in their prior decisions. In the study of economic behavior, traders whose decision-making process aligns with the principle of maximizing expected utilities are deemed rational. Traders have permanent assumes and choices unaffected by any modifications or additions to the variables, e.g., emotional states and financial crises. During the financial crisis, the investment amount experienced a decline, and the stocks were priced significantly lower than their previously purchased value; it would be a logical decision for investors to purchase these assets in large quantities, given their current affordability compared to their previous purchase price. Surveys conducted by several brokerage firms during the financial crisis have revealed that despite the traders maintaining a consistent level of risk tolerance, their market investments have dwindled in contrast to pre-crisis levels [2]. This suggests that decision-makers may be exhibiting irrational behavior during the decision-making process.

Over the past decades, neuroeconomics has significantly enhanced our comprehension of decision-making by utilizing quantitative methodologies and models borrowed from economics and psychology to analyze neuroscience data. Neuroimaging studies have more recently delved into the psychological foundations of trading biases, precisely the disposition and repurchase effects. Moreover, the progression of fMRI technology has facilitated the practice of 'hyper scanning,' which enables the simultaneous scanning of multiple subjects. This capability empowers researchers to investigate the neural activity that arises in a market environment where prices are established by consolidating the decisions of all participants. The capability to accumulate information during market trading is valuable because social influences affect trading behavior [3]. An fMRI study conducted with this approach discovered that during market sequences that demonstrated bubbles, the ventral and dorsomedial prefrontal cortex (PFC) displayed greater sensitivity towards a trader's portfolio value, and these regions exhibited more pronounced coactivation during periods of bubbles. A direct correlation existed between the strength of activity in the ventromedial PFC (vmPFC) and the proclivity to participate in the bubble [1]. The outcomes indicate that bubbles are linked to the coordination of valuation and mentalizing in the ventral and dorsal prefrontal regions.

In addition, evidence suggests that physiological responses among traders are linked to asset prices in naturally occurring markets. According to research, professional traders exhibited psychophysiological reactions to price fluctuations and trend reversals, while traders with more extraordinary experience demonstrated reduced responses [4]. Experienced traders were the subject of another study, which found a positive correlation between testos-

terone levels and daily trading profit [5]. This finding aligns with the "androgen priming" phenomenon observed in athletes before competition [6]. The cortisol levels of said experts were observed to correlate with the daily variability in profits and the volatility in market prices. Research has demonstrated that a decrease in the stock market is linked with a rise in hospital admittances, especially for psychological ailments like panic disorder and anxiety [7].

Mothers carrying male twins, exposed to heightened testosterone levels in utero through the fetal membranes, exhibit a greater propensity for taking financial risks [8]. Testosterone has garnered substantial scholarly interest because it amplifies behaviors characterized by aggression, competition, and a proclivity for risk-taking [9]. According to their findings, traders who earned greater profits exhibited elevated levels of testosterone, and those with testosterone levels that were 25% higher than the median level in the morning (at 11:00 AM) generated returns that were almost one standard deviation above the mean in the afternoon, compared to days when their morning testosterone levels were lower. From this discussion, testosterone steroids significantly influence financial decision-making and are hormonal indicators of traders' challenges in their daily activities. It can be deduced that these hormones have an unfavorable impact on traders at untimely intervals. Notwithstanding the importance of testosterone-influenced risk-aversion in a financial bubble, traders face the opposite.

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