Herd Behavior and Consumer Dynamics: A Game-Theoretic Deconstruction of Economic Phenomena

Yuxuan Hou*, Zi Wang

Beijing 21st Century School, Beijing, China

*yangxiaobinhello@tzc.edu.cn

Abstract. This article is based on a game theory model and systematically analyzes the research progress of group behavior in the economic market and its dual impact on consumer decision-making. Research has found that group behavior can bring decision-making convenience to consumers, but it may also lead to irrational consumption. From a positive perspective, group behavior reduces consumers' decision-making costs through information sharing, while providing relatively reliable product quality references through social learning mechanisms. However, its negative impacts are equally significant, including the possibility of triggering herd behavior, causing market information distortion, and even leading to unnecessary consumer spending and economic losses. In response to these issues, this article proposes corresponding countermeasures and suggestions: enterprises should focus on improving product quality and transparency and establish effective market signal mechanisms; Consumers need to enhance their ability to discern information and cultivate rational decision-making awareness. The study specifically points out that in a market environment of information asymmetry, improving product quality and strengthening information recognition are key to optimizing the impact of group behavior. These conclusions not only enrich theoretical research on market group behavior but also provide practical guidance for promoting a healthy market consumption ecology.

Keywords: Herd Behavior, Game Theory, Consumer Dynamics.

1 Introduction

The herd behavior, in which individuals mimic the action of a large group instead of based on their interest or information [1], is ubiquitous in the economy and the market. This tendency to blindly follow the crowd blindly can influence the market dynamics and market outcomes significantly, which can be a mixed blessing for consumers. Positively, this might bring tremendous benefits to consumers; for instance, in 2021, many retail investors bought many GameStop shares, which was followed by a larger scale of retail investors [2]. This led to significant stock price fluctuation, where many profits were made by retail investors. Negatively, the herd behavior may also give rise to loss for a large scale of consumers, or even economic crises. The subprime crisis in 2008 is a typical example of the negative impact of the herd behavior, in which consumers

P. S. Borah et al. (eds.), *Proceedings of the 2025 5th International Conference on Enterprise Management and Economic Development (ICEMED 2025)*, Advances in Economics, Business and Management Research 346,
https://doi.org/10.2991/978-94-6463-811-0_54

crowded in the real estate industry blindly without concerns, eventually made the economic bubble broken after the interest rate being increased. This had caused numerous financial institutions to go bankrupt, resulting in a global economic recession [3].

Herding behavior is essentially a strategic choice in non-cooperative game situations. When individuals face information asymmetry, observing others' behavior becomes a rational strategy to reduce decision-making risk [4]. The Information Cascade model in the game theory can explain this phenomenon: irrational groups tend to be formed when the following decision makers neglect private information and imitate the behavior of former groups. The game theory, however, plays a pivotal role in deciphering consumer behavior by modeling the interdependence of individuals and firms. It systematically illustrates how consumer behavior is rationally affected by the choices of others, providing a feasible method of delving into the underlying cause of the herd behavior. For instance, the collective action of consumers experiencing the price war between major producers can be modelled by referring to a classic Prisoner's Dilemma, where consumers are engaged in the waiting games (delaying purchase for further discounts) collectively. Under the condition of imperfect information and the phenomena of herd behavior, there would be three outcomes. The first condition might be that many consumers follow the purchase signal of a small group of people, where there is further willingness for the firms to cut the price. Secondly, it is possible that no one acts until the price war ends, and the price begins to increase, causing a collective loss of opportunities. Thirdly, the group of consumers jump into the market when the price is minimized, benefiting the whole group. In this case, the game theory helped explain information asymmetry challenges while showing the effect if consumers rely on actions of the others as heuristic signals. Additionally, concepts like the Nash equilibrium clarify the reasons for the market to be stabilized when consumers and firms behave differently. Critically, the game theory integrates behavioral nuances, such as bounded rationality and social preferences, to predict the deviations of consumer behavior from rational choices, such as impulsive buying driven by the fear of missing out.

This paper aims to investigate how herd behavior shapes consumer behavior in the dynamic market by game-theoretical analysis and attempts to uncover the mechanism of individuals imitating the actions of others under uncertainty. The findings aim to provide ideas to strategies mitigating the herd effect to enhance market efficiency.

2 Theoretical Foundations and Literature Review

2.1 The Concept and Research Progress of Herd Behavior

From 1930s to1970s, Keynes proposed the first structural thought of the involvement of irrational emotion on group behavior in the book 'animal spirits' [5]. Subsequently, from 1980s to 1990s, the information cascade model was proposed by Banerjee in 1992, which is the first quantitative analysis of decision bias in which individuals give up private information because they observe others [6]. This denotes that the analysis on the herd behavior shifts from phenomenon describing to mathematical modelling. In the 2000s, the study of the herd behavior shifts from static to dynamic via the Bayesian updating model, measuring how individuals can change their belief by observing the

others' behavior in multiple decisions with the decreasing personal belief and the empowered public belief, leading to the herding behaviors [7]. Since 2010s, the study of the herd behavior entered the micro view, in which quantitative analysis of certain psychological variables like the fear of missing out and the bounded rationality are adopted.

2.2 Basic Principles and Methods of Game Theory

The Bayesian updated model by Smith and Sørensen can be used in modeling the effect of the herd behavior on the consumers, in which it classified every consumer to two groups, the rational group, which follows the Bayesian updated model and the 'crazy' group. The rational group behaves rationally by accounting for their personal belief and the public belief, while the 'crazy' group takes the same action regardless of that of the others. Via the application of the likelihood ratio and observing the decision made by the others, the probability of individuals acting identically with the public can be observed. This is a dynamic game of incomplete information; the action taken by former people would increase the weight of public belief in the decision making of the latter group, which can be regarded as a pooling equilibrium under the perfect Bayesian equilibrium. Perfect Bayesian equilibrium is a dynamic game in which players update their beliefs and adopt optimal strategies according to Bayesian updated model, while the pooling equilibrium describes the result of the group behavior tends to be the same. Additionally, by incorporating bounded rationality and personal preferences, the difference between individuals can be integrated into something quantizable to enable people to consider it under the rational economics scenario. Through this measure, the government can avoid the negative effects of the herd effect by intervening in public belief and personal belief, such as improving information transparency.

3 Function of the Game Theory in Analyzing Consumer Dynamics

Traditionally, game theory mainly focused on rational strategies that maximize individuals' benefits. For instance, in the prisoners' dilemma, researchers used to believe that consumers make decisions based on rationality, and prisoners should choose to betray their partners to preserve oneself. However, it is discovered that some may choose to keep the secret due to social preferences, limited rationality, or other factors. According to Daniel Kahneman and Amos Tversky's research, people have various cognitive biases in decision-making, such as loss aversion and framing effects. These biases will affect consumers' strategic choices in the game, making them not always pursue maximizing profits [8]. Accordingly, the experimentations gradually start considering those determinants to interpret consumer behavior more realistically. Through the construction of game theoretic models, researchers are enabled to analyze the process of decisions of consumers while facing a sophisticated market. In the price war scenario, by using the model of prisoners' dilemma, it is observed that when consumers are making decisions with imperfect information, they tend to embody more explicit group characteristics. Imperfection of information may enlarge the impact of cognitive

bias, such as loss aversion will possibly make the consumers rely more on others' choice, therefore enhances the herd behavior [9]. In addition, Bayesian model has made a significant contribution to analysis of consumers' adaptive behavior towards new products or market trends [10], by categorizing the examinees into rational and irrational groups, clearly showed differences between individuals when considering involvement of public beliefs and personal opinions, provided a new perspective on understanding the internal interaction within consumers. Simultaneously, the theory of Nash equilibrium in game theory gives a theoretical basis for explaining how a market reaches a stable state under the impact of mutual engagement between firms and consumers' behaviors, it reveals the steady state of strategic interaction among market participants, for example, in price competition, firms and consumers will eventually converge to a certain price level, at which point neither party can benefit from unilaterally changing their strategy.

4 Comprehensive Analysis of the Impact of Herd Behavior on Consumer Choice

4.1 The Positive and Negative Sides of Herd Behavior

Herd behavior reflects the irrational imitation tendency in consumer decision-making. On the positive side, it can reduce the cost of decision-making significantly. In the market environment with explosions of information, consumers usually face massive information of various products, it's hard for them to extract the best, therefore referring to others' consumption becomes a convenient method of obtaining information. For example, on e-commerce platforms, consumers often pay attention to popular product rankings and follow the choices of the majority to purchase, thereby reducing their time and energy spent on collecting and evaluating product information. To some extent, this approach helps consumers obtain relatively reliable product information, reducing the risk of purchasing inferior products.

However, the convenience of relying on group decision-making may also lead to a weakening of consumers' ability to think proactively, which in turn can cause the following problem. It can easily lead to blind consumption, ignoring whether the product truly meets their needs. When consumers overly rely on group behavior and lack independent thinking, they may fall into a rush to buy products with inflated prices and unsatisfactory quality. Taking some famous products on the internet as an example, some consumers follow the trend of buying just because of their high popularity and a large number of purchase reviews on social media, and finally realize in the actual use process that the product functions are far away from their expectations, causing financial losses and seriously damaging the rights and interests of consumers. In the long run, this irrational consumption pattern may distort market signals, hinder competition for high-quality products, and ultimately harm the overall market health.

4.2 Coping Strategies for Firms and Consumers

For consumers, improving their ability to discern information is crucial. Consumers should actively learn about relevant knowledge of the products, know market trends, and not blindly follow group behavior. When facing various consumer information, it is necessary to maintain critical thinking, collect information through multiple channels, comprehensively evaluate the quality, price, reputation, etc., of products, and make consumption decisions that are more in line with one's own needs. In addition, consumers should enhance their consumption rationality, avoid being excessively influenced by herd mentality, and establish correct consumption concepts. More specifically, consumers can refer to objective data from third-party evaluation platforms such as Consumer Reports to compare the differences between user evaluations and professional evaluations; At the same time, using price tracking tools like Keepa to identify 'false promotions' and avoid impulsive consumption due to marketing tactics such as' flash sales'.

From the perspective of enterprises, on one hand, they can cleverly utilize herd behavior for precise marketing. By shaping the image of a product's "bestseller", attracting consumers' attention, and stimulating their desire to purchase. For example, companies can invite well-known bloggers to promote their products, create buzz on social media platforms, and guide consumers to follow the trend and make purchases. Moreover, Enterprises can use A/B testing to optimize the 'bestseller' language, determine the optimal advertising space layout through eye tracking experiments, and evaluate the conversion effect of different KOLs using attribution analysis such as Markov models. On the other hand, enterprises must ensure excellent product quality, which is the fundamental basis for them to keep themselves a staple in the market. Only by providing high-quality products can attract consumers through herd behavior, win their long-term trust and reputation, and avoid neglecting product quality due to excessive reliance on herd behavior, which may trigger negative market reactions and damage the company's own image and interests.

5 Conclusion

This article mainly explores the performance of herd behavior in the economic market and its impact on consumer behavior and uses game theory for in-depth analysis. Herd behavior refers to individuals blindly imitating the actions of large groups rather than based on their own information or interests, which is relatively common in the economy and market and has both advantages and disadvantages for consumers.

In analyzing consumer dynamics, traditional game theory focuses on rational strategies, but research has found that consumer decisions are influenced by social preferences and cognitive biases, such as loss aversion and framing effects. By constructing game models, it is possible to analyze the decision-making process of consumers in complex markets. In price wars, group characteristics are more pronounced when consumer information is incomplete. The Bayesian model helps analyze consumers' adaptive behavior towards new products or market trends.

Herd behavior has both positive and negative impacts on consumer choices. The positive aspect is that it can reduce decision-making costs, and consumers can refer to other people's consumption information. Negativity can easily lead to blind consumption, where consumers may purchase high-priced and low-quality products that do not meet their own needs.

In terms of solutions, consumers should enhance their ability to discern information, learn product knowledge, maintain critical thinking, and enhance consumer rationality. On the one hand, enterprises can use herd behavior for precise marketing. On the other hand, it is necessary to ensure product quality to win the long-term trust of consumers.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

Reference

1. Choijil, E., Méndez, C. E., Wong, W. K., Vieito, J. P., & Batmunkh, M. U. (2022). Thirty years of herd behavior in financial markets: A bibliometric analysis. *Research in International Business and Finance*, *59*, 101506.
2. Barnett, V.: Keynes, animal spirits, and instinct: Reason plus intuition is better than rational. Journal of the History of Economic Thought 39(3), 381-399 (2017).
3. Choijil, E., Méndez, C.E., Wong, W.K., Vieito, J.P., Batmunkh, M.U.: Thirty years of herd behavior in financial markets: A bibliometric analysis. Research in International Business and Finance 59, 101506 (2022).
4. Daniel, K., Tversky, A.: Prospect theory: An analysis of decision under risk. Econometrica 47(2), 263-291 (1979).
5. Fisch, J.E.: GameStop and the reemergence of the retail investor. Boston University Law Review 102, 1799-1830 (2022).
6. Jay, P.C.: Herd behavior, the "penguin effect," and the suppression of informational diffusion: An analysis of informational externalities and payoff interdependency. American Economic Review 87(5), 909-919 (1997).
7. Rahayu, A.D., Putra, A., Oktaverina, C., Ningtyas, R.A.: Herding behavior in the stock market: A literature review. International Journal of Social Sciences Review 1(2), 8-25 (2021).
8. Smith, L., Sørensen, P.: Pathological outcomes of observational learning. Econometrica 68(2), 371-398 (2000).
9. Ali, M., Amir, H. (2024). Understanding consumer herding behavior in online purchases and its implications for online retailers and marketers.
10. Zhou, F., Xu, X., Trajcevski, G., Zhang, K.: A survey of information cascade analysis: Models, predictions, and recent advances. ACM Computing Surveys 54(2), 1-36 (2021).