Let justice be silent no more: A study of “courage behaviors for a just cause” based on repeated game and evolutionary game model

Ximan Niu *

Central University of Finance and Economics, Beijing, China, 102206

* Corresponding Author Email: 819553802@qq.com

Abstract. In this paper, an empirical method based on game theory is employed to investigate the necessity and strategy of righteousness and courage. Firstly, a single prisoner's dilemma game model is established, and its limitations are analyzed. Secondly, the number of games is expanded, and the repeated game model is utilized to examine the optimal strategy for individuals. Next, the concept of finite rationality is introduced, and the characteristics of strategy superiority and inferiority are considered. The positive effects of brave behavior for righteousness on social groups are studied using the evolutionary game model. Finally, based on the empirical results, corresponding suggestions are offered, including encouraging residents to establish a concept of morality and integrity, rather than simply being "good people", and urging the government to foster a harmonious atmosphere in society and improve the legal protection system for righteous and courageous acts, with the aim of motivating people to take courageous actions that promote righteousness.

Keywords: Courage behaviors for a just cause, Economic ethics, Prisoner’s dilemma, Repeated games, Evolutionary games, Pareto optimality.

1. Introduction and Literature Review

The “Tangshan Barbecue Shop Beating Incident” in 2022 received significant attention and generated public discussion in China. On June 10, 2022, a man maliciously harassed a woman in a barbecue shop in Tangshan City, and when she resisted, the man became angry and beat the innocent woman. Despite many witnesses being present during the attack, not a single man went forward to help. This case triggered widespread outrage throughout China, with outraged comments being seen on social media platforms such as WeChat. The public finds it hard to believe that such audacious and lawless behavior could still occur in the 21st century, given the continuous improvement of the legal system and the increasingly educated population. The bystanders’ indifference, along with the perpetrator’s brazenness, caused further harm to the public. In addition to this incident, many similar cases have occurred in the past. For instance, on October 13, 2011, a 2-year-old girl named Xiaoyueyue in Foshan was run over by a vehicle twice, causing serious injuries. Before Xiaoyueyue was rescued, 18 passersby walked by but did not offer help. Unfortunately, she died after several days of intensive treatment. These moral issues have led people to ponder why individuals are becoming increasingly indifferent and numb in modern times as the economy develops.

Why do people tend to be bystanders during emergencies and choose not to intervene? Guo Ye (2012) suggests that public goods nature of courage behaviors for a just cause makes many people inclined to “take advantage” of the situation, hoping that others will make the effort and benefit from it themselves [1]. The act of courage has certain costs, including psychological and physical losses for coming forward, such as suffering the same verbal abuse, beatings, or even having personal belongings destroyed during the fight. Furthermore, after the incident, it may trigger retaliation from the perpetrator or even entanglement from the victim. According to Shang Jing (2019), people's sense of social responsibility is getting weaker and weaker, and they are more and more concerned about their own interests and indifferent to the interests of society, the public and others [2].

From the above analysis, it is evident that do boldly what is righteous do not seem to be economical for economically rational people. To verify the necessity of righteous behavior, several scholars have used game theory principles to elaborate on the positive and negative sides. With the help of theories

related to repetitive and evolutionary games, Zhu Wanrun (2020) proved that moral compliance is a collective requirement and that individual interests are optimal only when collective interests are maximized, thus proving the necessity of doing good deeds from the positive side [3]. Additionally, Liu Jie et al. (2018) proposed that courageous behavior for a just cause belongs to the optimal strategy of balancing morality and law. They explained the reasons why people do not save themselves in danger and propose measures to solve the problem [4], further confirming the need for acts of courage for a just cause from the opposite side.

Numerous scholars have proposed measures to promote acts of courage for righteousness, which are crucial for the well-being of society. One approach is for the government to enhance safeguards for courageous individuals, which can involve providing material and spiritual rewards to incentivize bystanders to act bravely, as well as offering sufficient relief and other safeguards to compensate for the loss of interests of those who act courageously. According to Zhang Tianwei and Tao Lunkang (2022), the compensation mechanism of state underwriting should be regulated, which means that the state takes the lead in compensating the brave person who suffers losses as a result of performing rescue acts, so as to safeguard the legitimate rights and interests of the brave person [5]. Additionally, the legitimate rights and interests of "good Samaritans" can be safeguarded through legislation and judicial recognition. For instance, legislation at the national level should be accelerated to clarify the state as the main body responsible for the protection of the righteous behavior, to fundamentally solve the worries of the heroes [6], and a relative exemption system for the misconduct of "good Samaritans" can be implemented [7]. What's more, the government can penalize immoral behavior to foster a moral atmosphere in society. Garrison (2018) proposed that punishment should be imposed on defectors, such as fines [8] to enhance cooperation among group members. Wu Ling et al. (2014) have suggested establishing a credit file and making it public to supervise dishonest members [9].

From a long-term perspective of social development, an increasing number of people engaging in altruistic behavior can lead to the Pareto optimality of society and thus solve the Hobbesian problem. Xiong et al. (2008) suggested that by establishing a system that encourages more individuals to engage in altruistic behavior, individual rationality can be transformed into collective rationality, and the Hobbesian dilemma can be resolved [10].

Although previous studies have examined the behavior of helping others in danger from the perspective of game theory, these analyses have limitations. Firstly, most scholars still use the traditional "rational actor" or "economic actor" game theory assumption, only considering the profit factors between individuals, while ignoring their social and collective attributes. Secondly, some scholars analyze the immediate gains and losses of individuals from a micro perspective, but neglect the long-term social benefits of this behavior. Moreover, many recommendations and conclusions focus on how to reward and protect individuals who help others in danger from external perspectives such as governments and states, but fail to provide convincing game-theoretical conclusions that encourage people to voluntarily engage in such behavior and provide relevant recommendations from the perspective of the public itself.

Based on the above analysis, this paper will first introduce relevant concepts and use the traditional one-shot Prisoner's Dilemma game model to analyze the behavior of individuals who perform acts of valor. Subsequently, the paper will expand the number of games and use the repeated game model to analyze the optimal strategy of individuals, introduce the concept of bounded rationality, and study the positive effects of acts of valor on society using the evolutionary game model. Finally, through the theoretical analysis, the paper will derive suggestions for individuals and the government to encourage the formation of a virtuous atmosphere of valor and righteousness, and to prevent justice from remaining silent.

2. Theoretical Foundation

2.1. The conceptions of game theory

Game theory is a branch of applied mathematics that provides mathematical models for real-life scenarios, it is the systematic study of some strategic choices and their strategic equilibrium theory through the process of occurrence or interaction of the behavior of rational decision-making subjects [11]. The analysis of definitions leads to several premises for the application of game theory:

2.1.1 The "economic man" assumption

The "economic man" assumption, which originated from the British economist Adam Smith, asserts that people are inherently selfish and motivated by self-interest. Individuals try to maximize their own utility as much as possible [12]. This assumption is the basic premise for the research of many economic problems and is also an essential premise for the application of classical game theory.

2.1.2 Interaction between two or more players

The application scenarios of game theory involve environments with at least two rational agents, and each agent has the opportunity to take actions or measures that affect the overall results.

2.1.3 Mutual influence

Mutual influence is a vital premise for the application of game theory. The scenarios require that the game environment should involve two or more economists, where the behavior of one or more subjects necessarily has a relationship or influence on the behavior of other subjects. In other words, there is an inseparable and interrelated relationship between all the subjects in the game environment.

2.2. The conceptions of courage behaviors for a just cause

Drawing on the Civil Code of the People's Republic of China and the analysis of various domestic legal scholars, this paper seeks to define the concept of courage behaviors for a just cause as a voluntary act undertaken by a natural person, without any prescribed obligations, with the aim of reducing or eliminating harm to the interests of the state, society, or others, while assuming risks to their personal safety and property. Through this definition, several key characteristics of righteousness and courage can be identified, as follows:

2.2.1 Natural person

The feature of a "natural person" expands the scope of the courageous actor, encompassing individuals of any gender, age, or physical condition who may be eligible for the subject of courageous acts as provided by law.

2.2.2 Unspecified obligation

The absence of any "specified obligation" implies that there is no statutory duty to protect the interests of the community or others who may suffer loss. For instance, a police officer who apprehends a thief is not considered to have acted courageously, since protecting public property is a critical duty and obligation of the police.

2.2.3 Crisis Relief

Distress relief acts are those in which the perpetrator performs an act intended to reduce the loss or threat [13]. Courageous actors often operate in highly critical or emergency situations, facing greater risks themselves.

2.2.4 Altruism

It is directly related to the empirical model of the prisoner's game developed below. A courageous actor must act with the intention to help others, even if such actions do not yield immediate benefits and may result in personal losses.

2.2.5 Actions

The "actions" of good Samaritans involve taking relevant measures and actions to protect and rescue individuals in distress.

3. Game Analysis of Courage Behaviors for a Just Cause

3.1. Model assumption

If we exclude extreme cases, such as those with only one witness at the scene of the crime, the scenario of the act of courage involves four distinct subjects:

(1) Actors who are committing acts that cause harm to the collective or others, referred to as "bad guys" in this paper.

(2) The party whose interests are being violated, which could be the interests of the state, society, or individuals, referred to as the "injured party" in this paper.

(3) Witnesses, including both potential courageous actors and bystanders who remain indifferent in the face of atrocities or evil acts.

The above analysis reveals that the act of courage takes place between at least two economic agents, namely the witnesses, whose behavior influences one another. For instance, if two witnesses, Witness A and Witness B, choose to act courageously, Witness A may become more confident and act in unison with Witness B. The decision of whether to act courageously or not may be a matter of confidence, and it will directly impact the injured party by determining whether the bad guys are deterred from committing further harm and whether the loss of benefits is minimized. By integrating the conceptual characteristics of game theory, the act of courage can be transformed into a game theory model for further analysis.

3.2. Analysis of courage behaviors for a just cause based on the single prisoner's dilemma model

3.2.1 Model building

In order to analyze the concept of courage behaviors for a just cause in a game-theoretic framework, the recent "Tangshan barbecue restaurant beating incident" will be employed as an illustrative example. For the sake of simplicity, the violent male will be considered as a single individual and refer to him as the "violent person", the woman as the victim, and the members of the crowd as two customers, denoted as customer A and customer B. As previously mentioned, individuals who do boldly what is righteous are likely to face a loss of self-interest. Thus, assuming that only one customer takes the courageous action, their interests will be damaged, with a damage of 2 units. As the other party refrains from action, their benefit loss is 0. In the scenario where both customers act courageously, a two-to-one situation emerges, whereby the righteous outnumber the evil side. In this case, the courageous actions of both customers will protect and assist the victimized woman, resulting in commendation and a gain of 1 unit for each individual. The resulting game matrix is presented as follows:

Table 1. Single game party utility matrix

		Customer A	
		Do Boldly What is Righteous	Observe from the Sidelines
Customer B	Do Boldly What is Righteous	1, 1	-2, 0
	Observe from the Sidelines	0, -2	0, 0

Upon examining the game matrix presented in Table 1, it becomes apparent that if customer A decides to act righteously, their payoff would be positive if customer B chooses to act righteously as

well, but the payoff would be negative if customer B chooses not to act. In contrast, if customer A decides to not act, regardless of customer B's decision, they will not face any losses. Therefore, due to the risk of facing a negative payoff, customer A opts for a conservative strategy and decides to not act, as does customer B. Consequently, the resulting equilibrium solution is for both customers to not act, which means stand by.

3.2.2 Limitations of single prisoner's dilemma model

Based on the aforementioned analysis, it can be concluded that observing a victim's suffering from a detached perspective is a means of maximizing personal interests. Nevertheless, the applicability of the model to real-life situations is subject to two significant constraints:

(1) One game or multiple encounters

As John Donne, the English poet, once proclaimed, "No man is an island." Humans are inherently social creatures who are inevitably connected to others in one way or another. Thus, when it comes to social interactions, people usually need to engage with the same person repeatedly, for instance, to establish long-term enterprise partnerships. Moreover, most individuals tend to have a restricted range of activities for the majority of their time. For instance, college students primarily socialize in their residence and campus areas. Such limitations enhance the probability of repeated encounters and the likelihood of familiarization, indicating that a single-game model is inappropriate.

Additionally, people recognize that they are interconnected and interdependent, as exemplified by the widespread indignation and reactions on social media following the barbecue restaurant assault incident. This indicates that human behavior is subject to imitation. Even if a person does not confront the same individual again, he or she may learn relevant information from various sources and imitate the behavior of the previous person in a comparable situation. Consequently, the speed and convenience of information transmission increase the possibility of repeated games among members of society.

(2) Single-period gain or long-term gain

In repeated games, players must not only consider the maximization of their immediate returns but also the optimization of the cumulative returns at each stage. The game's outcome at each stage impacts not only the present revenue but also the future revenue. To avoid confrontations, retaliations, or malicious competitions in subsequent stages, several parties opt to sacrifice their immediate interests for long-term benefits and demonstrate a cooperative attitude, hoping that the other party will reciprocate. Thus, both parties can optimize their mutual long-term interests. Consequently, the strategies employed by the players in repeated games differ significantly from those employed in the single-period prisoner game model.

(3) Chinese economy and Pareto optimality

Pareto optimality, a concept of economic ethics, refers to the situation where the collective economic situation shifts from situation A to situation B. After the transition, the economic situation of everyone in the collective does not deteriorate, and at least one individual becomes better off than before.

Since China's reform and opening up, its economy has witnessed rapid growth, with the quality of life for its citizens improving. Relevant data indicate that China's total GDP surpassed the GDP output of Japan and the European Union to become the world's second-largest economy, with a GDP output of over $14.7 trillion by 2020. Compared to 1960, the GDP output has increased by a factor of 246. Moreover, the Chinese government has committed to achieving social justice, with all poor counties lifted out of poverty by the end of November 2020, marking the nationwide elimination of poverty. China is gradually moving towards "Pareto optimal" development by implementing a range of legal and fiscal policies.

However, the aforementioned game model reveals that customers A and B both chose to stand by and failed to maximize the interests of the broader society, diverging from the actual situation of Chinese society.

3.3. Analysis of Courage Behaviors for a Just Cause Based on Repeated Game Model

3.3.1 Model improvement

After conducting the analysis, the model could be improved by considering the following aspects:

(1) Shifting from a single prisoner's dilemma model to an iterated prisoner's dilemma model. The latter accounts for repeated interactions among players and better reflects the complexity of social relationships.

(2) Acknowledging the interconnectedness and imitative nature of individuals in society. As such, players can refer to historical information from their interactions and the decline in social conditions may impact individual gains.

(3) Recognizing the finite nature of players' lives, repeated games between different players can be considered as a finite repeated game model. In this model, the number of interactions is high, which can influence the strategies adopted by players.

3.3.2 Model building

Based on the aforementioned analysis, the game will be simplified to a two-person scenario, in which customers A and B engage in the game N times, with the understanding that these N games need not occur simultaneously, but can be spaced out over an extended period, even spanning months or decades. During each of these N games, each decision-maker faces a binary choice, which implies that one decision-maker has 2^N possible choices in total. In light of these considerations, the existing model will be enhanced by:

(1) Modifying the payoff matrix

To account for the interdependence and familiarity among society members, the author propose modifying the payoff matrix. Specifically, it is assumed that only one customer incurs damage when choosing the righteous path, and that the extent of this damage remains at S (Sucker's Payoff) = -5. In contrast, the bystander who refrains from action benefits from the seeker's act of courage and enjoys a positive outcome for the entire society, which is denoted as T (Temptation) = 10. In the event that both customers exhibit courage simultaneously, and consequently enhance the social environment, each of them receives increased benefits, denoted as R (Reward) = 5. Finally, if both customers refrain from action, resulting in a worse social environment, they each receive a lower benefit, denoted as P (Punishment) = -1. Thus, the game matrix is constructed in Table 2:

Table 2. Repeated game party utility matrix

		Customer A	
		Do Boldly What is Righteous	Observe from the Sidelines
Customer B	Do Boldly What is Righteous	R=5, R=5	S=-5, T=10
	Observe from the Sidelines	T=10, S=-5	P=-1, P=-1

Thus, we have T > R > P > S. Following the analysis as above, the final conclusion of the single game is still that both sides choose to stand by.

(2) Adding the probability ω of playing the game again

In order to account for the probability of future interactions between the players, the parameter ω is introduced, which represents the likelihood of the two parties meeting again and facing a crisis scenario. Since the game matrix is symmetric, we can calculate the payoff function of one player to derive that of the other player. To determine the payoff function V of a player after N iterations of the game, the results vary depending on the strategies employed. Two extreme cases will be considered to explain the process of computing the payoff matrix. If both players consistently choose to do boldly what is righteous in all N games, then for any player, the first game yields a reward of

R, the second stage of the game gain for ωR . The third stage and later gains follow the same pattern. The payoff function for a player in this case is:

$$V_{(Both\ Parties\ Do\ Boldly\ What\ is\ Righteous)} = R + \omega R + \omega^2 R + \cdots + \omega^N R \quad (1)$$

If both parties decide not to take action, the payoff function of the game side can be determined by following the same analysis as described above. In this case, the payoff for each player in the first round of the game is P, and the payoff for each subsequent round of the game is also P. Therefore, the total payoff function of the game side is:

$$V_{(Both\ Parties\ Standby)} = P + \omega P + \omega^2 P + \cdots + \omega^N P \quad (2)$$

Based on the above analytical method, the payoff functions at different stages corresponding to different strategies can be calculated. Each payoff function is calculated separately, and the results are compared to determine the strategy that maximizes the return of the game players.

3.3.3 Limitations of repeated game model

(1) Individual game or group game

In the above-described repeated game scenario, the involved parties were assumed to be two bystanders, and the number of repeated games was determined by the lifetime of the bystanders. However, if we consider a group setting, where group members imitate the same strategy, then the number of games played can be infinite for different strategies. If we assume that the group can reproduce and its members do not decrease to 0, then the number of games played by the group in the same "see-it-all" scenario can be infinite.

(2) Perfect or limited rationality

As economist Simon pointed out, decision-makers may only be able to find satisfactory solutions instead of optimal ones. Although the decision-makers intend to be rational, their acts are objectively limited [14]. Several factors can affect limited rationality, including cognitive, psychological, and environmental factors, which can restrict the information processing ability of decision-makers.

(3) Survival of the fittest - human society is constantly evolving

In the above-described model, it is assumed that decision-makers may not discard some strategies that offer poor returns in the N-game or that there is an evolutionary process for strategies. Strategies that offer higher returns are retained from generation to generation, whereas those with poorer returns are gradually eliminated. The gradual evolution of different strategies also affects the overall returns of individuals and groups, thereby reflecting the constant evolution of human society.

3.4. Analysis of Courage Behaviors for a Just Cause Based on Evolutionary Game Model

3.4.1 Model improvement

(1) The number of games among group members is infinite

In the context of the evolutionary game model, the members of the group have the ability to adopt the same strategy due to their imitative behavior, resulting in the possibility of playing an infinite number of games with different strategies. This situation arises because the lifetime of the groups is not limited, and they can continue to play the game for an indefinite period of time.

(2) The actors involved in the game are considered to be bounded rational

The decision-making process of actors is subject to various constraints such as cognitive limitations, psychological biases, and environmental factors. As a result, their ability to analyze and process information in unforeseen circumstances is not perfect but finite. This bounded rationality may prevent the actors from identifying and choosing the optimal strategy, and may lead them to settle for satisfactory solutions instead.

3.4.2 Analysis of Strategy Stability

After adjusting the number of games to an infinite amount, the gain function is modified correspondingly. The expressions for the two extreme cases will be used as examples.

In the scenario where both parties choose to do boldly what is righteous, the utility function can be modified as follows:

$$V_{(Both\ Parties\ Do\ Boldly\ What\ is\ Righteous)} = R + \omega R + \omega^2 R + \cdots + \omega^N R = \frac{R}{1-\omega} \quad (3)$$

If both parties choose to observe from the sidelines, the analysis would still be consistent with the previous approach. The payoff function of the game party would be determined as follows:

$$V_{(Both\ Parties\ Standby)} = P + \omega P + \omega^2 P + \cdots + \omega^N P = \frac{P}{1-\omega} \quad (4)$$

3.4.3 Analysis of the Results

(1) The Optimal Strategy of Tit-for-Tat

In 1980, Axelrod, a renowned game theorist, organized a computer competition based on the repeated Prisoner's Dilemma game, consisting of three rounds. After running various software simulations, the strategy that achieved the highest payoff was "Tit-for-Tat". In the context of bravery, this strategy implies that at the start of the game, both parties should act courageously and not betray each other. However, if one party first chooses to defect, the other party should also defect in the next turn until the former party reverts to acting bravely. In the context of righteousness, this strategy is referred to as conditional righteousness behavior.

(2) Transition from individual rationality to collective rationality

A strategy is said to be a cooperative evolutionary stable strategy if it satisfies the following two conditions in a population evolutionary game. First, cooperativeness, meaning that a certain proportion of participants in the population are choosing to cooperate. Second, evolutionary stability, the strategy is evolutionarily stable relative to other strategies [15]. According to the evolutionary game theory, each strategy has its utility function, and the magnitude of this function represents the "survivability" of the strategy. Similar to the biological world, the larger the survivability of the strategy, the higher the chances of being adopted in the subsequent game, and hence the proportion of all strategies will increase. Conversely, strategies with low survivability will gradually die out. Ultimately, as each generation evolves, the chosen strategy is the one with the highest relative survivability among all the strategies. Based on the calculations, the conditional righteousness strategy emerges as the winner in the evolutionary game.

When the value of ω is small, implying that people are distant from each other, and the social atmosphere is indifferent, individuals who opt for conditional acts of bravery are highly vulnerable to being exploited by those who choose to look on with a cold eye. As people consider the interests of others to be insignificant compared to their own, they are more motivated to choose to act selfishly. If someone is willing to act bravely at the start, bystanders can reap the social benefits of that courage, but without any significant psychological or moral burden. Hence, naturally brave individuals are often exploited by other bystanders who enjoy free-riding. Conversely, when the value of ω is large, implying a closer relationship between people, if someone chooses to stand by coldly, they will not receive help from others when they encounter danger later, unless they first change their behavior and choose to act bravely. When people realize that their immoral behavior can cause harm not only to their own interests but also to the interests of the collective, they gradually alter their behavior. In an infinite number of repeated games, individuals move towards collective rationality, choosing to act courageously when others are in danger, leading to the Pareto optimal state of society.

(3) Shift from "economic man" to "moral man"

In real life, people frequently face the Hobbesian dilemma. On the one hand, they receive moral education from childhood, ranging from the act of offering one's seat to the elderly and children in need on a bus to the act of courage discussed here, which reflects the moral and ethical requirements of every member of society. On the other hand, "people have the same selfish and self-serving genes as animals [17]". In the conditional courage strategy, individuals choose to act bravely and also protect their own rights and interests when they encounter dangerous behaviors, in line with the requirements of social values.

4. Conclusion

Through the construction of a repeated game and an evolutionary game model, it can be inferred that exhibiting courageous behavior for a just cause not only benefits individuals in the long run, but also the society as a whole. This approach is consistent with the Chinese value of win-win cooperation, which is essential for achieving Pareto optimality in China. Nonetheless, certain conditions are required to prevent the "fair and honest starvation" of free-riding behavior. Therefore, it is necessary for individuals to cultivate a sense of integrity, morality, and justice, while the government should take affirmative steps to promote courageous behavior.

5. Suggestions

The concept of conditional courageous behavior has been found to contribute to the achievement of Pareto optimality in society. However, the analysis shows that certain incentives and prerequisites are necessary for such behavior to be encouraged in Chinese society. Based on this analysis, this paper proposes feasible suggestions for potential courageous individuals and the government.

5.1. Members of the community

5.1.1 Long-term vision

When faced with situations where others are in need of help, individuals may overlook the fact that socialization is a long-term and sustainable process, rather than a one-time occurrence. It is imperative for individuals to consider their own long-term development when making judgments, rather than limiting their vision to the present. Failing to do so not only fails to protect one's own interests but can also be self-inflicting, causing damage to one's interests when the social environment deteriorates.

5.1.2 Establishing the awareness that "caring for others is caring for ourselves"

In social life, most game behavior is a "non-zero-sum game", including acts of courage for a just cause. Individuals must abandon the idea that "others will take advantage of my courageous behavior" and instead believe that good will be rewarded. The conditional courage strategy is a method of maximizing the collective good by continuously guiding the opponent through a gentle response. This strategy is always "backward", which means that it requires judging the opponent's previous action. Such a rewarding behavior eventually receives positive feedback, maximizing both collective and individual interests. Therefore, an individual's own altruistic behavior sets a positive example for others, which is reciprocated, achieving the Pareto optimal of the whole society.

5.2. Governments

5.2.1 Improving the reward and protection system for courageous acts for a just cause

Proactive acts of courage depend not only on the goodness and justice within people but also on government incentives to eliminate worries and minimize possible risks and losses. For example, the bonus for the brave can be increased without requiring excessive results or consequences of bravery, and legal provisions related to self-defense can be improved. The protection system for the brave can also be enhanced to provide protection for the families of heroes who died because of bravery.

5.2.2 Creating a good atmosphere of social solidarity and harmony

A high degree of conclusion of interpersonal relationships in society is a prerequisite for a conditional bravery strategy to achieve the desired effect. Such a harmonious social atmosphere needs to be promoted by the government. Regular community activities can be organized to strengthen the ties between community members and form a radiating effect centered on one community. Public opinion can be guided, and the content and quality of news media reports can be regulated to spread "positive energy". Role models can also be established to increase the publicity of national moral models.

References

[1] Guo Ye. The evolutionary game analysis of “brave action for a just cause” [J]. Coastal Enterprise and Technology, 2012, 140(01): 80-83.

[2] Shang Jing. Jurisprudential analysis of the legislative regulation of the act of “seeing danger and not saving” [J]. Law and Society, 2019(13): 224-225.

[3] Zhu Wanrun. The calculation of good and evil: why to be good [J]. Social Science Research, 2020, 247(02): 150-157.

[4] Liu Jie, Qiu Fanggui. Game theoretical analysis of seeing danger without saving behavior [J]. Journal of Mudanjiang University, 2018, 27(05): 46-48.

[5] Zhang Tianwei, Tao Lunkang. Research on the legal system of rewarding and guaranteeing the courageous people for righteousness [J]. Legal expo, 2022, 871(11): 133-135.

[6] Zheng Hui. The construction of China's righteousness and courage system from the “Tangshan beating case” [J]. Shanghai People's Congress Monthly, 2022, 383(07): 46-48.

[7] Zhou Zopeng. On the shortcomings and improvement of China's legislation on righteousness and courage [J]. Legal Expo, 2019, 787(35): 133-134.

[8] Garrison W. Greenwood, Hussein A. Abbass, Eleni Petraki, When is altruistic punishment useful in social dilemmas, Biosystems, 2018(174): 60-62.

[9] Wu Ling, Jie Zaiming, Huang Guqiu. Analysis of college students’ integrity deficiency and exploration of integrity education from the perspective of game theory [J]. Value Engineering, 2014, 33(30): 254-256.

[10] Xiong Hui, Shen Xiaorong. The formation process of individual moral behavior from the perspective of game theory and its inspiration to moral education [J]. Journal of the University of Electronic Science and Technology (Social Science Edition), 2008, No. 44(05): 81-84.

[11] Sun Lu. A brief description of the impact of game theory on economics [J]. Bohai Rim Economic Outlook, 2019, 303(12): 154-155.

[12] Ding Shuyang. Analysis of the game dimension of justice [D]. Southwest University, 2019.

[13] Wang Weiwei. The recognition and analysis of “courageous acts” [J]. Law and Society, 2021, (08): 181-182.

[14] Yu J, Jia W S. Finite rationality and approximation theorems [J]. Journal of Guizhou University (Social Science Edition), 2021, 39(02): 34-40+120.

[15] Shu, M. B., Zhou, Y. F. The effect of betrayal actions with costliness on the evolutionary game of indirect reciprocal populations[J]. Journal of Guizhou Normal University (Natural Science Edition), 2021, 39(03): 65-71.