

Analysis of Repeated Games in International Climate Negotiations- With China as an Example

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Abstract. Through a systematic analysis of the current situation of international climate governance, this paper finds that the current international climate negotiations are characterized by an obvious “national interest priority”, in which countries seek to maximize their interests through the mechanism of repeated games while adhering to their respective positions and principles. The research results show that this repeated game mechanism provides an important path for the formulation of a more equitable and effective global climate policy. To realize this goal, the following key measures are needed: first, implement a scientific and reasonable phased emission reduction plan, and break down the long-term climate goals into operable milestones; second, adhere to the basic principle of “common but differentiated responsibilities”, and set up a fair and reasonable institutional arrangement; third, build a multilevel and multi-channel international communication platform, and effectively enhance mutual trust among countries; finally, strengthen environmental education, improve information disclosure, and so on, to maximize the benefits of global climate policies through the repeated game mechanism. Finally, the public's awareness of environmental protection should be enhanced through strengthening environmental education and improving information disclosure. These mechanisms design not only respect the reasonable interests of countries, but also effectively promote global climate governance from confrontation to mutually beneficial cooperation, and ultimately realize a new pattern of win-win cooperation. The findings of this paper provide new theoretical perspectives and practical paths to break the current deadlock in international climate negotiations.

Keywords: International climate negotiations; repeated games; benefit maximization.

1. Introduction

In recent years, international climate development has become increasingly severe, which can be described as both a crisis and challenge, with frequent occurrence of extreme weather giving serious impacts on human society and natural environment, and climate change leading to resource shortages, which may trigger migratory booms and increase social conflicts and political instability. Developing countries and poor regions faced greater climate risks owing to a lack of resources and coping capacities. International climate negotiations are extremely important, as they are a key platform for the global community to work together to address the climate crisis and promote sustainable development, and to harmonize the actions of all countries to avoid a climate catastrophe. However, the negotiation is full of complexity, with divergent national interests, differences in economic development, geopolitical interference, and different scientific knowledge all adding obstacles to the negotiation [1]. Countries have successively put forward countermeasures such as dual-carbon emission reduction, signing of the Paris Agreement, energy transformation and so on. However, due to the different development directions and interests of different countries, they cannot avoid differences in responding to international climate issues. Take dual-carbon for example, most countries maintain a positive attitude, a small number of countries are wavering, some countries have withdrawn from the dual-carbon program, so it is difficult to reach a consensus on climate issues. However, the good thing is that all countries have their coping strategies and are making efforts to solve the climate problem. Taking China as an example, China is a key force in the international climate negotiations, taking the lead in ratifying the relevant conventions, promoting the conclusion and entry into force of international agreements, and actively coordinating the differences between the parties and providing financial and technical assistance, thus demonstrating its role as a major

country. China's strategy in climate negotiations has evolved from emphasizing “common but differentiated responsibilities” and striving for development space to advocating a fair and reasonable global climate governance system with win-win cooperation. The results have been remarkable, enhancing the power of action and the atmosphere of cooperation in global climate governance. China is a cooperative player that adheres to the principle of making its position as a developing country clear in the game, and at the same time, it actively assumes the corresponding responsibilities and does not evade the international obligations it should fulfill. It promotes win-win cooperation, adheres to multilateralism, seeks fairness to the greatest extent possible, and actively carries out cooperation based on fairness. As a developing country, China seeks opportunities when participating in international cooperation and negotiation games and promotes the development of the volatile game of global climate governance in a direction of favors developing countries. To promote the international climate negotiation process, countries should strengthen their sense of responsibility, and developed countries should take the lead in deep emissions reduction and fulfill their commitments on financial and technical support. Establish an efficient and transparent monitoring mechanism to ensure the implementation of goals and the rational use of funds; build a communication platform to promote mutual trust to resolve differences and promote global climate cooperation.

2. Examining the Current Situation of International Climate Negotiations through the Lens of Repeated Games

2.1. Research Background and Significance of Repeated Games

Repeated games are a typical concept in game theory, strictly defined as the repetition of the same structured game many times, where the strategies and payoffs of the participants are affected by the outcome of the previous game." Repeated games are game processes in which the basic game is repeated many times between the same participants. According to the number of repetitions, it can be divided into finite repetitive games and infinite repetitive games, of which infinite repetitive games often lead to cooperative equilibrium due to their characteristic of having no termination point. The classic prisoner's dilemma, for example, helps to better understand the repeated game, simply put there are two prisoners, separate interrogation, from the static analysis of a single game down to say that the confession is the optimal choice, but from the overall interests of the two people are resisting the interests to reach the maximum [2]. It can be seen that the collective optimum cannot be realized when individual interests are maximized. In reality, a similar situation can be precisely applied to international climate negotiations, where all countries want to maximize their interests in the negotiations, but when they maximize their interests, they tend to reduce the overall interests of all countries. Repeated games in the pursuit of interest maximization, at the same time, the use of unlimited cooperation between countries, to protect the overall interests of countries. Therefore, repeated games provide part of the theoretical support for international climate negotiations and promote long-term cooperation among countries.

2.2. Negotiations and Outcomes Experienced by Countries to Address International Climate Change

The 1992 United Nations Framework Convention on Climate Change clarifies the shared responsibilities between developed and developing countries, but the responsibilities are differentiated, and there is no clear definition of the financial support and various types of assistance that should be provided by developed countries.

The 1997 Kyoto Protocol, proposed in Japan, stipulated that, between 2008 and 2012, mainly by developed industrial countries to reduce emissions would be reduced. In 2001, the United States announced its withdrawal. In 2005, the agreement came into force

2007 proposed the Bali Roadmap, the United Nations Framework of Contracts on Climate Change, to launch a dual-track negotiation for the expiration of the first commitment period of the Kyoto Protocol after the expiration of the global The Bali Roadmap, or the United Nations Framework for Climate Change Agreement, was proposed in 2007, launching the dual-track negotiations and setting the direction and framework for the global response to climate change after the first commitment period of the Kyoto Protocol expires.

In December 2015, the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached the Paris Agreement, which proposes temperature control goals such as limiting the increase in the global average climate to less than 2 degrees Celsius compared to the pre-industrial period and striving to limit the temperature increase to less than 1.5 degrees Celsius.

2.3. Repeated Gaming in International Climate Negotiations

In international climate negotiations, countries have different views. In the distribution of emission reduction responsibilities, developed countries emit a large amount of greenhouse gases, but want developed countries to assume most of the responsibility for emission reduction, on the issue of emission reduction, countries have conducted many negotiations, developing countries due to lack of funds and other parties are difficult to assume the main responsibility, developed countries in the reduction of emissions with advanced technology and relatively abundant funds, has not been able to reach an agreement, the two sides in the many games conducted After the two sides finally reached a consensus, after an infinite number of repeated games, the Paris Agreement was signed in December 2015, achieving the result of maximizing benefits.

3. Implications of Using Repeated Games in International Climate Negotiations

3.1. Positive Aspects

Repeated games have prompted each country to continuously adjust its policies, promote the continuous improvement of the international climate regime, facilitated exchanges among countries, maximized the interests of each country, and facilitated the easing of relations among countries while solving the problems, so that they can enhance their mutual understanding of the climate change issue and seek points of common interest. Multiple games have prompted countries to recognize the benefits of long-term cooperation, and to obtain long-term benefits, they will be more active in fulfilling their emission reduction commitments, thus enhancing the possibility of long-term cooperation. At the same time, countries build up a mechanism of reputation in the game, and a good reputation for active compliance is conducive to international image enhancement and diplomatic cooperation. Stable multilateral agreements are also gradually formed in the game, and countries monitor and constrain each other to ensure the effective implementation of the agreements and promote the steady progress of global climate governance.

3.2. Negative Aspects

Repeated games, when applied to international climate negotiations, have to be negotiated many times many times the game, to get the results that all countries are satisfied with. However, repeated games often lead to inefficient negotiations, consume a lot of time and resources, and affect the actual action and effect of climate negotiations. If countries are unable to reach an effective agreement in the long run or the implementation is not strong, it will put global climate governance in a difficult situation and aggravate the harm of climate change. The conflict between short-term interests and long-term games, short-term interests of countries focus on their economic development, long-term games need to focus on the global climate, the two contradictions are prominent. In the implementation of international climate negotiations, the ability and willingness of countries to fulfill their commitments are uneven, and it is difficult to implement financial and technical measures; in terms of supervision, there is a lack of uniform mandatory standards, and the monitoring and

evaluation system is imperfect, which makes it difficult to supervise. At the same time, the developed countries, with their economic and technological advantages, have the right to speak, while the developing countries have a weak right to speak, and the asymmetry of rights leads to the asymmetry of responsibilities and obligations between the two sides, and finally to an imbalance in cooperation.

4. Interpretation of China's Traditional Thought in International Negotiations

4.1. Peace is Precious, Seek Common Ground and Preserve Differences

Peace is precious has always been China's traditional thought, and this traditional thought is also applied in international climate negotiations, which advocates that peace is precious, and that international disputes are resolved in a peaceful and friendly way to avoid the escalation of conflicts. People are committed to reaching mutually beneficial and win-win agreements and actively participating in various international climate negotiations. Promote the building of a community of human destiny [3]. Seeking common ground while preserving differences emphasizes the need to respect the differences among countries and to seek common interests and goals through repeated games and multiple negotiations. The initial approach of seeking common ground while preserving differences was put forward by Premier Zhou at the Bandung Conference, setting aside the differences between different countries in terms of social systems and ideologies, and also providing an important concept for subsequent international negotiations.

4.2. National Sentiment and World View

China has not only firmly defended its interests but also advocated a community of human destiny in international climate negotiations, emphasizing that international climate change is a global issue that requires all countries to work together to deal with it. It calls on all countries to look beyond their problems and to face the climate problem from the perspective of the overall interests of mankind, and to shoulder international responsibility together. China as a developing country, actively participate in international climate negotiations, in the United States led other countries to withdraw from the dual-carbon plan, China actively take responsibility, and countries actively carry out some negotiations, after the game, with other countries to maximize the benefits of the results of the dual-carbon plan can be implemented [4]. This reflects China's worldview of taking the initiative to assume responsibility and leadership, and taking the initiative to put forward one climate goal after another. It actively participates in international rulemaking, contributes Chinese wisdom and programs, and contributes programs to global climate governance. After the United States withdrew from the Paris Agreement, and added the specific actions taken by China, such as “China has committed to achieving peak carbon by 2030, and set up a South-South Climate Cooperation Fund of X billion yuan”.

4.3. Learning from History, Combining the Strong and the Soft

International climate negotiations will not achieve the expected results after only one round of negotiations, so multiple rounds of negotiations must be conducted. Looking back at China's past negotiation history, China is good at drawing lessons from history. For example, when China negotiates on issues related to territorial sovereignty and other issues, China will clarify its position by international law by its interests and resolutely safeguard its national sovereignty. After a hundred years, China still resolutely defends its interests in international negotiations. At the same time, in the game of hard and soft, in international negotiations, China always sticks to its principles, always defends its interests, and shows a tough attitude when it comes to its interests. On the other hand, it also communicates with countries in a flexible way and with a gentle attitude to achieve the expectations of the negotiations [5].

5. Conclusion

International climate governance is still facing many challenges, and the fundamental reason is that countries have not yet reached a consensus on the causes and solutions of climate problems. By analyzing the international climate negotiation process, it can be found that the mechanism of repeated games plays a key role in it. Although this game process of multiple negotiations and repeated revisions can maximize the balance of interests of all parties and achieve relatively satisfactory negotiation results, its inherent inefficiency should not be ignored. As a responsible developing country, China has always upheld the concept of a community of human destiny and played a constructive role in global climate governance. Looking ahead, the international community needs to make breakthroughs in the following key areas:

First, a more equitable and reasonable mechanism for distributing benefits must be established. First, a fairer and more reasonable benefit distribution mechanism must be established, which should fully consider the differences in the development stages and actual capacities of countries, and require developed countries to assume greater responsibility for emission reduction by their technological and financial advantages. Second, it is necessary to build an efficient communication and coordination platform. It is suggested that high-level climate dialogue meetings be held regularly to enhance mutual trust among countries through institutionalized arrangements. Third, it is crucial to improve the incentive and constraint mechanisms. Consideration could be given to setting up a special climate cooperation incentive fund to provide substantial incentives to countries that are active in compliance. In the long run, with the deepening of global climate awareness and the popularization and application of emerging technologies, international climate cooperation will show a new development trend: on the one hand, countries will explore a more efficient mode of cooperation in the repetitive game; on the other hand, breakthroughs in clean energy technologies will accelerate the process of global energy transformation. Through the joint efforts of the international community, the global climate governance system will be improved day by day, laying a solid foundation for the realization of sustainable development of mankind.

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