Study on the Model Construction of Power Transfer Movement from the Perspective of China`s International Relations

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Abstract: Power plays a fundamental role in the system in the international relations. Basie on Game Theory, and by the assumption that the total amount of power is relatively constant in a short period of time, this paper makes a modelling analysis of the "take-and-give" movement of power among rational countries. Based on building the curve of power taken and the curve of power given, the power balance mechanism model and the power movement track model are constructed. We also make an analysis and by the examples. In the current situation, this paper agrees with the view of most scholars. China and the United States have opened a "cold war" different from the United States and the Soviet Union. With the coordination between the PRC-US relations, it is concluded that a stable international power mechanism requires the active cooperation of all countries, which could promote the power operation to reach the equilibrium point. The analysis method of power movement can explain the cause, progress, and trend of Sino US cold war to a certain extent.

Key words: Power Balance; Rational State; Zero-sum property; Power Movement; RPC-US relation.

1 Introduction

A large number of Chinese scholars began to engage in the quantitative study of international relations. Wang(2015)put forward an idea of constructing "micro international relations" and established the theory of state behavior including, State Power Constraint Curve, State Preference Selection and other models[1]. His studies provide an important reference for this pape. Yan (2017) have distinguished Power from Strength, believing that strength refers to the ability to do things, while power refers to the ability to urge others to do things. In international relations, the existence of power is based on the interaction between countries, while the strength is objective and not interfered by the relationship between the two countries[2].

2 Hypothetical Design

2.1 Rational State Assumption

Just like Rational Man, we assume that the sovereign state is rational, which means they will make choice to maximize their benefits after calculating all costs. Different from person, the state`s powerful allocation ability makes it more accurate in rational analysis. Especially in democratic countries, due to the participation of multiple parties in decision-making, this rational feature will be stronger. The actions taken by a rational state should achieve one effect: the increased national interest from the action should be greater than the cost paid for it. And at this time, the state acts can help it obtain a positive net interest.

2.2 Zero Sum Assumption of Power

The interaction among sovereign States constitutes the international community. The state can obtain or lose the dominant position of other countries in a certain field through the operation of power. In other words, the acquisition of power of one country or many countries

is often accompanied by the loss of power of another country or many countries, that is, power has zero sum[3]. The power flow between the states constitutes the key of our model. In this study,we define the cost of participating in international activities of countries as "strength cost".

2.3 The Limitation of Strength Cost

Strength, like energy or resourses, is the foundation of a country's ability to take action in the international community. Its limits always produce a contradiction with the unlimited need of the state`s desire for power. So a country hardly use the same strength cost to maintain two or more desire. Just like we all know that infrastructure construction plays a vital role in the health and welfare of the country[4]. But state can`t use all of its cost into infrastructure. Different fields have different utility satisfaction for a country. So, the limitation of the strength cost determines that the state has a preference for power requirements in different fields, and the different preferences for state power in different periods determine that the country implements the policy of expansion or contraction in a certain aspect of power.

3 The Curve of Power Taken / Given

The construction of the model of Power Taken or Given forms the basis of this analysis framework. Because the state with more power can operate more autonomously in the international community, and the keeping of power requires the state to pay the more strength cost. Base on this thought, the movement of power between countries is actually the interaction between the country of power claim and the country of power transfer.

3.1 Demand for Power: The Curve of Power Taken

In the short term, there is a contradiction between the unlimited pursuit of power by the state and the limitation of the state's own strength. This paper determines the following factors that affect the state's pursuit of power, including the strength cost (c), the state's preference (U), the international social operation (s), the strength comparison with other countries (PC), foreign policy expectation (PE),etc. And then a power taken equation is established.

$$T = f(C, U, S, Pc, Pe) \quad （2\text{-}1）$$

It can be determined first that they are in a positive proportion and incline to the upper right on a 2D

coordinate axis. But this increasing trend has the law of diminishing marginal utility. It can be explained by qualitative research: with the increasing cost of power paid, the amount of power obtained by the demander is
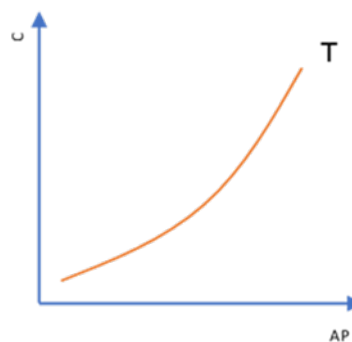

Figure.2-1：the curve of power taken

also increasing. But in the short term, there is zero sum in the international power movement. So, the power keeping of other countries will be less and less, which makes them more reluctant to give up the only influence. A good example to understand is that it is more difficult to attract a strange country than a country close to me. Both countries and individuals like to put difficulties in the final solution. It makes the positive proportion curve shows the shape of convex x-axis. Finally,we get the curve in Figure 2-1.

3.2 Transfer of power: The Curve of Power Given

3.2.1 Function and Curve

Like the power taken function, we have constructed a country's power given function with the same considerations and methods:
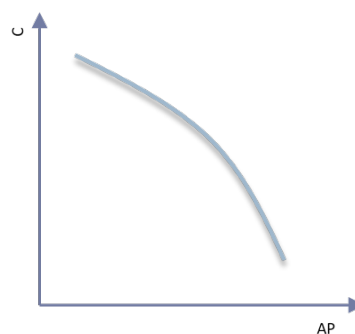
$$G = f(C, U, S, Pc, Pe) \quad （2\text{-}2）$$

Figure2-2:the curve of power given

Similarly,we can build a 2D coordinate model by observing the relationship between the amount of power transferred by a country and the cost of power gained (or saved) by the country.The contraction of a country's power means that it doesn`t have to keep the original investment in its external actions,and then it can "save" some strength that needs to be used to maintain its

external influence.Therefore,there is a negative correlation between the amount of power transferred and strength cost investment.We express the transfer amount and the input amount in 2D coordinates,and getting a curve that inclines to the right and down.

Like taken curve, there is a law of increasing marginal cost in this negative correlation trend, but its special feature is that it is not the increasing of the strength cost consumed, but the increasing of the cost paid for the transfer of power(This kind of cost is also a kind of "price" in another sense)[5]. Constant contraction often puts the state in a passive situation, making it more expensive to maintain the same power. And it will often lose more than gain. Therefore, under the effect of this Law of increasing marginal cost, the inverse proportion curve shows the feature of concave origin, thus the curve in Figure 2-2 is obtained.

4 Mechanism of Power Movement

The movement of the curves means a change in the efficiency of maintaining power. In an ideal situation, the rational power demander always hopes to obtain the maximum power at the minimum cost, while the rational power transferor hopes to exchange the minimum power loss for the most resource saving, which is manifested in the moderate expansion/contraction of both sides until the expansion party no longer demands power and the contraction party no longer transfers power.

4.1 Equilibrium Point of Power Movement and Power Con lict / Vacuum
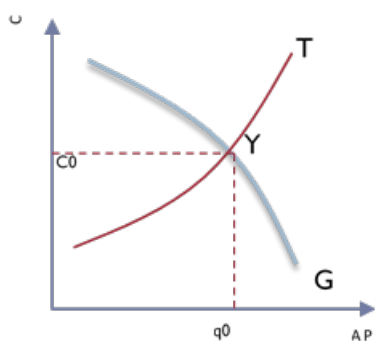

Figure 3-1: The determination of the equilibrium point of power movement

In order to investigate this movement, we put Two curves into a 2D coordinate. In Figure 3-1, the intersection Y means the demander country just gets the all power "released" by the transferor country. At this time, the model reached equilibrium. But countries are

not so tacit in fact. Two competing countries rarely exchange information, which makes it difficult for decision-makers to predict the direction of each other's next actions. Therefore, the power movement mechanism will not move to equilibrium at the beginning. The interaction between the two countries around power is a long-term phenomenon in a short-term mechanism, which is manifested as power vacuum or power contradiction, but the trend of equilibrium will be always there.
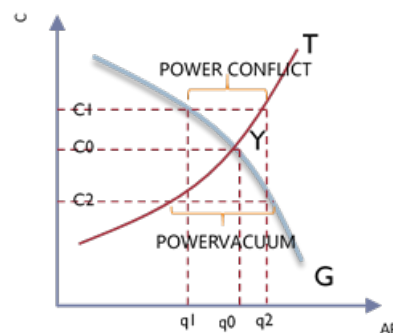

Figure 3-2: The movement of power

Figure 3-2 explains the concept of power vacuum and power contradiction. It is assumed that the strength cost owned or paid by each country is higher than the Y, which corresponding the level C0.And in the level C1,the Q1 that can be transferred by the transferor is less than the Q2,which can be obtained by the demander. The power demands of both sides overlap, there is a power contradiction in this movement mechanism. One party must therefore withdraw power demand to eliminate this overlap.

Similarly, when the strength cost of each country is lower than the level C2, which is lower than the equilibrium point Y. The demander pursues less power, while the transferor give more power. At this time, the surplus power is unclaimed, and the phenomenon of power vacuum appears. Similarly, the rational countries will take the opposite action when there is a conflict. This action will push power mechanism returns to the equilibrium point Y.

4.2 The Movement Track of Power Movement Mechanism

There is a long-term trend towards balanced development in the mechanism. If we regard the movement of power between "contradiction to balance" as a cycle, then we will get a long-term trend track of power mechanism operation after combining multiple cycles.
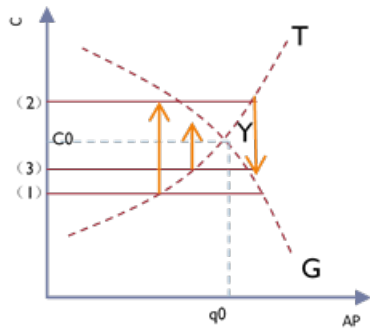
4.2.1 "Toshore" Wave
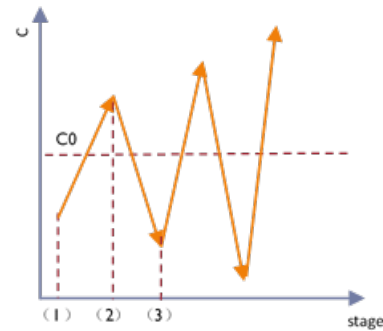
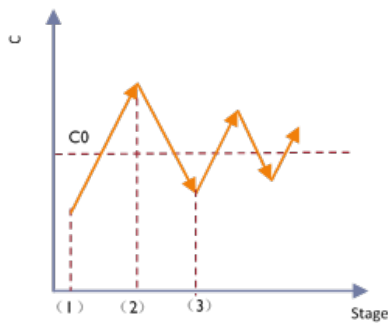Figure 3-3: Power movement under mutual exploration

Figure 3-4: converging volatility towards equilibrium

In Figure 3-3, assuming that there is a power vacuum in Stage (1), the two parties will take corresponding measures to push up their respective strength cost input level. However, since there is no "tacit agreement" between countries, the movement will not stop when the equilibrium level C0 is reached. We assume that both sides continue to expand their input level, to "testing" the bottom line of each other. They will observe each other's actions after exceeding the equilibrium point Y, and finally stop the expansion to enter the stage. (2) At this time, there is a contradiction of power in this mechanism. Combined with the above conclusions, at this time, the two countries will take a contraction action to reduce their strength cost investment. Thus, promoting the level of investment to move down. Similarly, due to the "testing" situation, this downward movement will stop when entering the stage (3) after slightly crossing the equilibrium level, but the power vacuum will be much smaller than that of the stage (1). In an ideal state, the two sides will continue to take actions to turn the vacuum into a contradiction. As shown in Figure 3-4, the two sides will continue to approach the equilibrium level, presenting a "Toshore" wave like movement. As a result, the international pattern will gradually become long-term stable。

4.2.2 "Offshore" Wave

Figure 3-5: the "offshore" that tends to diverge

Similarly, assuming that there is a power vacuum in the Stage (1), the actors in the mechanism still take the same action to expand their input, but the difference is that the two sides do not choose the "testing" expansion, but try to increase the power possession. Then the level of investment in the Stage (2) will be much higher than that in the "testing" situation. Similarly, due to the excessive efforts in the Stage (2), countries have chosen to "recuperate" and there will be a relatively large vacuum period in the adjustment to the Stage (3). However, this situation will soon be broken, and both sides will continue to substantially promote the level of investment to move up. The input will exceed the level of stage (2) in the power contradiction period of the next stage, and then shrink on a large scale again. In an ideal state, it will continue to cycle as shown in Figure 3-5, continuously deviate from the equilibrium level, showing an " Offshore " wave.

Different like the "Toshore" movement, the operation of this mechanism cannot last forever. The fundamental reason lies in the limited resources. Every larger-scale expansion is a loss of the comprehensive national strength. When both sides or one side breaks through the level of power retention that they can bear, the country will not be able to maintain its normal ruling ability, so it will collapse quickly in the short term. In fact, this trend has appeared in the most external stage of figure 3-5: The continuous overdraft of national power makes the time of power contradiction period shrink (i.e. the movement curve is steeper and steeper), and the peak of contraction period is closer to x-axis. When a country uses out resources, its foreign policy is totally lost. This is often accompanied by the collapse of its domestic rule. The well-known cold war between the US and the Soviet Union fits this model.

The WAVE gives us a point to study the case of PRC-US relation. In the current situation, many scholars thought that China and the United States have opened a "cold war", we agree with this kind of view but it is

different from the United States and the Soviet Union. The analysis method of power movement can explain the cause, progress and trend of Sino US cold war to a certain extent. The zero-sum of power shows that in the short term, the rise of China will inevitably lead to the weakening of American power. China's power is expanding. The reality is that the United States has made a strong response, so there are strong fluctuations between China and the United States. It just like the offshore wave in figure 3-5. The collision between China and the United States continues to expand, ease and expand again. Similarly, when the strength cost is more than one party can bear, this model will collapse. To be honest, we do not deny that the conflict between the two countries will show signs of easing, but it is clear that the movement of power transfer will never stop. Whether China or the United States, voluntarily withdrawing from the game means the loss of legitimacy of their governments, just like the Soviet Union.

5 Conclusion

Power plays a fundamental role in the international relations. By the assumption that the total amount of power is relatively constant in a short period of time, this paper makes a modelling analysis of the "take-and-give" movement of power among rational countries. On the basis of building the curve of power taken/given, the power balance mechanism model and the power movement track model are constructed. We also

make an analysis and by a case. With the coordination between the PRC-US relations, it is concluded that a stable international power mechanism requires the active cooperation of all countries, which could promote the power operation to reach the equilibrium point.

The taken/given curve coexist for each countries at one period because both curves are relative. When a country demands more power, its willingness to transfer power is decreasing; similarly, when a country transfers more power, its desire for power is also decreasing. That is also the reason why role of the two countries can be interchanged in the in the case of previous section. In a model analysis, whether a country is the demand country or the transfer country has no influence on the analysis results. The key is whether we can correctly explain the derivation process and results. Transferor or demander does not reflect that it is in an active or passive position in its foreign policy. It should be classified according to the needs of research and interpretation.

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