Game Analysis of Intergovernmental Interests in the Sharing of Grassland Ecological Civilization across Regions

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Abstract. The party has made a strategic decision to promote the construction of ecological civilization vigorously in the 18th CPC National Congress, and the impact of ecological civilization construction and sharing on the economic development of our country is also growing. This paper is based on the study of the coordination of local government interests in the process of joint construction and sharing of grassland ecological civilization. First of all, it explained the conflicts of interest between local governments in the process of co-construction and sharing of ecological civilization in the grass-roots steppe. Secondly, it conducted a game analysis of the interests among local governments in the process of co-construction and sharing of grassland ecological civilization across regions, and on this basis, the corresponding countermeasures were put forward.

Cross regional ecological civilization sharing refers to all the administrative regions (can be the smallest village as the basic unit) in the process of its development in a reasonable, fair, sustainable, harmonious as the basic value idea, to resource sharing, shared responsibility, development and win-win for the construction of ecological civilization of grassland basic mode. In this process, we must strengthen the different departments within the administrative region of the regional cooperation and build a win-win situation, emphasizing the administrative regional construction, symbiosis, sharing, win-win situation. The core obstacle in the process of sharing the ecological civilization across the grassland is the interest barrier, especially the interests among the local governments. If the interests of the regions cannot be effectively coordinated, it will cause great obstacles to the process of sharing the ecological civilization across the region and make it difficult to effectively carry out. The conflict of interests that the government faces will affect its decision-making and execution in the process of sharing ecological civilization, which leads to the difficulty of sharing the ecological civilization of the grassland across the region. Only by creating a community of interests, improve the cooperation between local governments, to mobilize the enthusiasm of the local government in the process of cross regional grassland ecological civilization sharing, coordinate the behavior of local government, to promote its development planning and use of resources, protecting the ecological environment of grassland, grassland construction and ecological civilization, so it is of great significance to study.

Interests Contradiction Performance between the Government in the cross-regional Grassland Ecological Civilization Sharing

The Disorder Contention of Grassland Resource

In the construction and sharing of cross regional grassland ecological civilization, the interests competition among different local governments is mainly reflected in the level of grassland resource contention. Different local government representatives of different interest groups, each local government are competing for more grassland resources on their own interest. Therefore, if each other cannot form an effective mechanism for communication and coordination of interests, it will cause interests barrier on the inter-regional grassland ecology civilization sharing constitutes. In the process of sharing ecological civilization in grassland regions across the region, the consequences of competition and game of grass resources between local governments are the frequent environmental disputes in border grasslands and the failure of governance of cross-border
environmental affairs. On May 20, 2016, the pasture disputes that plagued the village of Ulasst in Xinjiang for years were eventually resolved satisfactorily. Both Ulaster and Dantra owned the pasture certificate of the village's natural grassland. As the times change, villagers have not agreed on the right to use the grasslands, resulting in the intensification of conflicts and the settlement after consultation. Due to historical and man-made factors, the grassland boundary has not been uniformly divided over a long period of time. In the administrative areas where the grassland is not clearly defined, the grassland certificate of use was issued and cross-certification between administrative regions appeared. Herdsmen choose to settle in the vague boundary of the grassland, which further aggravates the difficulty of management. For the sake of their own interests in the administrative region, all stakeholders are reluctant to make any concession and have unlimited use of resources, which eventually leads to the development of the entire ecosystem destroy and hard to repair.

**Negative Externality of Grassland Resources Utilization**

In the course of co-construction and sharing of ecological civilization in the grass-roots steppe, a local government building an ecological civilization vigorously will have an external economic effect. When local government officials fully weigh the investment and benefits of the region in ecological civilization construction, the local government will choose to reduce invest and transfer as far as possible the problems that need to be solved in this region to manpower, material and financial resources to other regions. Under the fierce horizontal competition of local governments and the imperfect improvement of the ecological environment in grassland regions in the trans-administrative regions, local governments as "economic agents" tend to show the tendency of opportunism to externalize the environmental costs of their own administrative regions. This tendency is usually manifested in circumventing environmental laws and regulations and lowering environmental standards, hindering the enforcement of environmental protection departments and protecting local polluting enterprises. According to the survey, 1074 enterprises in Inner Mongolia have not gone through the grassland administrative departments to review the illegal occupation of prairie land in recent years, most of which have not been effectively investigated and dealt with. There are 396 enterprises involved in expropriation and occupation of grasslands in Qinghai Province, covering 22441 hectares of grassland and only 121 of them have handled the examination and approval procedures for grassland. Most of these enterprises are government investment projects. Since 2011, 510 cases of illegal expropriation of grasslands have been investigated and dealt with in Gansu Province. Most of these cases involve key construction projects and investment projects of local governments, and no grassland sign has been carried out in accordance with the law occupation approval. In 2015, at the joint meeting of grassroots law enforcement of seven provinces and autonomous regions, the grassroots supervision departments of various provinces reflected the fact that some local governments not only illegally committed to reduce or exempt grassland vegetation restoration fees, but also even allowed enterprises to indulge the acts of sabotage on grasslands. When the grassland supervision departments investigated and dealt with illegal grassland cases, local leaders interfere with each other and obstruct law enforcement. Many grassroots supervision agencies at county level find it hard to carry out their work in accordance with the law in the case of expropriation and occupation of grasslands.

**Game Analysis on Intergovernmental Interests in Ecology Civilization Sharing across Regional Grasslands**

The construction of cross-regional grassroots ecological civilization sharing mechanism is based on building a community of mutually beneficial cooperation between regions. Therefore, the game matrix of the inter-regional governments involved is a mutually beneficial matrix. This type of interaction generally takes place in regions with common interests In such cases, such exchanges are often easier to form. Even if the other side is not cooperative, the benefits of one-side cooperation are still more than the benefits of non-cooperation. If one side chooses to protect the grassland ecology, the other side will not cooperate with it and will not choose to protect it.
However, at this time, the income of the protection side will still be greater than that of the unprotected party. Of course, if both sides choose to protect, the good grassland ecology brings greater economic benefits to the two places, at this time, cooperation is dominant equilibrium solution.

As the economic and rational man, local governments all follow the dominant strategy during the game. That is the government B (A) chooses the best strategy no matter what the government A (B) adopts. Local government A and B are the main body of rational behavior, the total investment for the promotion of grassland ecological civilization process, to a certain extent, also promoted the development of the region's economy. If the local government only mines without protection, it will eventually lead to tragedy of the commons. Assuming that a conducts uncontrolled development and utilization activities, government A will benefit and B will be impaired. Government A's grass-roots ecological civilization construction activities can benefit both parties. Use P to indicate grassland ecological civilization construction activities, representing positive externalities; N represents uncontrolled mining activities, representing negative externalities.

Assume that the Return Functions of the Investments of Government A and Government B Take the Following Forms Respectively:

\[ U_A = (P_A + \gamma P_B)^\alpha (N_A - \varphi N_B)^\beta \quad U_B = (P_A + \gamma P_B)^\alpha (N_B - \varphi N_A)^\beta \]

\[ 0 < \alpha, \beta, \gamma, \varphi < 1, \alpha + \beta < 1. \]

Assume that the total investment budget of government A and government B is H. The positive externality parameter that A (B) conducts for positive externalities to B (A) is denoted by \( \gamma \), and the greater its value, the greater the positive externalities brought by the government in investing in grassland ecological civilization. The negative externalities caused by A (B) give A (B) the negative extrinsic parameters, which are indicated by \( \varphi \). The larger the value, the more negative externality brought by the government's investment in resource extraction.

Government A and Government B Do Not Cooperate

When local governments maximize their own interests as rational subjects, the decision of the government A can be expressed as:

\[ \max U_A = (P_A + \gamma P_B)^\alpha (N_A - \varphi N_B)^\beta \]

subject to:

\[ P_A \geq 0 \]

\[ N_A \geq 0 \]

\[ P_A + N_A \leq H \]

(2)

Government B's decision-making can be expressed as:

\[ \max U_B = (P_A + \gamma P_B)^\alpha (N_B - \varphi N_A)^\beta \]

subject to:

\[ P_B \geq 0 \]

\[ N_B \geq 0 \]

\[ P_B + N_B \leq H \]

(3)

From the first-order conditions, the response functions of local government A and local government B are:

\[ P_A = \frac{\alpha - \alpha \varphi}{\alpha + \beta} H + \frac{\alpha \varphi - \beta \gamma}{\alpha + \beta} P_B \]

\[ P_B = \frac{\alpha - \alpha \varphi}{\alpha + \beta} H + \frac{\alpha \varphi - \beta \gamma}{\alpha + \beta} P_A \]

(4)
It is available  
\[ P_A^* = P_B^* = \frac{\alpha - \alpha \varphi}{\beta + \beta \gamma + \alpha - \alpha \varphi} H \]  
(5)

The equilibrium income of government A and government B can be substituted:
\[ U_A^* = U_B^* = \left[ \frac{\alpha - \alpha \varphi}{\beta + \beta \gamma + \alpha - \alpha \varphi} H (1 + \gamma) \right]^{\alpha} \left[ \frac{\beta - \beta \varphi}{\beta + \beta \gamma + \alpha - \alpha \varphi} H (1 - \varphi) \right]^{\beta} \]
(6)

**Government A and government B cooperation**

In order to maximize the total return of all regions and achieve the optimal Pareto goal, it is:
\[ \max U_{AB} = U_A + U_B \]

Subject to:
\[ \begin{align*}
P_A + N_A &= H \\
P_B + N_B &= H \\
P_A, N_A &\geq 0 \\
P_A, N_A &\geq 0
\end{align*} \]
(7)

Since government A and government B cooperate, there is no positive or negative externalities in the whole region, so \( \gamma = 0 \) and \( \psi = 0 \), to solving the optimization problem, we get:
\[ P_A^* = P_B^* = \frac{\alpha}{\alpha + \beta} H \]

Substitution:
\[ U_A^* = U_B^* = \left[ \frac{\alpha}{\alpha + \beta} H \right]^{\alpha + \beta} \]
(8)

The economic implication of formula (8) is that when the relative importance of the construction of ecological civilization in grasslands increases (\( \gamma = 0, \psi = 0 \)) under the premise of local government cooperation, the investment in grassland ecological civilization construction by local governments will increase, However, the investment N in resource development will be reduced accordingly. In general, the higher the level of economic development in the region will pay more attention to ecological construction, thereby increasing investment in ecological construction, which is conducive to achieving ecological construction and sustainable development of regional economy; and underdeveloped areas pay more attention to development issues economically. Thus putting a large amount of budget into the economic development and bringing about ecological destruction while promoting economic development. In formulas (2) and (3), when the input of grassland ecological construction has greater positive externalities (MaxU_a<MaxU_b or MaxU_a>MaxU), the input P of grassland eco-construction by local governments will decrease, resulting in under-investment. That is, all local governments have the tendency of "free riding" and hope to obtain the environmental protection benefits of other local governments free of charge.

The meaning of (6) is that the input of economic development of local governments will increase with the relative importance of economic development (\( \psi \) increases), and the input of grassland eco-civilization construction will decrease correspondingly. This means that in the process of formulating regional development policies, when local governments set their economic development goals as the dominant factor, they will ignore ecological construction and indulge ecological destruction and environmental pollution for economic development. When the negative externalities of economic development increase, the input of grassland ecological construction will also decrease. That is, the local government takes the economic strategy of giving priority to development. Because of the negative externalities of economic development, it inevitably brings loss of income to another local government. The local government will also increase investment in economic development. Therefore, as a whole, an increase in investment in economic development will divest investment in grassland ecological construction and eventually bring about the loss of the total social benefits.

Local governments A and B perform equal game without cooperation. The equilibrium result
under Nash equilibrium is (negative external behavior, negative external behavior). Based on individual rationality, local governments A and B make their own interests to maximize will result in the lack of positive externality and negative externality, and the proportion of positive externality will be less than that in cooperative decision-making under the condition of non-cooperation, which further shows that the competition and game between local governments consequences often result in the failure of co-construction and sharing of resources across regions.

Local governments A and B play the equal game under cooperation. The equilibrium result under Nash equilibrium is (positive externality, positive externality). Based on individual rationality, local governments A and B make their own interests according to their own interests decisions will lead to excessive excesses of positive externality. This shows that the allocation of resources can reach the Pareto optimality and achieve the greatest social welfare under the overall rational control. Therefore, inter-regional governments should actively seek cooperation, standardize competition among governments, strive to achieve the sharing of resources and interests, The best model of shared responsibility.

The Conclusions and Recommendations
This paper analyzes the contradictions of interests among the local governments in different regions of the grassland and expounds the related game behaviors of their choice of actions and their consequences under cooperation and non-cooperation. It can be seen from the analysis that based on the inconsistency of the goals of local government interests, their behavior choices are different, but local governments can realize their maximum benefits only through cooperation. In the course of sharing the ecological civilization of grass-roots steppe in different regions, different government stakeholders are often restricted by various factors during the course of the game, which limits the cooperation of co-construction and sharing matters across administrative regions and is not conducive to the construction of ecological civilization in cross-region grasslands relevant administrative regions of coordinated development. At present, the issue of the construction of ecological civilization in grasslands is becoming increasingly prominent. It not only requires local governments to strengthen their own rationality, enhance mutual understanding and trust through exchanges and communication, and change the individual rationality to collective rationality. It also requires the superior government and local governments to issue effective measures will restrain and guide the behavior of the main players in the game, promote the cooperation of ecological affairs in the grassland between different regions, dilute the interest subjectivity of local governments and the community of interests, actively build a platform for the cooperation of local governments and establish voluntary cooperation in the construction of grassland ecological civilization Long-term mechanism, in order to achieve the unity of local interests and regional interests, economic growth and ecological goals and the sustainable development of society as a whole.

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References