

Article

Game Behavior Analysis between the Local Government and Land-Lost Peasants in the Urbanization Process

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Abstract: China is entering a period of rapid urban development. With the rapid expansion of cities, a large number of peasants have lost their land as a result. Given the development of urbanization, safeguarding the rights and interests of land-lost peasants in the process of urbanization has become a new topic of interest in China. In this study, based on game theory, we analyze the interests of the local government and land-lost peasants in several rounds of the citizenization process. The result demonstrated the following: (1) this paper proposed that overall interest declines in the entire game, in which the peasant can obtain a greater share of benefits from bargaining with the local government; (2) However, a long bargaining process would lead to the diminishment of peasants' rights and benefits. In contrast, the local government would obtain greater share of benefits than the peasant and would obtain fewer benefits than at the beginning of the process. Therefore, both sides expect to end the game process early; (3) Under the "rational economic man" process, this process will always tend to be one in which one party struggles while the other compromises. Therefore, in the game, the game process will not reach a game equilibrium state and both sides will be at a stalemate; (4) The local government, as the power owner, is expected to surrender its interests as the "rational economic man" for the Pareto optimality; (5) Finally, we proposed policy recommendations for the sustainability of citizenization. Increasing the public service benefits, establishing the system of subsistence allowances and raising the minimum living allowance of citizenization, improving the training and employment service system for the peasant can improve land-lost peasants' acceptance in the game.

Keywords: sustainable way of citizenization; game; benefits; land-lost peasants; local government; China

1. Introduction

With rapid economic development and population growth, urbanization is taking place at an unprecedented pace around the world, especially in developing countries such as China [1]. China has been experiencing urbanization at an unprecedented rate since the implementation of economic reforms in 1978 [2]. The urbanization rates were 17.9% in 1978, 30% in 1995, 36% in 2000, and 56.1% in 2015 [3,4]. It increased by approximately 1% annually over this period. The Chinese urban population ratio exceeded 50% for the first time in 2011 [5]. Urbanization in China is being pushed by industrialization and rapid economic development [6,7]. Fredmann proposed that the urbanization of China is an endogenous process [8]. Ma proposed that the household registration and land system

are the most fundamental driving forces of urbanization in China [9]. With the rapid growth of the economy, industrial development and the reform of the household registration system, the pace of urbanization in China will further increase.

As a result of rapid urbanization, China is experiencing a drastic loss of arable land [10–12]. One of the important reasons for this development is that urban land is highly correlated with arable land in spatial distribution [13]. Based on the growth rate and massive demand for construction in the urbanization process in China, the number of peasants whose land will be expropriated is predicted to increase to 42 million by 2020 and the total number is expected to exceed 100 million by 2030 [14]. Rural and urban development in China is experiencing a transition from both societal and economic perspective [15,16]. Farmland conversion has attracted great a significant amount of attention from researchers. Arrow emphasizes that the farmland's conversion mechanism and demonstrates that the overall interests of the land requisition system should be identified and determined by the government [17]. Models that are used to test whether to develop agricultural land were built [17–19].

Land-lost peasants' issues, such as non-agricultural employment and the transition of the social structure of rural areas, have become the research themes for urbanization. Nevertheless, the majority of studies focus on the three main aspects of such problems. Firstly, the integrity studies of peasants' urbanization which includes the present situation, urban adaptability [20], spatial perception [21], life space remodeling [22], self-identity [23], and restricting factors of citizenization in China and the policy discussion [24–27]. Wenjun Ru summarizes six factors, including demographic factors, ideological concept, behavior, social rights, quality of life, and social participation influencing peasants' citizenization [26]. Zuopei Jiang noted that barriers related to cognition, the government, institutions, information, and peasants' quality of life are the main obstacles of peasants' citizenization. Second is the countermeasure research on citizenization [28–31]. Scholars have conducted research from the perspectives of legal protection, system guarantees, government services, and citizen consciousness. Minjie Cao believes that the law's positive role of protecting legal rights for vulnerable groups should be given full exposure. Therefore, the legal system for citizenization should be improved [29]. Tan Bin believes that the government should accelerate the reform of the household registration system, reject the various interest distinctions attached to the household registration system and discard the identification of the agricultural and non-agricultural individuals completely [30]. Yugang Lou believes that the key to preserving the basic life safeguards of land-lost peasants is to perfect the social security system by setting up the formal and informal pension arrangements [31]. The third aspect is the relationship between peasants and the government in the process of citizenization. This research based on cost-benefit theories and the game model draws the conclusion that the government should adopt a positive policy to reduce the costs of citizenization [32–34]. Liang Wei divided the cost of citizenization into four categories: the economic cost, psychological cost, affection cost and risk cost in which economic cost is the most critical factor of whether peasants stay in city [35]. Significant progress has been made in deepening the understanding the dilemma of landless peasants. Traditional peasants used to make a living from the land. However, a social security system covering all citizens has not yet been established in rural China [36]. Most of the land-based value-added benefits derived from the process of land conversion are taken away by the government [37]. Land-lost peasants comprise a social group that bears the largest loss in this land conversion process [36]. Therefore, the unreasonable land property rights system in China has significantly reduced the land use rights of these peasants. Rong Tan revealed that the current policy of increasing urban land conveyance through competitive mechanisms cannot protect land-lost peasants better [38]. Peasants become vulnerable to poverty because they, themselves, bear a significant proportion of the transaction costs of urban expansion [39]. Daping Shi recognized that land expropriation causes income reduction and the loss of livelihood and security [40]. Furthermore, the compensation for peasants only accounts for a small share of huge land profit from farmland conversion. Social concerns are absorbed into the issues of social tension and social justice [41], social exclusion [42], the social security of landless peasants [43,44], and so on, all of which may pose a long-term threat to stable and sustainable development. An important solution is

proposed to protect peasants' income rights of farmland conversion by clarifying land property rights and promoting land market growth in rural areas [45–47].

The Premier of China Keqiang Li noted that it is important to further promote a new type of people-centered urbanization and help 100 million rural migrants obtain residency status in cities and towns [48]. Meanwhile, one officer from the national development and reform commission in China said that the new urbanization emphasis concerns the urbanization of individual rights [49]. The four types of rights include economic, cultural, social, and political rights. Becoming city residents is the implementation of the four rights.

Some of the most important topics for promoting the development of modern agriculture and maintaining rural harmonious stability in the question of how to safeguard legitimate rights and the interests of peasants effectively and the question of how to resolve the survival and development problem of peasants after citizenization. The current research lacks the adequate microeconomic foundation and sufficient studies on individuals' behavior at the micro level. Therefore, this paper initiates research based on a game analysis between the government and peasants. The behaviors in their decisions are also discussed in this paper. The Nash equilibrium model analysis method was employed to reinforce the effectiveness analysis to complete the citizenization of land-lost peasants as quickly as possible.

2. Interest Game Analysis between the Local Government and Peasant

Game theory can first be traced back to the work of Von Neumann [50] and was developed by Nash in 1950 [51]. Since then, game theory has been used in different fields, such as politics [52], economics, and biology [53]. Game theory is used to analyze strategic interactions which are related to decision-makers' interactions in one game [54,55]. The action performed during interactions is called the "strategy". Strategy includes an individual's actions, how and why individuals make decisions, etc.

Under the premise of "rational economic man", all players of the game can develop the action strategy of demanding their own interests:

$$s^* = (s_1^*, s_2^*, \dots, s_n^*) \quad (1)$$

The strategy will be the Nash equilibrium if the benefit in i is larger than at any other point:

$$E_i \geq E_j \quad (2)$$

The Nash equilibrium satisfies the following conditions:

$$\frac{dE_i}{d\varepsilon} = 0; \quad \frac{dE_i}{d\theta} = 0; \quad (3)$$

θ, ε present the variables; $i = 1, 2, \dots, n$

This strategy is called the Pareto optimality principle [56,57]. Chankong noted that by maximizing the following weighted sum of the players' payoff functions, the Pareto optimum solutions can be obtained [57]:

$$Z(s) = \sum_{i=1}^n w_i E_i \quad (4)$$

w_i presents the weights. In this study w_i is the opportunity for one event to happen.

Local governments have a collection of economic, political, and moral interests. Local officials also have their own political and economic interests, which are mainly shown below: the government always hopes to be able to complete the citizenization of land-lost peasants quickly, at a large scale, and at the lowest-cost possible. Land-lost peasants, as individuals with limited rational economic options, tend to pursue the maximization of self-interest and strive for more benefits as much as possible by various means. In the meantime, they consider the likely "loss" of their own vested interests if they

take action. The citizenization of land-lost peasants actually includes changes of status, living space transformation, rights and production method. Given these changes, peasants always wish to fight for these rights as much as possible in the process of citizenization due to their lack of survival skills. Local governments are keen to complete the transformation at the lowest cost due to demands of political and economic interests.

2.1. Hypothesis

To establish a reasonable game model, the following assumptions are needed.

(1) Although there are many game relationships in this game, including land-lost peasants, developers, peasants' collective economic organizations, the local government, and the central government, the conflict between local government and land-lost peasants is the main conflict in the process of urbanization. Therefore, the main body involved in the game includes the local government and land-lost peasants. Under the condition of a given linear constraint, the local government and land-lost peasants are in conformity with the assumption of the "rational economic man" hypothesis. This means that the individual's optimal choice is the function of others choices [58].

(2) The information and power between the local government and land-lost peasants are asymmetric. The local government is not only the owner of the power, but also controls the power monopoly. This means that the local government can use this power to collect considerable information that would be helpful for formulating and implementing policy measures to meet the needs of its own interests. The peasant, as the significantly weaker group compared to the local government in terms of gathering and processing information, is in a passive position. When competing with the local government, the peasant is helpless and is forced to be altruistic.

(3) Once the peasant resists successfully, the local government would suffer a loss in response to the peasant's struggle strategy. This loss includes hindering the development of the local government's willingness and delaying the implementation of policies.

2.2. The Establishment of the Bargaining Game Model between the Local Government and Land-Lost Peasants

On the premise of the "rational economic man" hypothesis, the local government and the peasant are engaged in a finitely repeated game in which more sub-game sets are contained. Every expansion of the sub-game is repeated to eliminate the dominating strategy in the last phase of expansion. Regardless of the type of the citizenization scheme the local government enacts, the peasant has two choices: accept or resist. The bargaining game model between the local government and land-lost peasants is shown in Figure 1 below.

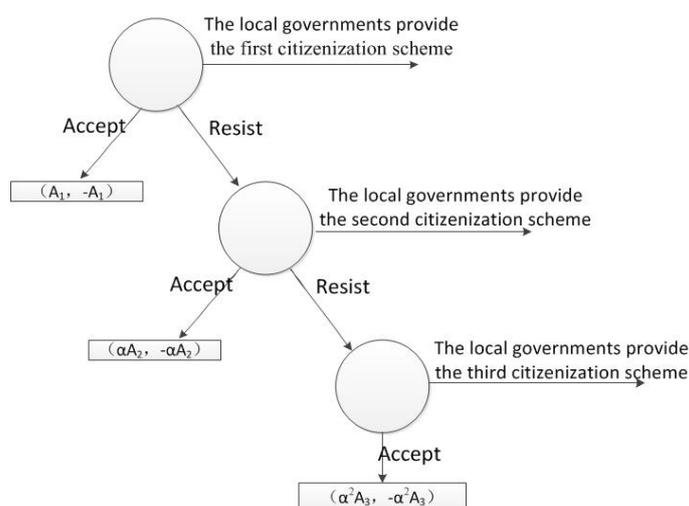


Figure 1. The bargaining game model between the local government and land-lost peasants.

Suppose that the game is divided into three phases. α ($0 < \alpha < 1$), as the time-consumption coefficient, refers to the discount loss in the bargaining process due to the time delay and negotiation costs. A_1, A_2, A_3 refer, respectively, to the citizenization scheme in the three phases that the government provides for the peasant. In the process of the land-lost peasant citizenization, both the local government and peasants are pursuing their own interests. In the first phase of bargaining, the local government proposes a scheme for the peasant. The peasant has two choices: accept and resist. The government will propose another scheme if the peasant does not accept the first scheme. The peasant again decides whether to accept the proposal again. In the process cycle, as long as peasants receive the citizenization schemes proposed by the government, the game ends. In the process of presenting citizenization schemes, the game lasts several rounds so that the time cost discounts both interests.

Assuming that the interest sum of the local government and peasants is 1, S_1, S_2, S_3 refer, respectively, to the citizenization price proposed by the government in every phase. Thus, the interests of the government income would be $1 - S_1, 1 - S_2$, and $1 - S_3$, respectively. The game between the local government and the peasant belongs to the limited perfect information game. Therefore, the backwards induction method is used to solve the sub-game refining Nash equilibrium. The solving process is essentially the extended game expansion when eliminating the dominant strategy, which means that since the dominant strategy in each sub-game is rejected from the final decision, the final survival strategy makes up the refining Nash equilibrium. The joint knowledge of both parts is still that "all participants are rational".

In the third round of the game, the government offers a price according to the maximize interests which the peasant must accept. Thus, in the third round, the local government and peasants benefit $\alpha^2 S_3$ and $\alpha^2(1 - S_3)$, respectively. From the third round back to the second round, the peasant gains $\alpha^2(1 - S_3)$ once the game enters the third round. Therefore, in the second round, the condition that both the local government and the peasant can accept is that the local government's gain $\alpha S_2 = \alpha^2 S_3$ and the peasant gains $\alpha(1 - \alpha S_3)$. Since $0 < \alpha < 1$, the peasant's benefit in the second round $\alpha(1 - \alpha S_3)$ is larger than the benefit $\alpha^2(1 - S_3)$ in the third round. Therefore, the peasant gains a greater share of benefits in the second round.

If the game moves back to the first round, assuming that the local government knows that its benefit is $\alpha^2 S_3$ and that the peasant would be content to obtain $\alpha(1 - \alpha S_3)$ in the third round, the local government would provide the peasant $\alpha(1 - \alpha S_3)$ and gain $1 - \alpha(1 - \alpha S_3)$. In this way, the interests of both sides would depend on the size of the $\alpha(1 - \alpha S_3)$. The greater the $\alpha(1 - \alpha S_3)$, the less the local government gains and the more the peasant gains.

$\alpha = 1/(2S_3)$ is the critical value. When $\alpha = 1/(2S_3)$, $\alpha(1 - \alpha S_3)$ has a maximum value. When $0 < \alpha < 1/(2S_3)$, the greater the value " α " is, the greater the value $\alpha(1 - \alpha S_3)$ is. When $1/(2S_3) < \alpha < 1$, the greater the value " α " is, the smaller the value of $\alpha(1 - \alpha S_3)$ is. When $\alpha = 0$ or $\alpha = 1$, $\alpha(1 - \alpha S_3)$ has the minimum value. All in all, when $0 < \alpha < 1/(2S_3)$, the greater the value α is, the less the government gains and, the more the peasant gains. When $1/(2S_3) < \alpha < 1$, the greater the value α is, the less the peasant gains and, the more the government gains. When the negotiation covers a long time (which means $\alpha = 1$) and the peasant fails to gain any benefits (means $\alpha = 0$), the peasant gains the minimum benefit 0 and the government retains all of the benefits.

(1) Through the game analysis of all rounds, the peasant can obtain larger gains by bargaining with the government. This is because, in the early stage of the game, the peasant holds the initiative. If the peasant accepts the citizenization scheme proposed by the government, the citizenization succeeds. If the peasant does not accept the citizenization scheme, the government will propose a higher scheme in the first few rounds.

(2) However, in the long term, longer negotiations damage the peasant's rights and interests. This is because, in the anaphase of the negotiation, the peasant's initiative is gradually weakened and the government has more initiative. The government will take compulsory measures if the peasant insists on resisting.

There are two reasons for probing into the cause of the damaged rights and interests of peasants. First, there is information asymmetry between the government and peasants which leads to their behavioral decision asymmetry. The local government occupies an absolute amount of information and power which eventually leads to the damage of land-lost peasants' rights and interests. Second, compared with the local government, land-lost peasants have a lower educational level and organizational degree such that few organizations in rural China can safeguard their interests, leading to the weaker position in the negotiation and the inability to safeguard their legitimate rights effectively.

(3) The long bargain seems to make the local government gain the relatively high-benefit in the game. However, the local government gains the absolute low-benefit. This is because a long bargain will make the local government lose benefits, such as the administrative achievement of economic growth. This means that the local government is willing to yield more benefits within a certain limit to the peasant in the hopes of an early end to the negotiations.

(4) Due to the time-consumption coefficient, the interest sum of both sides is decreasing. The interest sum of the peasant and the local government is decreasing in the three round games. In the third round of the game, the interest sum of the peasant and the local government is reduced to $1 - (1 - \alpha) \alpha$. Therefore, in the citizenization game, the overall interests are essentially declining.

3. Analysis of the Static Game Model between the Local Government and Land-Lost Peasants

Through the analysis above, the local government hopes that the game ends quickly to reduce the loss produced by the game in the process of the citizenization. The game enters into a new stage as long as the negotiation enters into a new stage. So, when does the game reach the balanced stage?

The transformation from peasants to citizen is a complicated process. This is not only the change of the peasant's household registration system and the residential area, but also the life synchronization with the citizens [59]. The transformation of citizenization includes another following several aspects: the first one is the change of the production mode, which shifts from simple agricultural production activities to non-agricultural industries [60]; the second is the living space transformation which shifts from the countryside to the city [61]; and the third is the transformation of culture, ideology, and lifestyle [62,63]. Therefore, the citizenization of land-lost peasants should include the following meanings: regional citizenization; production skill citizenization; thought citizenization; identity citizenization.

3.1. Establishing the Dual Game Matrix

In this article, the game between the local government and peasants includes four parts of sub-games: the working probability when the peasants transforming to city dweller, the increase of the consumption coefficient that accompanies the transition of the living space, the difference of public services behind the identity transformation, and the land expropriation compensation brought about by the urbanization of the rural land. The dual game matrix is built as shown in Table 1.

Table 1. The dual game matrix between the local government and peasants.

		The Local Government	
		Resist (G_1)	Accept (G_2)
Peasants	Resist (P_1)	$m - F_1, B - m - G_1$	$M + I - F_2, B - m - G_2 - I$
	Accept (P_2)	$m, B - m$	$M + (1 - r)L + T - C, B - m - (1 - r)L - T$

The variables are described as follows: m refers to the land expropriation compensation in the form of a one-time monetary payment that the local government pays for the peasant. B refers to the benefit the local government gains in the process of citizenization. F_1 and F_2 refer to the cost if the peasant uses the resistance strategy. G_1 and G_2 refer to the cost of the government response to the peasant's resistance strategy. r refers to the employment probability of the peasant after citizenization. T refers to the other conditions the local government provides for the peasant. L refers to the unemployment security benefits after citizenization. I refers to the improved compensation after the peasant resists. C refers to the increased consumption after citizenization which includes the consumption expenditure and housing expenditure

3.2. Instructions for Building the Game Model

The instructions for building the game model between the local government and peasants are:

(1) When $(P_1, G_1) = (m - F_1, B - m - G_1)$, the peasant is not satisfied with the citizenization scheme so they choose to resist; the negotiation between the local government and peasants failed and the local government also resists. As a result, the peasant is forced to citizenization without any further compensation, except for the land expropriation compensation. Since the peasant resists citizenization, they pay the extra cost F_1 for resisting. The local government pays the land expropriation compensation and the cost G_1 to respond to the peasant's struggle strategy.

(2) When $(P_1, G_2) = (m + I - F_2, B - m - G_2 - I)$, the peasant accepts the struggle strategy due to the unsatisfied scheme and pays the extra struggle cost of F_2 . Finally, the local government compromises and improves I for the amount of compensation. As the resistance in this situation is less than the situation above, the conclusion can be searched in which $F_2 < F_1, G_2 < G_1$.

(3) When $(P_2, G_1) = (m, B - m)$, at the start of the land expropriation, the peasant accepts citizenization. The peasant can only gain the land expropriation compensation at this moment. Only the transition of the living space is completed, and the local government gains $B - m$.

(4) When $(P_2, G_2) = (m + (1 - r)L + T - C, B - m - (1 - r)L - T)$, the local government proposes extra benefits for the peasant, such as unemployment security and social insurance, to ensure the smooth progress of citizenization. In this situation, the peasant gains $m + (1 - r)L + T - C$ and the local government gains $B - m - (1 - r)L - T$.

3.3. Stability Analysis of the Equilibrium Point

The hybrid strategy of the peasant is $\sigma_L = (\varepsilon, 1 - \varepsilon)$ which means that the peasant has the probability ε of resisting and the probability $1 - \varepsilon$ of accepting. The hybrid strategy of the local government is $\sigma_G = (\theta, 1 - \theta)$, which means that the local government has the probability θ to resist and has the probability $1 - \theta$ to accept.

The average benefit for peasants to adopt struggle strategies is as follows:

$$E_{P_f} = \theta[m - F_1] + (1 - \theta)(m + I - F_2) \quad (5)$$

The average benefit for peasants to adopt accepting strategies is as follows:

$$E_{P_c} = \theta[m] + (1 - \theta)(m + (1 - r)L + T - C) \quad (6)$$

The total average benefit of the peasant is:

$$E_P = \varepsilon E_{P_f} + (1 - \varepsilon) E_{P_c} \quad (7)$$

The core of analyzing the limited rational game is the dynamic change speed of the game strategy type. The dynamic differential equation (which is the replicated dynamic equation of the strategy) is used to show the dynamic change speed of the peasant who chooses the "struggle" strategy as shown below.

$$F(\varepsilon) = d\varepsilon/dt = \varepsilon(E_{P_f} - E_P) = \varepsilon(1 - \varepsilon)[E_{P_f} - E_{P_c}] = \varepsilon(1 - \varepsilon)[I + C - F_2 - (1 - r)L - T + \theta(F_2 - F_1 + (1 - r)L + T - I - C)] \quad (8)$$

Similarly, the average benefit for the local government to adopt struggle strategies is as follow:

$$E_{G_f} = \varepsilon[B - m - G_1] + (1 - \varepsilon)(B - m) \quad (9)$$

The average benefit for the local government to adopt accepting strategies is as follow:

$$E_{Gc} = \varepsilon[B - m - G_2 - I] + (1 - \varepsilon)[B - m - (1 - r)L - T] \quad (10)$$

The total average benefit for the local government is:

$$E_G = \theta E_{Gf} + (1 - \theta)E_{Gc} \quad (11)$$

The dynamic differential equation (which is the replicated dynamic equation of the strategy) is used to show the dynamic change speed of the peasant who chooses the “struggle” strategy as shown below:

$$F(\theta) = d\theta/dt = \theta(EGf - EG) = \theta(1 - \theta)[EGf - EGc] = \theta(1 - \theta)[(1 - r)L + T + \varepsilon(G_2 - G_1 + I - T - (1 - r)L)] \quad (12)$$

Equations (8) and (12) constitute the replicated dynamic equation between the local government and peasants. According to the definition of the equilibrium point in the differential equation qualitative theory: the point meeting the condition that $F^2(\varepsilon) + F^2(\theta) = 0$ is called the equilibrium point of the replication dynamic equations [50,64].

The steady state solutions of the replication dynamic equations can be found as follows [65]:

$E_1(0,0)$, $E_2(0,1)$, $E_3(1,1)$, $E_4(1,0)$, $E_5(\frac{(1-r)L+T}{T+(1-r)L+G_1-G_2-I}, \frac{F_2+(1-r)L+T-I-C}{F_2-F_1+(1-r)L+T-I-C})$, among which E_5 can be simplified as the available symbol $(\frac{W_1}{W_2}, \frac{R_1}{R_2})$. The Jacobi matrix and its local stability analysis testing are as follows:

$$J = \begin{bmatrix} (1 - 2\varepsilon)(R_2\theta - R_1) & R_2\varepsilon(1 - \varepsilon) \\ \theta(\theta - 1)W_1 & (2\theta - 1)(W_2\varepsilon - W_1) \end{bmatrix} \quad (13)$$

One can consult [66–68] for detailed knowledge of the J-Matrix method.

The determinant of the J matrix is:

$$\text{Det}J = \frac{\partial F(\varepsilon)}{\partial \varepsilon} \frac{\partial F(\theta)}{\partial \theta} - \frac{\partial F(\varepsilon)}{\partial \theta} \frac{\partial F(\theta)}{\partial \varepsilon} \quad (14)$$

The trace of matrix J is:

$$\text{Tr}J = \frac{\partial F(\varepsilon)}{\partial \varepsilon} + \frac{\partial F(\theta)}{\partial \theta} \quad (15)$$

According to the actual situation, the peasant’s benefit is $E(\text{resisting}, \text{accepting}) > E(\text{accepting}, \text{accepting}) > E(\text{accepting}, \text{resisting}) > E(\text{resisting}, \text{resisting})$, $m + I - F_2 > m + (1 - r)L + T - C > m > m - F_1$ which can be simplified to $I - F_2 > + (1 - r)L + T - C > 0 > -F_1$

The local government’s benefit $E(\text{accepting}, \text{resisting}) \geq E(\text{accepting}, \text{accepting}) \geq E(\text{resisting}, \text{accepting}) \geq E(\text{resisting}, \text{resisting})$, $B - m > B - m - (1 - r)L - T > B - m - G_2 - I > B - m - G_1$ which can be simplified to:

$$G_1 > G_2 + I > (1 - r)L + T \quad (16)$$

The determinant and trace value of matrix J at the five equilibrium points can be obtained according to the above equations. The results of the stability analysis are obtained as Table 2.

The Table 2 shows that the dynamic replication system has two local equilibrium points, $E_2(0,1)$ and $E_4(1,0)$, which are stable. Its corresponding strategy is (accepting, resisting) and (resisting, accepting), respectively. The two points E_1 and E_3 are unstable. The E_5 is the saddle point and the trace of the Jacobi matrix is zero such that the point cannot be a stable state in the system.

Table 2. Stability analysis of the equilibrium point.

Equilibrium Point	Determinant of Matrix J	Positive or Negative	Trace of Matrix J	Positive or Negative	Result
$E_1(0,0)$	$[(1-r)L + T] \times [I + C - F_2 - (1-r)L - T]$	+	$I + C - F_2$	+	Instable
$E_2(0,1)$	$F_1 \times [(1-r)L + T]$	+	$-F_1 - T - (1-r)L$	-	Stable
$E_3(1,1)$	$F_1(G_1 - G_2 - I)$	+	$F_1 + G_1 - G_2 - I$	+	Instable
$E_4(1,0)$	$(I + C - F_2 - (1-r)L - T)[(1-r)L + T](G_1 - G_2 - I)$	+	$F_2 + T + (1-r)L + G_2 - G_1 - C$	-	Stable
$E_5 \left(\frac{(1-r)L+T}{T+(1-r)L+G_1-G_2-I}, \frac{F_2+(1-r)L+T-I-C}{F_2-F_1+(1-r)L+T-I-C} \right)$	$\frac{F_1(1-r)L[F_2(1-r)L+T-I-C](G_1-G_2-I)}{[T+(1-r)L+G_1-G_2-I]^2[F_2-F_1+(1-r)L+T-I-C]}$		0		Saddle Point

3.4. The Interactive Evolution Process of the Game Strategy

When the local government provides greater conditions for the peasant this means that as T increases, the value of ε increases and the value of θ decreases in response. In the meantime, the corresponding dynamic change shows that E_5 moves to the bottom right and eventually converges with E_4 . If the unemployment security L that the local government provides increases, the value of ε would increase and the value of θ would decrease in response. The corresponding dynamic change shows that E_5 moves to the bottom right and eventually converges with E_4 . If the consumption C increases, the value of ε would decrease and the value of θ would increase in response. The corresponding dynamic change shows that E_5 moves to the right and eventually converges with E_2 . If the employment probability r of the peasant after citizenization increases, the value of ε would increase and the value of θ would decrease in response. The corresponding dynamic change shows that E_5 moves to the bottom right and eventually converges with E_4 . If the improved compensation I increases after resistance, the value of ε would increase and the value of θ would decrease in response. The corresponding dynamic change shows that E_5 moves to the bottom right and eventually converges with E_4 . It can be observed that whatever parameters change, the dynamic equation always converges with E_2 or E_4 .

The dynamic change process of the game is as shown in Figure 2 below.

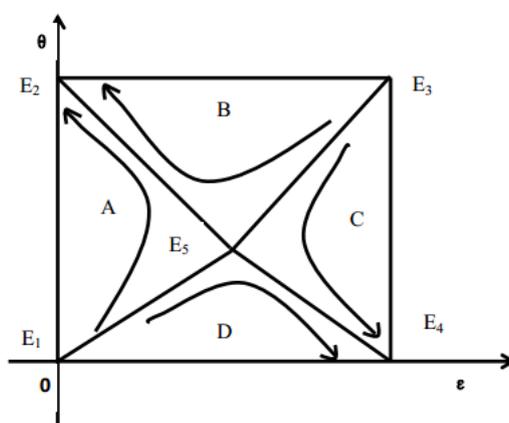


Figure 2. The interactive evolution process of the game strategy.

The picture describes the interactive evolution process of the game strategy. When the two sides of the game are located in the bottom right area of the line, all points converge to the evolutionary stable strategy $(1, 0)$. This means the game tends to be balanced when the peasant adopts the resisting strategy and the local government adopts the accepting strategy. When the two sides of the game are located in the left area of the line, all points would converge to the evolutionary stable strategy $(0, 1)$. This means the game tends to be balanced when the peasant adopts the accepting strategy and the local government adopts the resisting strategy. Therefore, there are two types of stability states in the process of citizenization—(accepting, resisting) and (resisting, accepting).

However, the evolutionary game converging to the two equilibrium points means that any side using the resisting strategy would add resistance to the citizenization process. As a result, both sides of the game would fall into the “prisoner’s dilemma”. In other words, the citizenization process did not achieve Pareto optimality. Therefore, both the two equilibrium results are not satisfactory.

It can be interpreted in the first situation that the local government would compromise to increase the peasant’s benefit due to pressure from the higher government and the pressure when the peasant adopts the resistance strategy. The peasant then realizes from the resisting instance that struggling can gain increased benefits. They intend to follow and adopt the “resisting” strategy. The local government intends to compromise and adopt the “accepting” strategy. This can also be interpreted as the second situation, in which the local government is occupying the dominant position and the peasant is occupying the disadvantaged position in the game. The peasant is at a disadvantage in

terms of legal knowledge and policy information. Moreover, the high struggling cost also prevents most peasants from resisting. As a result, a variety of adverse conditions prompt the peasant to accept the citizenization scheme passively at the beginning. The local government obtains the greater share of benefits.

Therefore, the best strategy choice for the peasant is to resist if the local government chooses to adopt the compromise strategy. When the peasant chooses to compromise, the best strategy choice for the local government is to resist. In the rational economic man strategy, adopting the resistance strategy is the optimal choice for realizing one's benefit optimization. Thus, the overall interests are minimized in the equilibrium state.

3.5. The Improving Measure

Therefore, in the game, the game process will not reach game equilibrium if the local government adheres to the "rational economic man" thought. Both sides will be at a stalemate. If the peasant's benefit can be increased when the peasant compromises, this means that the peasant's benefit $E(\text{accepting}, \text{accepting}) > E(\text{resisting}, \text{accepting})$, $m + (1 - r)L + T - C > m + I - F_2$, at that point in $E_1(0,0)$ the determinant of $J = [(1 - r)L + T] \times [I + C - F_2 - (1 - r)L - T] < 0$, $I + C - F_2 > 0$ (which is actually determined), then the point $E_1(0,0) = (\text{accepting}, \text{accepting})$ would be the stability point. The Pareto optimality appears in the citizenization process. The overall interests of both sides also appear to be maximized. This can be understood that both the local government and peasants more easily achieve equilibrium when the local government can pay more attention to the peasant's benefit. At this point, there is no additional struggling cost generated. The voluntary agreement must meet the following conditions: the compensation fees and measures that the local government provides must be sufficient to cope with various risks after citizenization.

Some measures can be enacted to reach the Pareto optimality:

(1) Increasing the public service benefits of citizenization can improve land-lost peasants' acceptance in the game. The citizenization can never be just the identity transformation from the rural resident to the urban resident. In fact, the core of the citizenization is to realize the citizenization. The peasant who completes the citizenization should enjoy the social security and public welfare benefits such as education, health care, and housing security in a city.

(2) Establishing the system of subsistence allowances and raising the minimum living allowance appropriately can also improve land-lost peasants' chance of acceptance. After the citizenization, the peasant lives in cities and towns, and many aspects such as the ideology, the character of the reemployment and the lifestyle would gradually approach that of the urban residents. The basic living cost will rise significantly. There is a large population of the older, sick, and unemployed individuals among the peasants after citizenization. A more comprehensive security system should be established for these disadvantaged groups.

(3) Improving the training and employment service system for the peasant can propel land-lost peasants to accept the proposal. The production mode changes significantly, and the peasant's re-employment ability is low. This demands that the local government carry out a specific job training plan and the integration services of training and employment for the peasant according to the market demand. All in all, the peasant's livelihood should be safeguarded.

4. Discussion

This article shows the citizenization as a game process between the local government and the peasant. The main purpose of this paper is to provide researchers with a background for reference when studying the citizenization. We understand that our approach represents a vantage point in the analysis of citizenization. We believe that our approach is of relevance (1) conceptually, because of our focus on the two main contradictions in the citizenization process; (2) methodologically, because our approach allows for the disentangling of the disequilibrium game state in the process of citizenization; and (3) practically, because we focus on finding a sustainable way toward citizenization and safeguard

the rights of the peasant through the analysis. However, the game result is biased, which is reflected in the fact that the interest of the game is not fair but rather favors the peasant more.

In addition, it is clear that the various issues need to be discussed in the preceding analysis.

(1) Before the analysis of the game between the land-lost peasant and the local government in the process of urbanization, this paper makes three assumptions, and the three assumptions have certain restrictions on the game relationship discussed in this paper. Situations beyond the three assumptions have not been considered and need to be solidified in future research.

(2) This paper studies the game relationship between land-lost peasant and the local government in the process of urbanization. In fact, the local government and land-lost peasants are only the main conflict pair in the process of urbanization. The urbanization process also involves many aspects of interest, such as the central government, developers, and peasants' collective economic organizations. This adds another five types of game relationships, including the land-lost peasant and developers, land-lost peasant and peasants' collective economic organizations, the developers and the local government, peasants' collective economic organizations and local government, and local government and the central government. This paper does not analyze these games, which can be undertaken in future research.

5. Conclusions

The local government is the aggregation of economic, political, and moral components. Officials also have their own political and economic interests. The main performance shows that the local government always hopes to be able to complete the citizenization in a short period of time and in large numbers. The peasant, as a limited rational economic man, tends to pursue the maximization of self-interest and more benefits as much as possible by various means. The citizenization of the peasant actually contains production skill citizenization, thought citizenization, identity citizenization, and regional citizenization. Among these changes, the peasant is eager for these benefits due to the lack of survival skills. The local government, given the demand of political and economic interests, is keen to complete the citizenization at the lowest cost.

(1) The peasant can get obtain more benefits through bargaining with the local government in the process of citizenization in the first few rounds. In the early stage of the game, the peasant has the initiative. If the peasant accepts the citizenization scheme proposed by the government, the citizenization succeeds. If the peasant does not accept the citizenization scheme, the government will put forward an improved scheme in the first few rounds. However, in the long-term, the lasting negotiations would damage the peasant's rights and interests. Moreover, peasant's production development and quality of life will be limited. In the anaphase of the negotiation, the peasant's initiative is weakened significantly, and the government has greater initiative. The government will take compulsory measures if the peasant insists on resisting citizenization. The long bargain seems to make the local government gain the relative high-benefit in the game. However, the local government gains the absolute low-benefit since the long bargain will make the local government lose the most important benefits such as the administrative progress and economic growth. This means that the local government is willing to give more benefits to the peasant in the hopes of an early end to the negotiations.

(2) Therefore, in the game, the game process will not reach the game equilibrium state if the local government adheres to the "rational economic man" thought. The most important reason is that the local government occupies the absolute position of power. Both sides will be at a stalemate. In the pursuit of political and economic interests, local government is keen to complete citizenization at the lowest cost. The uneven interests of both sides form the disequilibrium game state.

(3) The research of this paper will guide and regulate the government's decision. This can be specifically expressed as follows: before the game, the local government can make a budget assessment to determine the bottom line and the price. Therefore, in the process of citizenization, the local government can give a stretch compensation for land-lost peasants to avoid a stalemate.

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