Strategies Analysis of MNCs' Technology Transfer Based on the Asymmetric Evolutionary Game

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Whether the MNCs transfer their technologies to Chinese enterprises has become a significant issue for China to implement catch-up strategies .This paper introduces the evolutionary game theory to the field of technology transfer, sets up the evolutionary game model according to the strategies of technology transfer in two types of MNCs that set up factories in China early or late, and analyzes the evolutionary stable strategy (ESS) of the two types of MNCs and the key factors that affect the ESS. It provides the useful revelation for China obtaining the advanced technologies from western MNCs.

INTRODUCTION

Will the MNCs transfer their advanced technologies to Chinese enterprises? And what types of MNCs are more likely to transfer their technologies to China-- the MNCs that have already set up to set up factories in China or those ready to do so? These problems have great significance to narrow technology gap between China and developed countries, and to carry out the strategies of technological leapfrogging and technological catch-up. Therefore, these problems have become the hot spot issues in Chinese industry community and academic circles. Many scholars have done relevant studies from different perspectives, such as Hu and Jefferson (2001), Chen Guohong and Zheng Shaolian (2000), Jiang Xiaojuan, Li Rui (2002) and so on. They used the empirical approach to analyze the influence of foreign investment on Chinese technological progress. Hu Longying (2000) and Yue Zhonggang (2005) separately used cooperative game and duopoly game theory to analyze the factors that affect MNCs transferring their technologies to the host countries. The behavior of technology transfer of the MNCs is not entirely rational, so the traditional game theory applied in this area inevitably has its limitations.

The evolutionary game theory takes gamers with limited rationality as the basis, studies the trend and stability of the proportion of specific strategies adopted by group member. It achieves great success in analyzing social institutional change, the trend of industry development, social customs and so on. In recent years, evolutionary game has been applied in studying Infection and Immunization Dynamics (Bulò&Bomze, 2011), the imitate behavior of electricity market producers (Daniele&Nicola, 2008), the environmental pollution control (Lu Fangyuan, 2007), the competitiveness of retail enterprises (Yao, Di &Ding, 2007), the reverse supply chain of manufacture (Wang Yuyan, 2008) and so on. This paper attempts to introduce evolutionary game theory to the field of technology transfer, sets up the mode of evolutionary game according to the strategies on the two types of MNCs (that have set up or ready to set up factories in China) to transfer their technologies to China, and analyzes the evolutionary stable strategy (ESS) of technology transfer in these two types of MNCs, and furthermore provides the revelation and theoretical basis for obtaining the advanced technologies from western MNCs.

THE THEORETICAL BASIS OF THE ASYMMETRIC EVOLUTIONARY GAME

The asymmetric evolutionary game is a theory that combines the classical game theory analysis with dynamic evolutionary procedure analysis. On the one hand, it uses the Bounded Rationality and learning ability replace the traditional game theory concerning the hypothesis of perfect rational subject to consistent with the reality. On the other hand, it uses a dynamic frame to analyze the system equilibrium and the process of achieving system equilibrium so as to describe the change and development of system more accurately.

The evolutionary game is the model of game theory concerning the interaction of behavior strategy and the iteration process. The basic principle of it is the survival of the fittest of the biological evolutionary theory. Each kind of individual participant can choose different behavior strategies, and then gains the Corresponding "reward" or "fitness". After some time's iteration, the adoption of a behavior strategy will lead to increasing or decreasing of its fitness, thereby making some kind of individual behavior's distribution evolutionary according to the principle of survival of the fittest.

The most essential concept of evolutionary game theory is "Evolutionary Stable strategy (ESS)", which applies extensively and gains the continuous improvement. The evolutionary stable strategy is that if an individual of the majority group choose it, small mutations group can't invade it. Or we can put it in another way, under the pressure of natural selection, mutations can either change the strategies and choose the evolutionary stable strategy, or log out and disappear in the process of evolution.

For K populations that game mutually, each population k ($k = 1$,..., K) has N strategies which are devoted by subscript $i = 1$, ..., N. Population K's Corresponding N dimensional vector set $S^k = \{x = (x_1, \ldots, x_N) : x_i \geq 0, \Sigma x_i = 1\}$. Any vector S^k with this form devotes any individual mixed strategies of population K, and vector S^k with this form devotes that the proportion of individual who adopts each strategy in population K. Therefore, k such N dimensional space's Cartesian product $S = S^1 \times \ldots \times S^K$, that is strategy set, is state space also.

The evolutionary game takes the fitness of individual in each population as payment to describe the game strategy, the individual fitness is the individual strategy and the function of current state. Fitness function is a mapping $f^k : S^k \times S \rightarrow R$, in which, $k = 1, \ldots, K$. It assumes this function to the linear function of the first variable(its strategy) $r^k \in S^k$, and is continuously derivable for the second variable(population status). Fitness function also can be marked as f: $S \times S \rightarrow R^K$, or $f(r, s) = (f^1(r, s), \ldots, f^k(r^k, s))$. The fitness function concerning the linear hypothesis of variable $x = r^k$ can be seen "large number" hypothesis: for a large population, a mixed fitness of strategy is the expectant fitness that formed every kind of pure strategies.

The final basic model of evolutionary game is a dynamic structure that describes the status S how to evolve with time. For the situation of continuous time, the variable of time corresponding to status is defined as: $\dot{s} = (\dot{s}^1, \cdots, \dot{s}^K)$, in which, $\dot{s}^k = (\dot{s}_1^k, \cdots, \dot{s}_N^k) = (ds_1^k / dt, \cdots, ds_N^k / dt)$, (k = 1 , ..., K). Thus, It can be showed with some function $F : S \rightarrow R^{NK}$, that is $\dot{s} = F(s)$. This is a autonomous system of differential equation, in which, the initial condition is given, the answer of system of differential equation $\dot{s} = F(s)$ corresponding to curved line that describes the process of evolution of all population(Friedman, 1991).

THE BASIS HYPOTHESES OF EVOLUTIONARY GAME MODEL AND THE CONFIRMATION OF PAYOFF FUNCTION

When the MNCs transfer their technologies to Chinese enterprises, the strategies of technology transfer that MNCs select are of uncertainty and limited rationality. It is the process of learning and a dynamic game system with time changing. This paper will analyze the spontaneous evolutionary process and evolutionarily stable strategy (ESS) of two types of populations, which contain both MMCs who have set up factories in China (entrants) and MNCs who prepare to set up. In the need of study and analysis, the paper makes following hypotheses to the evolutionary model:

Hypothesis 1. Approximate eye. When one of MNCs changes its strategy, it always takes the distribution of recent strategy as a known condition, then transforms to one type of the best strategies corresponding to the recent strategy. Despite that large numbers of MNCs change the strategies, it will make strategy space and payoff function different from the original ones .

Hypothesis 2. Cooperative condition. In order to facilitate the following theoretical analysis, this paper assumes that the cooperation between Chinese enterprises and MNCs is based on technology transfer. That is, if the MNCs want to cooperate with Chinese enterprises, MNCs must transfer their technology to China, otherwise, it is seemed to be uncooperative.

Hypothesis 3. Homogeneity of two types of populations. In order to be convenient to analyze, this paper assumes that two types of MNCs completely have the same technologies and the capabilities of profitability, and their difference is only that one type of MNCs have set up factories in China and another is ready to set up factories in China.

Hypothesis 4. Complete homogeneity of the same types of technologies. Even though the same technology developed by different MNCs is not completely the same, this paper assumes that the same types of technologies in all MNCs are completely same.

This Paper discusses the problem of technology transfer, divides the MNCs into 2 types Based on whether they have already set up factories in China (that is, K=2): MNCs have set up factories in China, K=1; MNCs that are ready to, K=2. Both of them have two strategies (that is, N=2) on the problem of technology transfer: strategy 1, MNCs transfer their technologies to Chinese enterprises; strategy 2, MNCs don't transfer their technologies to Chinese enterprises. When foreign MNCs transfer their technologies to China, in the selection of strategies, this paper assumes that the profits R obtained by technology transfer, the loss L caused by technology transfer, and the cost C of technology transfer, all these factors will directly affect the game payoff function U, which is similar to game process between eagle (non-transfer) and pigeon (transfer). When two types of MNCs all adopt the strategies of technology transfer, because they were assumed to be homogeneous the above, so the profits R and the loss L have half each, and the cost C needed in technology transfer is undertaken by each MNCs, but the MNCs who have entered also should have one more item in game payoff, that is, they can gain the profits R_0 as well even though they don't transfer their technologies. When one of the MNCs transfer its technology, and another don't do, at this time, the MNCs who transfer their technologies certainly obtain the transfer profits R, or not, but the loss caused by technology transfer should be undertaken by the MNCs. In addition, if the MNCs who have not entered China want to enter independently, they will need the incoming cost, therefore, in their payoff function, the incoming cost C_0 must be deducted. As shown in table 1.

TABLE 1
THE GAME PAYOFF MATRIX OF TWO TYPES OF MNCS

2 / 1		Ready to enter	
		1（transfer）	2（non-transfer）
Have entered	1（transfer）	$R_0+\frac{R-L}{2}-C$， $\frac{R-L}{2}-C$	$R_0+R-\frac{L}{2}-C$， $R_0-\frac{L}{2}-C_0$
	2（non-transfer）	$R_0-\frac{L}{2}$， $R-\frac{L}{2}-C$	R_0， R_0-C_0

THE EVOLUTIONARY STABLE STRATEGIES OF MNCS IN TECHNOLOGY TRANSFER

This paper assumes that, P denotes the strategy 1 (transfer), is adopted by MNCs who have set up the factories in China, and q denotes the strategy 1 (transfer), is adopted by MNCs who are ready to set up the factories in China. Then one point (p, q) in the area of $S = [0, 1] \times [0, 1]$ is used to describe the state $s = \{ (s_1^1, s_2^1), (s_1^2, s_2^2) \} = \{ (p, 1 - p), (q, 1 - q) \}$, in which, $s_1^1 = p$, $s_1^2 = q$, thus, $s_2^1 = 1 - p$, $s_2^2 = 1 - q$. $r^1 = (1, 0)$ denotes the strategy 1 (transfer) that MNCs select with probability 1, $r^2 = (0, 1)$ denotes the strategy 2 (transfer) that MNCs select with probability 2 (non-transfer). We can know from table 1:

The strategy 1 (transfer) is adopted by MNCs who have set up factories in China, which its fitness is:

$$f^1(r^1, s) = q\left(R_0 + \frac{R-L}{2} - C\right) + (1-q)\left(R_0 + R - \frac{L}{2} - C\right)$$

The fitness of adopting strategy 2 (non-transfer) is:

Its average fitness is: $f^1(p, s) = p\, f^1(r^1, s) + (1-p)\, f^1(r^2, s)$

Similarly, we can know that, the strategy 1 (transfer) is adopted by MNCs who have set up factories in China, which its fitness is:

$$f^2(r^1, s) = p\left(\frac{R-L}{2} - C\right) + (1-p)\left(R - \frac{L}{2} - C\right)$$

The fitness of adopting strategy 2 (non-transfer) is:

$$f^2(r^2, s) = p\left(R_0 - \frac{L}{2} - C_0\right) + (1-p)\left(R_0 - C_0\right)$$

Its average fitness is: $f^2(q, s) = q\, f^2(r^1, s) + (1-q)\, f^2(r^2, s)$

In evolutionary game theory, duplicators of populations are dynamically assumed to: the growth rate of one strategy depends on its fitness, and the strategies that produce higher profits have higher growth rate. Therefore, according to Malthusian equation, the strategy 1 (transfer) is adopted by the MNCs who have set up factories in China, which its fitness $f^1(r^1, s)$ minus the average fitness $f^1(p, s)$ equals its growth rate $\dot{p}/p$, that is,

$$\dot{p}/p = f^1(r^1, s) - f^1(p, s)$$

thus, $$\dot{p} = p(1-p)\left[q \cdot \frac{L-R}{2} + \left(R - \frac{L}{2} - C\right)\right] \qquad (1)$$

Similarly, we can know, the strategy 1 (transfer) is adopted by MNCs who have set up factories in China, which its growth rate is:

$$\dot{q} = q(1-q)\left[p\left(\frac{L-R}{2} - 2C_0\right) + \left(R - \frac{L}{2} - C - R_0 - C_0\right)\right] \qquad (2)$$

A two-dimensional, dynamic and autonomous (not contain t) system is made up of (1) and (2).

According to the theory of differential equations, if (p_0, q_0) makes the right side of (1) and (2) be zero, so there is equations

$$\begin{cases} p_0(1-p_0)\left[q_0 \cdot \frac{L-R}{2} + \left(R - \frac{L}{2} - C\right)\right] = 0 \\ q_0(1-q_0)\left[p_0\left(\frac{L-R}{2} - 2C_0\right) + \left(R - \frac{L}{2} - C - R_0 - C_0\right)\right] = 0 \end{cases}$$

Then (p_0, q_0) is the equilibrium point or singular point. Therefore, this autonomous system has five equilibrium points (singular point):

$E_1(0, 0)$、$E_2(0, 1)$、$E_3(1, 0)$、$E_4(1, 1)$、$E_5\left[\frac{R - L/2 - C - R_0 - C_0}{(R-L)/2 + 2C_0}, \frac{R - L/2 - C}{(R-L)/2}\right]$

According to the method proposed by Friedman(Friedman, 1998), a population dynamics systematically described by the differential equation, its stability of the equilibrium point is obtained through local stability analysis of the Jacobian matrix, in which, Jacobian matrix is gained by this system. The system is composed by equation (1) and (2), which its Jacobian matrix is:

$$J=\begin{bmatrix}\partial \dot{p}/\partial p & \partial \dot{p}/\partial q\\ \partial \dot{q}/\partial p & \partial \dot{q}/\partial q\end{bmatrix}=\begin{bmatrix}(1-2p)\left(\frac{L-R}{2}\cdot q+R-\frac{L}{2}-C\right) & p(1-p)\left(\frac{L-R}{2}\right)\\ q(1-q)\left(\frac{L-R}{2}-2C_0\right) & (1-2q)\left[p\left(\frac{L-R}{2}-2C_0\right)+\left(R-\frac{L}{2}-C-R_0-C_0\right)\right]\end{bmatrix}$$

According to the stability theory of dynamic systems(Liao Xiaoxin,2000), the proposition can be obtained below:

Proposition 1 When $R < L/2 + C$, E_1（0，0）is a locally asymptotically stable point, that is, the system is formed by (1) and (2), which its evolutionary stable strategy (ESS) is (transfer, non-transfer).

Proof: in the point E_1（0，0）, the Jacobian matrix of the system $J=\begin{bmatrix}R-L/2-C & 0\\ 0 & R-L/2-C-R_0-C_0\end{bmatrix}$, the corresponding latent root can be obtained, which is $\lambda_1=R-L/2-C$，$\lambda_2= R-L/2-C-R_0-C_0$.

When $R < L/2 + C$, the two characteristic roots both have negative real parts, therefore, E1（0，0）is locally asymptotically stable, the evolutionary stable strategy (ESS) of system is (0, 0), that is (transfer, non-transfer). When R ≥L/2 + C, there are one in two characteristic roots is zero or not completely negative real parts at least, so E_1（0，0）is not positive, that is, at this moment, the characteristic roots of Jacobian matrix of system are not asymptotically stable, and it's not the evolutionary stable strategy(ESS) of system too. (Completion proof)

The proposition shows that: when the profits obtained by technology transfer are too small, no matter the MNCs who have set up factories in China or the ones who are ready to set up factories in China, they all will gradually become rational to select strategies: not transfer the technology and not cooperate with Chinese enterprises.

Proposition 2 When $L/2 + C < R < 2C + 2R_0 + 6C_0$, (if $L < 2C + 4R_0 + 12C_0$ ）, the equilibrium point E_3（1，0）is the locally asymptotically stable point, that is, the evolutionary stable strategy (ESS) of the system is (transfer, non-transfer).

Proof: in the point E_3（1，0）, the Jacobian matrix of the system $J=\begin{bmatrix}-(R-L/2-C) & 0\\ 0 & R/2-C-R_0-3C_0\end{bmatrix}$,

the corresponding latent root can be obtained, which is $\lambda_1=-(R-L/2-C)$ ，$\lambda_2= R/2-C-R_0-3C_0$.

When $L/2 + C < R < 2C + 2R_0 + 6C_0$, (at this time, there must be $L < 2C + 4R_0 + 12C_0$ ）, the two characteristic roots λ_1、、λ_2 both have negative real parts, so the equilibrium point E_3（1，0）is locally asymptotically stable, that is, the evolutionary stable strategy of system (ESS) is (1, 0), namely (transfer, non-transfer).

When $R \le L/2 + C$ or $R \ge 2C + 2R_0 + 6C_0$, there is one in the two characteristic roots is zero or positive real parts at least, that is, at this time, the characteristic roots of Jacobian matrix of the system do not all have negative real parts, therefore, E_3（1，0）is not asymptotically stable, and is not the evolutionary stable strategy (ESS) of system. (Completion proof)

The proposition shows that: if the loss caused by technology overflow is not too large, when the profits obtained by technology transfer are within definite area, the MNCs that have set up factories in China all will gradually choose strategies to transfer their technologies to China and therefore cooperate with Chinese enterprises; the MNCs who are ready to set up factories in China, they all will gradually choose the strategies not to transfer their technologies and cooperate with Chinese enterprises.

Proposition 3 When $R > 2C + 2R_0 + 6C_0$, the equilibrium point E_4（1，1）is the locally asymptotically stable point, that is, the evolutionary stable strategy (ESS) of the system is (transfer, non-transfer).

Proof: in the point E_4（1，1）, the Jacobian matrix of the system $J = \begin{bmatrix} -(R/2-C) & 0 \\ 0 & -(R/2-C-R_0-3C_0) \end{bmatrix}$, the two corresponding characteristic roots can be obtained, which is, $\lambda_1 = -(R/2-C)$ ，$\lambda_2 = -(R/2-C-R_0-3C_0)$.

When $R > 2C + 2R_0 + 6C_0$, both two characteristic roots have negative real parts, so the equilibrium point E_4（1，1）is locally asymptotically stable, the evolutionary stable strategy (ESS) is (1, 1), that is (transfer, transfer).

When $R \le 2C + 2R_0 + 6C_0$, there is one in the two characteristic roots does not completely have negative real parts, so E_4（1，1）is zero or positivereal parts, that is, at this time, the characteristic roots of Jacobian matrix of the system is not asymptotically stable, Therefore, and is not the evolutionary stable strategy (ESS) of system. (Completion proof)

The proposition shows: if the profits obtained by technology transfer are big enough, then no matter the MNCs that have set up factories in China or the MNCs that are ready to set up factories in China, they all will gradually select the rational strategies: transferring their technologies, and cooperation with Chinese enterprises.

Proposition 4 When $L/2 + C + R_0 + C_0 < R < 2C$, (if $C > L/2 + R_0 + C_0$), E_2（0，1）is a locally asymptotically stable point, that is, the evolutionary stable strategy (ESS) of system is (non-transfer, transfer).

Proof: in the point E_2（0，1）, the Jacobian matrix of the system $J = \begin{bmatrix} R/2-C & 0 \\ 0 & -(R-L/2-C-R_0-C_0) \end{bmatrix}$, the corresponding characteristic roots can be obtained, which is

$\lambda_1 = R/2-C$，$\lambda_2 = -(R-L/2-C-R_0-C_0)$.

When $L/2 + C + R_0 + C_0 < R < 2C$（at this time, there must be $C > L/2 + R_0 + C_0$）, the two characteristic roots λ_1、λ_2 both have negative real parts, so E_2（0，1）is locally asymptotically stable, that is, the evolutionary stable strategy (ESS) is (0, 1), namely (non-transfer, transfer).

when $R \ge 2C$ or $R \le L/2 + C + R_0 + C_0$, there is one of the two characteristic roots is zero or positive real parts, that is, at this time, the characteristic roots of Jacobian do not all have negative real parts, therefore, E_2（0，1）is not asymptotically stable, and is not the evolutionary stable strategy (ESS) of the system too. (Completion proof)

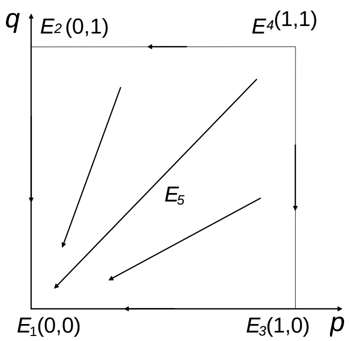
The proposition shows that: if the loss caused by technology transfer is especially large, when the profits obtained by technology transfer are within definite area, the MNCs who have set up factories in China all will gradually choose the strategies not to transfer their technologies to China, therefore, not to cooperate with Chinese enterprises. And the MNCs that haven't set up factories in China but are ready to, will gradually choose the strategies to transfer their technologies and cooperate with Chinese enterprises. However, as the condition that required in this proposition doesn't exist in reality, this proposition almost doesn't hold either .

Proposition 5 Normally（$R > L$）, the point E_5 is a saddle point (unstable node).

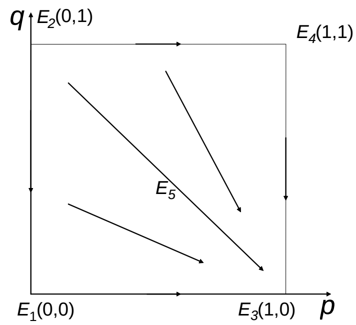
Proof: in the $E_5\left[\frac{R-L/2-C-R_0-C_0}{(R-L)/2+2C_0}, \frac{R-L/2-C}{(R-L)/2}\right]$, the Jacobian matrix of the system $J = \begin{bmatrix} 0 & A \\ B & 0 \end{bmatrix}$, in which, $A = p(1-p)\left(\frac{L-R}{2}\right)$，$B = q(1-q)\left(\frac{L-R}{2} - 2C_0\right)$, normally because there is $L - R < 0$，$\frac{L-R}{2} - 2C_0 < 0$, but $0 < p < 1, 0 < q < 1$, so it's not different to educe，$A < 0$，$B < 0$，$AB > 0$，the two corresponding characteristic roots can be educed, which is : $\lambda_1 = \sqrt{AB}$ ，$\lambda_2 = -\sqrt{AB}$. These two characteristic roots are the real roots of opposite sign, so E_5 is a saddle point (unstable node). (Completion proof)

This proposition shows that: normally, no matter whether the MNCs have already set up factories in China or are ready to, there is not a fixed proportion(less than 1) of them choosing to transfer their technologies to China and cooperated with Chinese enterprises.

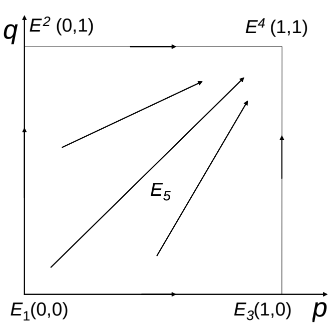
FIGURE 1
EVOLUTIONARY PHASE DIAGRAM OF FOUR PROPOSITIONS



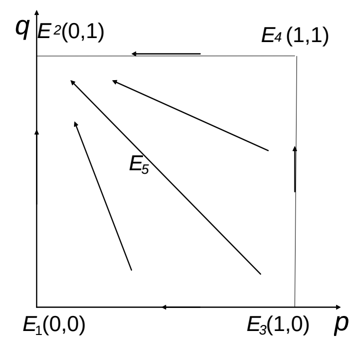
The diagram of proposition 1



The diagram of proposition 2



The diagram of proposition 3

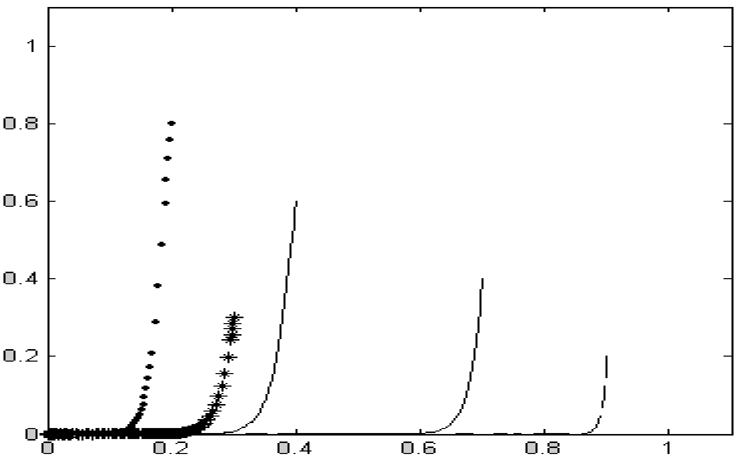


The diagram of proposition 4

NUMERICAL SIMULATION AND ANALYSIS

The following is to further confirm the equilibrium point what had been confirmed and show the evolutionary track from different initial value point to equilibrium point with the method of numerical simulation. This paper uses the software of MATLAB7.0 to make numerical simulation analysis. The initial value is taken from [0.2，0.8]，[0.4，0.6]，[0.3，0.3]，[0.7，0.4]and [0.9，0.2]，time quantum is [0,100], Lateral Axis and longitudinal axis separately represents p and q, and in the space of [0，1]×[0，1], the dynamic evolutionary process is described from five different initial point to each equilibrium point.

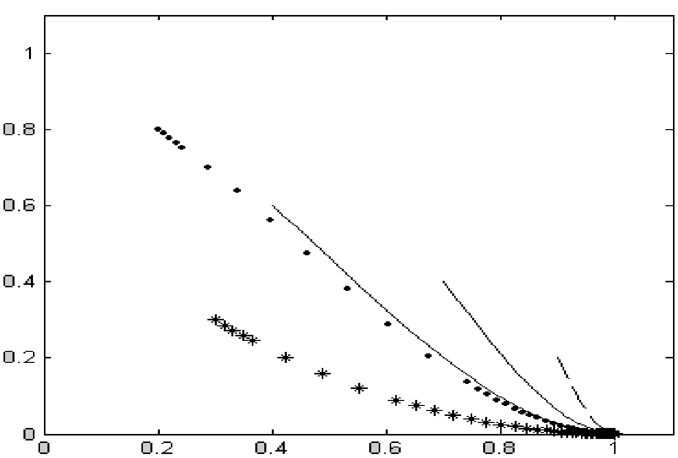
FIGURE 2
PROPOSITION 1 DYNAMIC EVOLUTIONARY FIGURE OF DIFFERENT INITIAL VALUE



Hypothesize parameter R=1.5；L=2；C=1；C_0=1.5；R_0=2.5

The figure 2 shows that, the proportion p of technology transfer strategy that is adopted by the MNCs who have entered host country and set up factories and the proportion q by the MNCs who are ready to enter, their different initial value point[p，q] trends toward the path of equilibrium point(0，0): If the initial value point is smaller differences comparing with the corresponding to value of equilibrium point(0，0), it will approach the value quickly; Contrarily, if it is far from the equilibrium point(0，0), it become slow to approach the value.

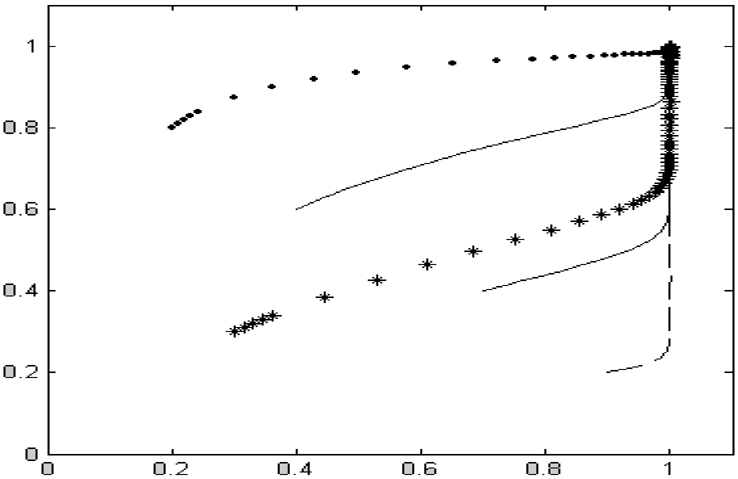
FIGURE 3
PROPOSITION 2 DYNAMIC EVOLUTIONARY FIGURE OF DIFFERENT INITIAL VALUE



Hypothesize parameter R=5；L=2；C=1；C_0=1.5；R_0=2.5

The figure 3 shows that, different initial value point[p，q] trends toward the path of equilibrium point(1，0): If the initial value point[p，q] is close to the equilibrium point(1，0), it will approach the equilibrium point quickly; Contrarily, if it is far, it become slow to approach the equilibrium point.

FIGURE 4
PROPOSITION 3 DYNAMIC EVOLUTIONARY FIGURE OF DIFFERENT INITIAL VALUE



Hypothesize parameter R=18；L=2；C=1；C0=1.5；R0=2.5

The figure 4 shows that, different initial value point[p，q] trends toward the path of equilibrium point(1，1): If the initial value point[p，q] is close to the equilibrium point(1，1), it will approach the value of equilibrium point quickly(such as p or q is 0.7, 0.8, 0.9, so the value will be increased up to 1 quickly) ; Contrarily, if it is far, it become slow to approach the equilibrium point(such as p or q is 0.2, 0.3, so the value will be increased up to 1 slowly).

CONCLUSION AND REVELATION

This paper has set up the evolutionary game model, which refers to two types of the MNCs, one type is that the MNCs have set up factories in China and another is that the MNCs are ready to set up factories in China. Through analyzing the balanced result above, we can safely draw the useful conclusions and revelations: when the profits obtained by technology transfer are too small, these two types of MNCs will all choose the strategies not to transfer their technologies; when the profits obtained by technology transfer are big enough, the size of the loss caused by technology overflow is not the factor that affect technology transfer of MNCs, and at last, two types of MNCs will all choose the strategies to transfer their technologies to Chinese enterprises; normally (the loss caused by technology is not too large), the MNCs that have set up factories in China are more likely to transfer their technologies to Chinese enterprises than the MNCs who haven't set up factories in China; only under the special condition that the cost needed in technology transfer is especially large, the result is just the opposite. Therefore, China should strongly encouraged MNCs to invest and set up factories in China, and with no additional conditions. It is more favorable for them to transferring their technologies to Chinese enterprises.

In this paper, the evolutionary game theory is initially used to analyze the strategies of technology transfer of the MNCs, the demand of the hypotheses is much higher and with many limited conditions. The results derived from hypotheses may have gap with the real situation, therefore, we need do further studies, to lose conditional limitations gradually in order to get closer to the reality, and make it of greater guiding significance for the leap development of China's technology.

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