Research on Symbiosis Model and Its Stability of Commercial Banks Strategic Alliance

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Abstract As a basic characteristic of biological species, symbiosis evolution phenomenon such as the sharing of value, resource and risk exists in the evolution of commercial banks strategic alliance. This paper employs logistic equation to describe the symbiosis evolution process of commercial banks strategic alliance. Based on it, this paper will draw conclusobns that parasitism, commensalisms, symmetric mutualism and non-symmetric mutualism in commercial bank strategy alliance and their stabilities are discussed.
Key words Commercial banks strategic alliance; Symbiosis evolution; Systemic dynamics

1 Introduction

With the development of market-economy in China, the commercialization function of Chinese banks are reinforced which forces they begin their businesses by establishing closer relationship with enterprises and each other. Meanwhile, the core function of banks is also increasingly enhanced in the economy, which gives them more opportunity to ally with the others. Therefore, the strategy alliance of banks spring up incessantly with the force of above two factors. So some scholars pay their interest in the research of the strategy alliance, for example, Tang Meirun's research on the strategy alliance of small and middle commercial banks (2008)[1], Liang Qinghua'a research on the strategy alliance of local commercial banks in China (2006)[2], Song Chen's research on the stability of commercial banks strategy alliance (2005)[3] . But their researches never mention symbiosis evolution phenomenon in commercial banks strategy alliance. Otherwise, symbiosis phenomenon in the strategy alliance has been earlier researched by (Nohria and Garcia-Pont, 1991)[4], (Porter and Fuller, 1986)[5] and their achievement has been accepted widely. Therefore, it is necessary to research symbiosis evolution mechanism in commercial banks strategy alliance, especially on symbiosis relationship of commercial banks strategy alliance. The paper will study it.

2 Symbiosis Relationships in A Commercial Banks Strategy Alliance

According to biological symbiosis theory, a symbiosis mode means the symbiosis relationship between cells. There are four symbiosis modes to bring commercial banks strategy alliance to evolve.

2.1 Parasitism

Parasitism is a kind of alliance model that enterprise (or organization) without license or ability to develop financing business completely or partly expands the relative business by depending on a bank. in this mode, the bank is a "host part" who has the license or ability to develop financing business fully or partially and the enterprise (or organization) is a" parasitic part" who hasn't the license or ability to expand financing business fully or partially but it have abundant capital. So these lies parasitism relationship between bank and enterprise (or organization) in the financial business, and the relationship can bring them mutual benefit, which forces them to cooperate. For example, there lies a parasitism relationship between saving office and bank when they cooperate to develop loan business, this is because that the former can't develop loan business but it has abundant savings and the latter has the function to develop the loan business.

2.2 Commensalisms

Commensalisms are a kind of alliance relationship where enterprise gets financial support from bank when the latter carries out the administration function. In this mode, administration function of bank is the basic of the model, when administration function is carried out by bank, it can have very little profit, and the related enterprises can have abundant interest. Bank has three purposes when it carries out the function as following: carry out the governmental policy; bring up latent copartner; ensure financial security. Moreover, enterprise can attain stable policy benefit by alliance.

2.3 Non-symmetric mutualism

Non-symmetric mutualism is a kind of alliance whose members develop the large-scale business with high specialization of asset and technology by sharing in recourse. In this mode, it is very difficult

to look for a suitable copartner that has specific technology or has very abundant capital, so capital is very important for enterprise, technology is very important for bank. When they cooperate to carry out the business, there is very strong dependent between alliance members. Moreover, the characters of business decide that there is non-symmetry of ability, information, resource, even contract between the alliance members.

2.4 Symmetric mutualism

Symmetric mutualism is a kind of alliance relationship whose members attain mutually benefit by share in recourse and closer cooperation. In this mode, as the allied members are independent and their cooperation is dynamic, they pay attention to flexible management and avoid rigid symbiosis relationship destroying their cooperation. Therefore, it is a kind of competitive and cooperative relationship. For example, Union Pay is a specific symmetric mutualism relationship. The cooperative model brings benefit for every member.

3 Mode for the Symbiosis Evolution of Commercial Banks Strategy Alliance

As the relationship such as parasitism, commensalisms, non-symmetric mutualism and symmetric mutualism lie in commercial bank strategy alliance. A Logistic equation [6] can be employed to describe its evolution process of commercial banks strategy alliance.

3.1 Assumption

(1) Commercial banks are considered as the subject of alliance and their incomes level is $x(t)$; the other members (including banks, enterprises and/or other organizations) in alliance are considered as object and their income level is $y(t)$. Their income level can reflect a dynamic evolution process of commercial banks strategy alliance, so their incomes are a function of time.

(2) The average growth rates of allied members are γ_1 and γ_2 in a special time and condition, the limit income of each member as x^* and y^*, the degree of nature growth saturation of each members as $\frac{x}{x^*}$ and $\frac{y}{y^*}$ which resists the growth of the income of allied members.

(3) Supposing that the all allied members existed in symbiosis alliance could more or less promote other's growth of income. The promotion coefficient are λ_1 and λ_2 respectively, and the degree of nature growth saturation of each members $\frac{x}{x^*}$ and $\frac{y}{y^*}$.

(4) supposing that all allied members depend on each other which can be described for subject and object, and their dependence degree are δ_1 and. δ_2 respectively.

3.2 Evolution rule of symbiosis relationship

According to the Logistic evolution rule of allied member in commercial banks strategy alliance and the above hypothesis, the symbiosis relationship of commercial banks strategy alliance can be showed as formula (1).

$$\begin{cases} \dfrac{dx}{dt} = (1-\delta_1)\gamma_1 x\left(1-\dfrac{x}{x^*}+\lambda_1\dfrac{y}{y^*}\right)+\delta_1\gamma_1 x\left(-1-\dfrac{x}{x^*}+\lambda_1\dfrac{y}{y^*}\right)=\gamma_1 x\left(1-2\delta_1-\dfrac{x}{x^*}+\dfrac{\lambda_1 y}{y^*}\right) \\ \dfrac{dy}{dt} = (1-\delta_2)\gamma_2 y\left(1-\dfrac{y}{y^*}+\lambda_2\dfrac{x}{x^*}\right)+\delta_2\gamma_1 x\left(-1-\dfrac{y}{y^*}+\lambda_2\dfrac{x}{x^*}\right)=\gamma_2 y\left(1-2\delta_2-\dfrac{y}{y^*}+\dfrac{\lambda_2 x}{x^*}\right) \end{cases} \tag{1}$$

In symmetric mutualism mode of strategy alliance, the allied members could promote resource efficient utilization and cutting cost by sharing in resource. So, the symbiosis relationship can promote their income to increase. But the equivalent and symmetric of allied members rely on their lower dependence, that is, $\delta_1 = \delta_2 = 0$, therefore, formula (1) shows symmetric mutualism relationship of strategy alliance.

In non-symmetric mutualism mode of strategy alliance, a member ends the alliance relationship, their benefits can decrease gradually to zero, that is, $\delta_1 = \delta_2 = 1$, and therefore, formula (1) shows non-symmetric mutualism relationship in strategy alliance.

In parasitism mode of strategy alliance, host part could extend its business and increase its income with the support of parasitic part. Otherwise, the development of parasitic part will be limited, so its benefit gradually decreases to zero without host part, but its can attain some benefit when it depends on parasitic part, that is, $\delta_1 = 0, \delta_2 = 1$, therefore, formula (1) shows parasitism relationship in strategy alliance.

In commensalisms mode of strategy alliance, banks could attain very limited benefit when it carry out management function, that is to say $\lambda_1 = 0$.But enterprises would earn much income from their cooperation. Therefore, bank doesn't depend on enterprises, but the latter depend on the former. That is, $\lambda_1 = 0, \delta_1 = 0, \delta_2 = 1$, therefore, formula (1) shows commensalisms relationship in strategy alliance.

3.3 The stability of symbiosis relationship

When formula (2) is satisfied, the evolution of commercial banks strategy alliance is stable.

$$\begin{cases} \dfrac{dx}{dt} = \gamma_1 x\left(1 - 2\delta_1 - \dfrac{x}{x^*} + \dfrac{\lambda_1 y}{y^*}\right) = 0 \\ \dfrac{dy}{dt} = \gamma_2 y\left(1 - 2\delta_2 - \dfrac{y}{y^*} + \dfrac{\lambda_2 x}{x^*}\right) = 0 \end{cases} \tag{2}$$

According to formula (2), the balance pointes can be gotten as following: $P_1(0,0)$, $P_2\left(\dfrac{(1-2\delta_1)+(1-2\delta_2)\lambda_1}{(1-\lambda_1\lambda_2)}x^*, \dfrac{(1-2\delta_2)+(1-2\delta_1)\lambda_2}{(1-\lambda_1\lambda_2)}y^*\right)$. Where, when there is symmetric mutualism mode in strategy alliance ($\delta_1 = \delta_2 = 0$) and $\lambda_1\lambda_2 < 1$, the balance point of the symbiosis relationship is $P_2\left(\dfrac{1+\lambda_1}{(1-\lambda_1\lambda_2)}x^*, \dfrac{1+\lambda_2}{(1-\lambda_1\lambda_2)}y^*\right)$; when there is parasitism mode in strategy alliance ($\delta_1 = 0, \delta_2 = 1$) and $\lambda_1 < 1, \lambda_2 > 1, \lambda_1\lambda_2 < 1$, $P_2\left(\dfrac{1-\lambda_1}{(1-\lambda_1\lambda_2)}x^*, \dfrac{-1+\lambda_2}{(1-\lambda_1\lambda_2)}y^*\right)$ is the balance point of the symbiosis relationship; when there is commensalisms mode in strategy alliance ($\lambda_1 = 0, \delta_1 = 0, \delta_2 = 1$), $P_2\left(x^*, (-1+\lambda_2)y^*\right)$ is the balance point of the symbiosis relationship.

4 Conclusions

As a newly phenomenon, commercial bank strategy alliance includes the symbiosis relationship such as parasitism, commensalisms, symmetric mutualism and non-symmetric mutualism. These relationship models make Logistic evolution rule to satisfy its evolution process of commercial banks strategy alliance. However, the rule is also affected critically impacted by the dependence of allied members, so, ecologic niche of every member in their alliance is a very important factor influencing its symbiosis evolution. Meanwhile, the degree of trust and the relationship of cooperation are also very important to the evolution of commercial bank strategy alliance.

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