The Evolution Analysis of Endogenous Comparative Advantages of Chinese Liquor Enterprises[1]

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Abstract

At present, the living space of Chinese liquor enterprises has been facing an unprecedented pressure. If they themselves cannot set up an endogenous comparative advantage, the liquor and liquor enterprises might become marginalized in the fierce competition. This paper tends to set up a dynamic comparative model for the enterprise, which can simultaneously make the technological dynamic change and dynamic of comparative advantage endogenous. Moreover, through the comparison between Wuliangye and Jiuguijiu, two famous Chinese liquor enterprises, the paper analyzes the inherent determinants and their evolution trend of endogenous comparative advantages of Chinese liquor enterprises and further researches on the necessity and path of building up endogenous comparative advantages of Chinese liquor enterprises.

Keywords: endogenous comparative advantage; technology change; evolution; liquor enterprise

With the rapid development of economy and further deepening of opening up to the outside world of China, red wine, imported liquor and other overseas liquor have encroached on part of the traditional liquor consumer groups of China under the leading of cultural guidance with extremely individual characters. Moreover, the slow-down of macroeconomic growth rate, restricted official entertainment consumption, and liquor quality crisis caused by plasticizer incident have greatly threatened the survival of Chinese liquor enterprises. If no measure has been taken to build up the endogenous comparative advantage of these enterprises, some of the liquor enterprises may very probably be marginalized in the industrial adjustment and even be kicked out by the consuming current. Therefore, to find out the internal determinants and technical change path of enterprises' endogenous comparative advantage has become a top priority.

1. Relevant theoretical bases

Generally, the endogenous comparative advantage refers to the comparative advantage between regions and individuals can be impacted or even determined by the factors that behaviors can control. Therefore, the behavioral agent can change the comparative position (advantage) of a transaction through changing his/her own behaviors and choices.

The comparative advantage has its own internal evolution mechanism. No matter whether it arises from the technological level or the difference of its own factor endowments, it will continuously change in the production and investment activities with the elapse of time. The change mechanism of comparative advantage is represented as the initial relative productivity level determines the endogenous comparative advantage and then determines the initial model of labor division, while the division of labor mode and degree of specialization can affect the resource configuration in different departments. This resource relocation effect can react upon the productivity growth and the change of relative productivity can further act on the comparative advantage. The endogenous comparative advantage theory can be used to analyze the interactive relationship between the comparative advantage changes and endogenous technological progress and the determinants and their evolution mechanism of endogenous comparative advantages.

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The main way of thinking to apply the endogenous comparative advantage theory to enterprises' development is that the enterprises' comparative advantage is inherently decided by the economy system operation. Its root lies in continuously refined and deepened division of labor and specialization. "Through the division of labor and specialization, increasing returns, learning effect, and the increase of the efficiency of transaction, etc, labor productivity can be improved, and the endogenous comparative advantage can be created and cultivated."(Yang Xiaokai, Zhang Yongsheng 2001). Therefore, only through specialization, economies of scale and expanding market share, etc. can the endogenous comparative advantage of the enterprise be cultivated, i.e. the creation of wealth and reproduction, and the ability of an enterprise can be further developed.

2. Model introduction

To explain the enterprise's technological change path and the initial comparative advantage will interact with each other, thus endogenously decide the technology change rate (i.e. the growth rate of productivity) and the evolution of the endogenous comparative advantage, Krugman and David Ricardo's comparative advantage model and Jones model are adopted as a base to set up a dynamic model.

Firstly, Ricardian Model[2] is adopted to illustrate the static equilibrium of an enterprise's endogenous comparative advantage. Suppose in a domestic market of free competition, when the unit cost of H enterprise producing j product is lower than or equivalent to that of the industry F ($j \in [0, n]$), this product should be assigned to the enterprise to produce. The illustrative formula is,

$$W_H(t)/W_F(t) \leq A_{Hj}(t)/A_{Fj}(t) \quad (1)$$

where,

A_{Hj}: the labor productivity of enterprise H producing the goods j;

A_{Fj}: the average labor productivity of industry F of enterprise H producing the goods j;

W_H and W_F: respectively indicating the average wage rate of the enterprise and the industry.

The following Fig. 1 clearly shows the equilibrium relationship of the ratio of labor productivity and the ratio of the wage rate. The vertical axis indicates the ratio of the enterprise's labor productivity or wage rate corresponding to the average one of the industry. The horizontal axis shows the various products of indexation. Curve D ($D = W_H(t)/W_F(t)$) shows the ratio change track of the enterprise's wage rate corresponding to the industry's average wage rate; when the curve inclines towards the upper right, it indicates the ratio increases with the increase of n value. Curve B ($B = A_{Hj}(t)/A_{Fj}(t)$) indicates the ratio of the enterprise's labor productivity corresponding to the average one of the industry; when the curve inclines towards the lower right, it indicates the ratio gradually increases with the decrease of n value.

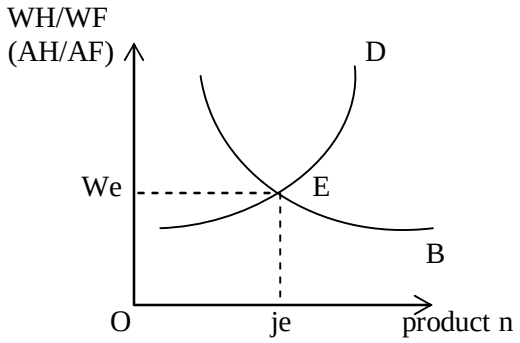

Fig. 1 Equilibrium Relationship of Endogenous Comparative Advantage

This means the closer to the original O, the bigger the ratio of the labor productivity of the enterprise's and the industry's average, the more obvious the enterprise's comparative advantage, the more possibility that the enterprise may make benefit; on the contrary, the more possibility that the enterprise may lose. However, when on earth can the enterprise change from loss to gain? What does the change from comparative advantage to comparative disadvantage lie on? The answer is to lie on relative wage rate Curve D.

[2] Originally, Ricardian Model is used to explain the comparative advantage of trade between two countries; here it is used to explain the comparative advantage between two enterprises through improvement.

The intersection of D and B is equilibrium point E, the relative wage rate E corresponds to is We, and product is je. When the enterprise produces the product on the right side of je, the enterprise is under a comparative disadvantage and can lose money as the ratio of the relative wage rate is bigger than the ratio of the relative labor productivity. When the enterprise produces the product on the left side of je, the enterprise is under a comparative advantage and can make money, while as for product je, the relative labor productivity is exactly equal to the relative wage rate. Suppose the instantaneous utility function is Douglas symmetric function, the consumption elasticity to each product is β, then when the relative wage rate of the enterprise meets exactly right the condition that the enterprise's income is equal to the market's expenditure to je, its comparative advantage can realize static equilibrium:

$$Dj_e = We = j_e\beta/(1 - j_e)\beta \cdot L_F/L_H \quad (2)$$

the intersection E of two curves meet Formula (1), (2) at the same time, i.e. the enterprise can realize static equilibrium of comparative advantage at this point.

A large number of studies have shown that technological progress will prompt the change of the comparative advantage, meanwhile, the technology progress mainly comes from the learning by doing and knowledge spillover between enterprises (i.e. in economic system, production technology can be diffused to the technology outdated enterprises from the technology advanced enterprises.). Therefore, the index and dynamic change of productivity are introduced to have an expanded analysis to Ricardian Model. Whereas the technology progress is endogenously from learning by doing and knowledge spillover, Krugman's Learning by Doing model and Jones' technology diffusion model are combined in this paper to survey the technology change:

$$\ln[A_{Hj}(t)/A_{Hj}(t-1)] = \gamma_{Hj} + \psi L_{Hj} + \lambda \ln[A_{Xj}(t-1)/A_{Hj}(t-1)] \qquad \psi,\lambda \geq 0 \quad (3)$$

where,

A_{Xj} indicates the labor productivity of the technology advanced enterprise X producing the product j;
γ indicates department's exogenous technological progress rate;
ψ is parameter of learning by doing rate;
λ is parameter of technological catch-up rate.

Then, the labor productivity change rate of enterprise H producing product j corresponding to enterprise X producing product j is:

$$\Delta \ln[A_{Hj}(t)/A_{Xj}(t-1)] = (\gamma_{Hj} - \gamma_{Xj}) + \psi[(L_{Hj}(t) - L_{Xj}(t)] - \lambda \ln[A_{Hj}(t-1)/A_{Xj}(t-1)] \quad (4)$$

Thus it can be seen that the dynamic evolution process of endogenous comparative advantage is that the initial productivity level determines an enterprise's comparative advantage and specialized mode, while the initial comparative advantage and the labor allocation between each enterprise thus occurred will affect the growth rate of productivity as well and further bring about the evolution of comparative advantage. On the one hand, an enterprise's learning by doing can enhance its initial comparative advantage, and make the evolution of the endogenous comparative advantage represent the curing characteristics; on the other hand, the different exogenous technological progress rate among enterprises together with the existence of technology spill over may cause the reversal of comparative advantage and further make the evolution of the endogenous comparative advantage represent the feature of liquidity. Of course, it also depends on the correlation between the initial relative productivity level and the steady state level. Therefore, the evolution process of endogenous comparative advantage depends on the net effect of these two back actions.

Here two extreme situations should be considered. First, suppose there is no knowledge spill over and the exogenous technological progress rate is the same in each enterprise. Meanwhile, the learning by doing in the enterprise can make the productivity of the initial non-specialized departments in the enterprise decline while that of the specialized departments ascend. After a period of time, it can be found the enterprise's initial static equilibrium model can be continuously cured and locked.

Second, suppose there is no learning by doing in an enterprise, but there is knowledge spill over and difference of exogenous technological progress rate in the enterprise, the progress of the initial non-specialized departments may be much quicker than that of specialized departments, and make the productivity of the enterprise of which initial productivity is lower than that of the industry average higher than the average productivity on the contrary when reaching the steady state.

3. Empirical analysis based on liquor enterprises

As per the aforesaid models, the data from Wuliangye Co., Ltd (sz000858) and Jiuguijiu Co., Ltd (sz000799), two typical listed companies of Chinese liquor industry, are selected to carry out Empirical analysis so as to empirically test the models. One company is the leading brand of Sichuan liquor and the other one is the leading brand of Hunan liquor. It can be said both of them are greatly featured and own numerous consumer fans. They were listed before 2003 and long-standing listed companies and the data of them are complete, which are persuasive and authentic for comparison. Therefore, the data of them from 2003 to 2012 (as of the writing of the paper, 2013 annual reports have not yet been issued) are adopted for comparison analysis.

Table 1 Annual Output Value, Total Wages and Number of Employees of Wuliangye and Jiuguijiu

(units: million yuan, person)

		In 2003	In 2006	In 2009	In 2012
Wuliangye	Output value	6311.6795	7234.0898	10337.5184	26076.1753
	wages	315.1096	417.0741	1127.3065	2489.5647
	Staff Nos.	21112	16673	22967	28437
Jiuguijiu	Output value	352.4901	173.7702	359.8523	601.9014
	wages	30.9902	44.3855	40.8296	121.2959
	Staff Nos.	2719	1149	2202	2137

Data source: The annual report data statistics of Wuliangye and Jiuguijiu

From Table 1, it can be found the enterprise scale of Wuliangye is far bigger than that of Jiuguijiu. No matter whether it is enterprise annual output or staff numbers, the former is many times of the latter. However, big scale does not necessarily mean comparative advantage. Labor productivity and wage rate should be taken in account for judging the comparative advantage.

Table 2 Wage Rate (WH) and Labor Productivity (AH) of Wuliangye and Jiuguijiu

(unit: ten thousand yuan/person/year)

	Wuliangye		Jiuguijiu	
	W_{Hj}	A_{Hj}	W_{Hj}	A_{Hj}
In 2003	1.49	29.90	1.14	12.96
In 2006	2.50	43.39	3.86	15.12
In 2009	4.91	45.01	1.85	16.34
In 2012	3.75	31.70	5.68	28.17

From the absolute values, the labor productivity of both Wuliangye and Jiuguijiu are all under the state of increase from 2003 to 2012, which means the two companies are making progress. First, the progress should arise from enterprises' learning by doing. Second, the existence of knowledge spill over makes the enterprises gain the support of exogenous technological progress. In view that the exogenous technological progress rate of entire liquor market is similar, the learning by doing in the enterprises should be the main reason for the increase of enterprise labor productivity. Wuliangye's labor productivity has always been higher than that of Jiuguijiu, which means the former has a certain advantage in liquor production. However, to judge the comparative advantage of two enterprises, Ricardo's static equilibrium model should be adopted for analysis. Statistics show that the manufacturing industry average wage is 12,671 yuan and 41,650 yuan in 2003 and 2012 respectively, and the average labor productivity is 149,900/person/year and 208,200/person/year in the same two years respectively. Accordingly, the ratio of the wage rate and industry average wage rate and the ratio of labor productivity and industry average labor productivity in 2003 and 2012 of the two companies can be calculated.

Table 3 Relative Wage Rate Ratio and Relative Labor Productivity Ratio of Wuliangye and Jiuguijiu

	Wuliangye		**Jiuguijiu**	
	$W_H(t)/W_F(t)$	$A_{Hj}(t)/A_{Fj}(t)$	$W_H(t)/W_F(t)$	$A_{Hj}(t)/A_{Fj}(t)$
In 2003	1.18	1.99	0.90	0.86
In 2012	0.90	1.52	1.36	1.35

As the relative wage rate ratio is less than relative productivity of Wuliangye in 2003 (1.18<1.99), while the relative wage rate ratio is higher than relative productivity of Jiuguijiu in the same year (0.90>0.86), this indicates Wuliangye owns the initial comparative advantage. In 2012, the relative wage rate ratio is still less than relative productivity of Wuliangye (0.90<1.52), while the relative wage rate ratio is higher than relative productivity of Jiuguijiu (1.36>1.35), it can be seen Wuliangye increases its productivity through learning by doing, enhances its endogenous comparative advantage and makes its initial endogenous comparative advantage own the curing tendency. Meanwhile, from Table 4, it can be found that Jiuguijiu has always made efforts to increase its productivity and tried to make its endogenous comparative advantage and specialized mode tend to be more liquidity through technology spillover differences (i.e. technology catch-up) and this effort has begun to pay off. Its productivity change ratio increases from -0.3 to +0.51, indicating the endogenous comparative advantage began to reverse.

Table 4 Productivity Change of Wuliangye and Jiuguijiu

	$\ln[A_{Hj}(t)/A_{Hj}(t-1)]$			$\Delta\ln[A_{Hj}(t)/A_{Xj}(t-1)]$	
Wuliangye	0.37	0.03	-0.36		
Jiuguijiu	0.16	0.08	0.54	-0.3	0.51

4. Conclusion

Although whether the endogenous comparative advantage in the long term is to cure or reverse is a problem of empirical research, the above empirical analysis shows that:

First, an enterprise with initial endogenous comparative advantage can be in a leading state in relatively long time. Although the two companies have increased their productivity, the enterprise with initial endogenous comparative advantage can have a quicker increase speed. That is to say, all enterprise tries to enhance its initial advantage through internal learning by doing and thus gain comparative advantage; however, the empirical results show that the endogenous comparative advantage tends to cure. Particularly, when the exogenous technological progress rate of the entire market is the same or close or there is no knowledge spillover among enterprises, the curing of endogenous comparative advantage is more obvious.

Second, if the enterprise under the initial endogenous comparative disadvantage wants to reverse the disadvantage, on the one hand, it should continuously enhance the internal learning by doing, on the other hand, it needs to rely on knowledge spillover between enterprises to achieve technological catch-up and then set up the endogenous comparative advantage. This will make the evolution of the endogenous comparative advantage demonstrate certain liquidity. This can be seen from the technology rectification in 2011, production line expansion, and active introduction advanced production technology, its productivity has achieved rapid increase and even the comparative advantage demonstrates a reverse trend.

Third, if an enterprise ignores or abandons to strengthen enterprise's own learning by doing, even if it owns the initial endogenous comparative advantage, the reverse may happen in the end. Of course, whether the endogenous comparative advantage can be successfully reversed depends on the relationship between the initial relative productivity levels and the steady-state level and the net effect of its back action. However, it has shown that no progress simply means regression, which is not an empty talk as to an enterprise.

Therefore, if Chinese liquor enterprises want to gain a foothold in the fierce market competition, and grow continuously, besides transforming the present development driven by exogenous factor model of low cost model, i.e. capital, labor, natural resources into the endogenous growth model with low cost, low capital and high efficiency, enhancing technology investment, talents training and products innovation, it still needs to implement technology chase and transcendence, and improve the efficiency of production, establish the endogenous comparative advantage.

How far the liquor enterprise can go in the future actually depends on in a great extent whether it can build up its own endogenous comparative advantage. Only have the liquor enterprises endogenous comparative advantage, they can adapt to market changes, resist the slow-down and the impact of China's economic growth brought with industry adjustment and gain long-term development.

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