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An Empirical Study on the Degree of China Trust Market Competition Based on Panzar-Rosse Model

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Abstract: The paper has an empirical study on the degree of China trust market competition based on Panzar-Rosse model, using the panel data of 43 trust companies during the year of 2008-2012. The empirical result shows that China trust has market structure of monopolistic competition. Furthermore, the paper reveals the factors leading to China trust market structure of monopolistic competition, which includes the declining trend in the degree of China trust market concentration, prominent homogenization of trust products, and obvious features of the administrative region segmentation.

Keywords: Panzar-Rosse model; The Degree of China Trust Market Competition; Market concentration.

1. Introduction

Since 1979, after China International Trust Investment Company was established, our country's Trust business was developing unstably. While after the sixth industry consolidation in 2007, Trust business in our country comes into a fast development, nowadays, the size of entrusted assets of the whole industry breaks out ten trillion RMB, because of that, it becomes the second big financial industry, only ranks to commercial banks, this phenomenon attracts a special attention among the business and educational circles. However, with the market competition of asset management taking on an increasing fierce condition, Institutional advantages of the trust business is disappearing. Trust companies are facing a serious transformation and survival pressure, also, trust company's the development strategies and management models are beginning to change. To study the competition situation of the company in time, it is necessary to make researches on degrees of the competition and the status of industrial organization, so that we can make a series of efficient industrial policies, to promote a sustained and healthy development of the industry. So, this article aims at using a Panzar-Rosse model to make an empirical research on degrees of market competition of our country in 2008-2012, and according to this empirical result, making a further analysis about the factors which effecting the degrees of the industry.

2. Reviews on Literature

A basis problem in industry histology is the measure of industrial market competition degrees. With the development of industry histology, the method of measuring the degree of industry competition can be divided into structured and unstructured methods. Structured methods mainly refers to a way that measure the degree of industrial competition in early times, a hypothesis according to SCP (Structure - Behavior- Performance) in traditional industry histology, and ES (effective structure), adopting a series of indicators such as Market Concentration Index, Dahl Seaman index, Lorenz Curve, Gene coefficient etc. to make measurements. From the existing empirical literature, Market Concentration Index and Dahl Seaman index, which based on SCP paradigm, have a more common application.

While, more and more challenge and controversy are existing in the structured methods, from the aspects of theoretical hypothesis and empirical methods, thus, an unstructured method appears and improves gradually. Unstructured methods cast off a thinking that, instead of inferring companies' competitive behavior and performance by market structure characteristics, paying attentions to the relationship between non structural characteristics of the market (eg. behavioral characteristics of an enterprise) and operating performance directly. In contrast, unstructured methods are more likely to have a basis of micro-economic theory, comparing to structured methods. In the empirical aspect, newly proven theory of industrial organization mainly put forward Iwata model, Bresnahan model and Panzar-Rosse model (the following referring to RP model). RP model in empirical research have a widest use.

RP model are put forward and improved by two economists, ((Panzar *et al.*, 1977; Panzar and Rosse (1982); Panzar and Rosse, 1987) this model measuring the degree of competition by calculating H statistic. (that is, total variable elasticity of producing to input factor price) RP models are widely used in various industries. In the

financial sector, scholars at home and abroad aims at banking's empirical research mainly, securities and insurance following, but there is few research on trust business. There are reasons of two respects: on the one hand, many trust business aboard are run by banks, it is relatively rare to make industrial organization analysis on trust company separately; on the other hand, for a long time, development orientation of trust company and business scope is blurred, educational circles have a much lower attention degree to trust business, comparing to other financial industries.

At present, our country is lacking in the empirical research on competition degree of trust business, only a small amount of literature use a structured method, that is, according to market concentration index and Dahl Seaman index, as well as other indicators, an analysis based on market structure characteristics of trust business is completed. For example, Wang and Peng (2011) take advantage of 31 trust companies' s data in 2006-2007, and calculate the market concentration index and Dahl Seaman index, it reflects that trust business market concentration in our country is low, relatively, and have an obvious difference comparing to other industry' s (especially the banking industry) high concentration. In addition, the operating performance of trust companies in recent years takes a significant positive correlation with market share, and a negative correlation with market concentration. Yuan Jiwei (2013), also use the market concentration index and Dahl Seaman index, analyzes the market competition condition of trust business of our country in 2006-2007, the research points out that our country' s trust business market concentration is not high, market competition is fierce, and producing a series of leaders which located in different echelon levels , such as Citic Trust, Foreign Trade Trust, China Credit Trust and Ping An Trust.

From the review of literature above, it can be find that our country is still short of researches which using unstructured Panzar-Rosse model to measure the competition degree of trust business, and that is the blank this article attempting to make up for.

3. Construction of Panzar-Rosse Model in China Trust Industry

3.1. Basic Content of RP Model

RP model is based on contestable market theory, by establishing the overall revenue equation, calculating H statistic to judge market competition degree where enterprises locate in. H statistics refers to the elastic sum of total enterprise income to changes in input prices.

The assumptions of establishing a RP model including:

- (1) Enterprises are operating in a long-term balanced environment;
- (2) Enterprises' s behavior is influenced by other enterprises(except complete monopoly enterprises);
- (3) Enterprise' s cost structure is same, agreeing with Cobb-Douglas Production Function of constant returns to scale;
- (4) Under different competition degree, enterprises adopt different cost input strategies, and produced an effect on price.

Since the conditions of enterprises making maximize profit is that marginal cost equals marginal revenue:

Where R'_i refers to $R'_i(Q_i, N, Z_i) = C'_i(Q_i, W_i, T_i)$ enterprise i' s marginal revenue, Q refers to enterprise' s output, N is the number of enterprises, Z is the exogenous variable causing enterprise profit function move; C'_i represents marginal cost, W is the input price of essential factors, T is the exogenous variable causing enterprise cost function change.

The constraint condition of market to achieve a balanced zero profit is:

$$R^*_i(Q^*, N^*, Z) = C^*_i(Q^*, W, T)$$

Where * represents the equilibrium value of variables.

Market forces can cause changes in equilibrium returns, by changing the input price of enterprises, thus, H statistics expressed as elastic sum of total enterprise income to each element input price, to measure the market competition degree.

$$H = \sum_{m=1}^n \frac{\partial R^*_i W_{mi}}{\partial W_{mi} R^*_i}$$

Different H reflects different competition degree, the larger statistical value is, the greater competitive intensity is.

When H=1, it is a fully competitive market. Profit maximization' s constraint conditions bring up the factor prices, causing an increasing marginal cost and marginal revenue in proportion, so H=1.

When H≤0, it is a monopoly market or total collusive market. Increasing factor prices lead to a rising of marginal cost, thus, reducing the equilibrium output and equilibrium input, so H≤0.

When 0<H<1, it is a monopolistic competition market. Rising range of factor price is larger than that of total revenue, so 0<H<1.

3.2. Measurement Equation of PR Model in Trust Business

Under the current supervision system of our country, trust companies' s business scope includes inherent business and trust business. Includes inherent is conducted by trust companies' s natural capital, and trust business is

a kind of operating activity, trust companies committing trust business and dealing with trust affairs in the capacity of a trustee. From the point of input price, The labor, capital and physical capital is a main element of the company, so, when applying a RP model, the revenue of productions are operating incomes of a trust company. Factor price includes labor cost, capital cost and capital cost. According to the establish principle of H statistics and features of trust market, a RP model of trust business can be established.

3.2.1. The Measurement Equation of Competitive Test

$$\ln TRA_{it} = a + b_1 \ln PL_{it} + b_2 \ln PF_{it} + b_3 \ln PK_{it} + b_4 \ln RISK_{it} + \varepsilon \quad (1.1)$$

H statistics can be represented as:

$$H = b_1 + b_2 + b_3 \quad (1.2)$$

Where TRA represents the incomes of trust companies, PL represents labor cost, PF refers to a fund cost, PK refers to a capital cost, RISK represents the risk degree of trust companies, ε is random error.

3.2.2. The Measurement Equation of Equilibrium Test

Since the RP model assumes that trust companies operating in a long time equilibrium market, so it is a must to judge whether trust companies in samples are operating in a long time equilibrium market before estimating the model. If it is, the profit ratio of asset should equal to rate of market risk return, that is to say, the profit ratio of asset has nothing to do with factor input prices. As a result, equilibrium test can be conducted by:

$$\ln ROA_{it} = a + b_1 \ln PL_{it} + b_2 \ln PF_{it} + b_3 \ln PK_{it} + b_4 \ln RISK_{it} + \varepsilon \quad (1.3)$$

Where ROA is profit ratio of asset.

After model estimation,

$$H' = b_1 + b_2 + b_3 \quad (1.4)$$

Make a statistical test on the original assumption H', if it can not be refused, then it suggests that market is in a long time equilibrium.

3.3. Selecting Variables of RP Model in Trust Business

3.3.1. Dependent Variables of Competitive Test

When estimating H, there are two kinds of index can be selected as dependent variables of competitive test: one is absolute value of incomes, such as interest income of banking, business incomes of securities business; the other is proportional value of incomes, such as operating income / total assets. Remember that adopting absolute value or proportional value of incomes has a great effect on model's correct estimation. It has been tested that an appropriate setting of RP model ought to be independent variable without scale variable (such as total asset), and dependent variable is absolute value of incomes, instead of proportional value of incomes, otherwise, H statistics' s systematicness will be higher estimated. Thus, this article selects the business income of trust companies as dependent variables of competitive test.

3.3.2. Dependent Variables of Equilibrium Test

Dependent variables of equilibrium test are profit ratio of enterprises, return on assets (ROA) and return on net (RON) are usually used, the former reflects profit margin produced by mutual funds of shareholders and creditors, and the latter reflects the profit margin produced by invested funds of shareholder only. This article follows the setting of most empirical research, choosing ROA as the dependent variables of market equilibrium test model.

3.3.3. Independent Variable

According to RP model in trust business, independent variable including trust companies' s proportion of labor PL, proportion of fund PF and capital cost rate PK.

Proportion of labor is the price of labor, it can be calculated by wage expenditure / number of employees. But in practice operating, the annual report of trust companies do not provide the data about "wage expenditure", they have to use "business and management expenses" to replace "wage expenditure", it is also an alternative method commonly used in many literature. So, this study adopts "business and management expenses / number of employees" to represent proportion of labor.

Capital cost rate is capital input price, are usually expressed by "interest expense / total assets" or "financial expenses / total expenditure". Considering that the situation about "financial expenses" are undisclosed in annual report of trust companies, while trust businesses are not belong to liabilities of trust companies, and it has been a main business of the trust companies. As a result, this study use "trust project operating expenses / total assets" to represent capital cost rate.

A relatively accurate metrics of capital cost rate is calculating the ratio of "accumulated depreciation/net fixed assets", while "accumulated depreciation" are not completely disclosed in annual reports, so a practice operating cannot be conducted. This article draws lessons from other documents, using a definition of "generalized capital cost rate", that is to say, capital cost rate is the expenditure price of total cost without labor cost and capital cost, adopting "(operating expenditure - business and management expenses)/total assets" to represent capital cost rate.

3.3.4. Control Variable

The control variables of RP model usually including risk variable and scale variable. To avoid H statistic's systematic overestimation, the control variable of RP model is set as risk variable, the index is "general risk preparation/total assets".

In summary, according to the actual condition of trust business in our country, we choose dependent variable, independent variable and control variable for RP model, seeing table 1 for more information.

Table-1. Variable setting of RP model in our country's trust business

The name of variables	financial index
TRA	business incomes
ROA	net profit / total assets
PL	business and management expenses/number of employees
PF	trust project operating expenses/total assets
PK	(operating expenditure - business and management expenses)/total assets
RISK	General risk reserve/total assets

4. Empirical Tests and Results of Market Structure in Chinese Crust Business

4.1. Selection of Samples

According to general experience, too small sample size will lead to an inaccurate estimation result, when sample size ≥ 30 , it is able to meet the requirements of econometric model estimation. At present, there are 68 trust companies of our country totally, except for those companies which haven't a comprehensive annual report during 2008 - 2012, 43 companies' s annual report data during 2008 - 2012 are selected to be samples, to make an empirical analysis on the competition degree of trust business in China. The data of samples are all come from yanglee website company' s annual report.

4.2. Steps and Results of Empirical Test

This study use Eviews7.0 to make an estimation on RP models. Before parameter estimation, a non dimensional treatment is applied on the data of samples, as well as an unit root test and cointegration test. Considering that sample variances have heterogeneity, so we take a two multiplication method of weighted minimum to estimate the parameters.

4.2.1. Equilibrium Test

As mentioned above, RP model assumes that trust companies are operating on a long time balanced market, so it is necessary to examine that whether companies are in such a market before estimating H statistic, if not, then we can not use this model to estimate H. This article use Wald statistic to test the equilibrium of trust market. By calculating Eviews, a P value of statistic W which equals 0.2101 are obtained, is bigger than the level of 0.05. It suggested that the value of W statistic is located in an acceptance region of original hypothesis $H'=0$, that is to say the trust market in our county can meet the requirements of market equilibrium. Equilibrium test results are showed in table 2.

Table-2. Equilibrium test results

	Coefficient	t-Statistic
InPL	0.531465	3.707642
InPF	0.110481	2.225909
InPK	0.086193	2.972066
InRISK	0.239332	2.505118
Adjusted R-squared	0.977483	/
F-statistic	5.23677	0.0000
W-statistic ($H'=0$)	1.430278	0.2101

4.2.2. Competitive Test

Using Eviews to calculate and H-statistic is 0.689673, the regression results of competitive test are shown in table. In further, make a saliency test on H-statistic. Provided that H-statistic equals 1, then it suggests that the trust market in our country belongs to the market structure of complete monopoly; if H-statistic neither significantly equal to 1 nor 0, then it suggests that the trust market in our country belongs to market structure of monopolistic competition. This article still use Wald-statistic to test the saliency of H-statistics, calculating Wald-statistic under the assumption of $H=0$ and $H=1$, respectively, obtaining the the values of P which are all closing to 0, it suggests that under the 5% saliency level, original hypothesis of $H=0$ and $H=1$ are refused, accepting the hypothesis of $0 < H < 1$.

Thus, the results of the empirical test suggests that, during 2008-2012, trust market in our country belongs to the market structure of monopolistic competition in whole, and H-statistic is large, it shows that our countries' s trust market have an obvious competitiveness.

Table-3. Results of competitive test

	Coefficient	t-Statistic
InPL	0.221101	9.001518
InPF	0.132349	3.402833
InPK	0.152943	5.925431
InRISK	0.183280	3.783907
Adjusted R-squared	0.994983	/
F-statistic	18.97816	0.0000
H- statistic	0.689673	/
W-statistic (H=0)	29.7731	0.0000
W-statistic (H=1)	17.8922	0.0000

5. Analysis on Factors of Influence

According to industrial economics theory, market structure is the basic element to reflect the competitive nature of industrial organization, and the main determining reasons including market concentration, product differentiation, the growth rate of market demand, price elasticity of market demand and regional distribution of enterprises etc. These factors affect each other and effects the whole market structure of the industry. In which, market concentration, product differentiation and barriers of new enterprise' s entry is especially important.

According to the empirical results above, after the sixth industry consolidation of trust business, a market of monopolistic competition appears, and the market competition is relatively fierce. So this paper will analyze the causes of the formation of trust market structure in China from three points-----market concentration, product differentiation and barriers of new enterprise' s entry

(1)The concentration of trust market in China has been declining year by year, and taking on an increasingly fierce competition in industry.

Industrial organization theory holds that, market concentration effects the competitive status of the market directly, and it is also the primary factor which effects the market structure. The index measuring the market concentration are divided as absolute concentration index and relative concentration index, this paper through the frequently-used CR_n index and HHI - index to calculate the concentration of trust market.

$$CR_n = \sum_{i=1}^n \frac{X_i}{X} \quad (1.5)$$

$$HHI = \sum_{i=1}^n \left(\frac{X_i}{X} \right)^2 \quad (1.6)$$

Where X represents the total size of market, X_i represents the scale of i enterprise, n represents the number of enterprises in this industry. When calculating CR_n - index, Usually take n=4 or n=8. CR₄ means the proportion of market share the top four companies hold, CR₈ means the proportion of market share the top eight companies hold. The higher the CR_n index and HHI index value are, the higher market concentration is. For that HHI - index is usually small, it is usually multiplied by 10000 in practice use.

There are 68 trust companies in our country until now. According to the trust asset management scale, the top eight companies are selected to calculated Concentration index of trust market.

Table-4.Concentration index of trust market in 2008-2012

Particular year	CR₄	CR₈	HHI - index
2008	35.04%	54.42%	509.6
2009	30.54%	47.77%	420.0
2010	26.81%	42.48%	365.5
2011	21.62%	37.11%	294.7
2012	21.22%	33.56%	227.8
2013	19.61%	31.53%	137.8
2014	20.92%	34.68%	159.2
2015	23.17%	37.86%	191.2

Note: calculating according to the relevant data provided by the Yanglee trust website.

Through the calculation, CR₄, CR₈ and HHI index in trust market during 2008 - 2015 (Table 4) are showing a declining trend, indicating that the market concentration of China's trust industry has an obvious decline, which has become an important reason for the trust market structure competitive aggravate in China.

(2)Homogenization of trust products at this stage is prominent

Product differentiation is an important way to against competition during the enterprises' s business process, it reduces the substitutability of products themselves, to bring up the degree of market monopoly. In contrary, homogenization of products within the industry are more likely to bring up the competition of market. After Reform and Opening-up, the development of trust industry in China is rough, and trust business do not replace the inherent

business until 2010, to be the main business of the trust company. In just a few years, trust companies rely on the advantage of “full license”, expanding the business scale rapidly, but trust products of different companies share commons in some aspects, such as investment areas, trading patterns, etc. Degree of homogeneity of the product is high, and has a very large substitutability. This also leads to an obvious competitiveness on trust market’s structure in our country.

At present, the high degree of homogeneity of trust products also suggests that, the trust companies haven’t cultivated an ability to actively manage assets, and haven’t get rid of the model of extensive business growth, the core competence of trust companies are still waited to be further explored. However, in an increasingly intense circumstances of asset management industry competition, trust companies have accelerated business innovation and adjustments of business model, gradually establishing the different development of strategic objectives in market competition, relying on each business advantages, working in breakthrough and innovation on different products, reducing the substitutability of products.

(3) Trust market has a higher policy barriers, and regional segmentation features are obvious.

The trust market in our country has a high barrier to entry and exit. A trust company’s establish must approved by the China Banking Regulatory Commission and obtaining a financial license. After consolidation of the industry, the number of trust company’s business licenses are controlled strictly, up to now, there are totally 68 trust companies in country. At the same time, China Banking Regulatory Commission implements a trust business qualification management system on trust companies’ s employees. Trust companies of China conduct a two-tier supervision mechanism of territorial supervisions and combination of guidance and coordination. Trust companies are not allowed to establish or establish remote branches in disguise, but can make sales in different places. Although a number of trust companies set up a marketing center in different places, but there is no legal corporate identity in the locate place, the business developments of trust companies in remote markets are still restricted greatly. Such system causes a serious regional segmentation of trust markets in our country, also hinder the further concentration of market customer resources to some certain extent, reducing the monopoly of trust market, also causing the loss of trust resources allocation efficiency.

6. Conclusions and Suggestions

- (1) By constructing RP models of our countries’ s trust business, using the data of 43 companies in 2008-2012, to conduct an empirical test. Test results shows that, Trust market in China belongs to the market structure of monopolistic competition in whole, having a relatively higher competitiveness of market.
- (2) Market concentration, product differentiation and barriers of new enterprise’ s entry are important factors that affecting the degree of market competition. At this stage, the trust market in our country takes on a trend that market concentration are decreasing year by year, homogenization of trust products is prominent, the characteristics of regional segmentation are obvious, all of these lead to a relatively obvious competitiveness of trust companies in China.
- (3) To promote effective competition in the trust markets and optimize the allocation of market resources, reducing the entering barriers of trust market is needed, and perfecting the withdrawal system of trust companies, gradually providing deregulation for the establishment of branches. At the same time, with rapidly expanding the scales of companies, extensive management should be changed gradually to cultivate companies’ s own competitive advantages of the market.

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