



Regional Differences and Variability on Enterprise Management Performance: A case in China

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ABSTRACT

This paper measures variation in the economic performance of firms using the entropy weight method and cluster analysis. Regional differences and changes in the trend of listed companies' management performance are analyzed in China's four economic regions and 31 provinces from 2006 to 2010, the Eleventh Five Year period. We show that the listed companies' management performance in four economic regions presents a ladder type distribution with large swings and different trends over time. Moreover, there is a large difference in listed companies' management performance across provinces and some provinces have abnormal fluctuations. It is indicated that differences in industrial structures across regions are the main factor determining regional differences in economic development and the variability of enterprise management performance. So from the perspective of policy and institution, some suggestions are advanced to promote integrated development of all regions. In addition, the research results can provide governments at all levels with systematic reference information to formulate a coordinated, sustainable development policy for different regional economies.

Keywords: Regional Differences, Ladder Type Distribution, Management Performance

1. Introduction

In the early 1980s, in order to encourage some regions to take the lead in development, the Chinese government implemented unbalanced regional economic development strategies. East coastal regions became the pioneers of China's reform and opening-up and got many favorable policies including finance, revenue, open strategy, etc. With the help of preferential policy, the east that already had possessed advantages of resources and geographical location realized leapfrogging development. At the same time, it drove the economic development of other regions in China, which made a significant contribution to strengthening our country's

comprehensive power. In the late 1990s, as regional disparities widened and social contradictions are more and more prominent, the Chinese government started to implement balanced regional development strategies. During the period of Eleventh Five-Year Plan, the Chinese Government implemented a series of regional development strategies including "Western Development", "Revitalizing the Old Industrial Base in Northeast China" and "Rise of Central China", which have been effective. However, the unbalanced development of the regional economies is still obvious. In order to reduce regional disparities and promote the coordinated development of China's regional economies, the 12th Five Year Plan makes it clear that the comparative advantage of each region should be brought into full play, the rational movement of factors of production should be promoted and that regional economies should develop

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characteristics that give prominence to their industrial features and deepen regional cooperation, thereby promoting benign regional interaction (The State Council of China, 2011).

The space differentiation of regional economic development is a common phenomenon in the course of world economic development. Inter-regional differences in the development environment are bound to have a significant impact on the management performance of enterprises, which in turn implies that it is necessary to accurately grasp the differences of regional enterprise management performance in order to study and formulate regional economic development strategies. Scholars at home and abroad have considered regional differences in enterprise management performance. Yip (1991) found that 'continental businesses' (those businesses with continental scope) in the United States were more profitable than those in Europe, and 'regional businesses' (those businesses with regional scope) in Europe were more profitable than those in the United States, which indicates that enterprise performance is influenced by regional environment. Christmann, Day and Yip (1999) conclude that country characteristics are one of the most important determinants of enterprise performance. Khanna and Rivkin (2001) also found substantial differences in group profitability across countries in emerging markets. Shige Makino (2004) finds that regional environment factors affect corporate behavior as well as economic performance. Scholars in China have also provided relevant research. Liang Chen (1998) applied principal components analysis to data from a cross-section of Chinese provinces in 1997 to provide a qualitative assessment of regional economic environments and an index of the strength of listed companies in all regions. He concluded that the regional economic environment had a large effect on the economic performance of listed companies. Haiyan Zhong (2002) analyzed differences in Chinese listed companies from the eastern, central and western economic regions. He also found an association between the geographic distribution of Chinese listed companies and regional economic development. Chunli Wang (2011) used the DEA method to empirically analyze regional differences of the operating efficiency of listed companies in northeast China. Guoqing Chen (2011) studied characteristics of the distribution of Chinese listed companies' across regions and found that the operational performance of listed companies decreases gradually from the eastern region through the middle region to the western region.

Some scholars started to apply the idea of institution to study China's economic transition. Dimaggio & Powell (1983) studied the impacts of institutional environment on

organizational operation. New institutional economic school used culture as the carrier of institution and emphasized the impact of informal institution such as culture and cultural restrictions on economic development and social progress (Scott, 1995). Lu Yuan & Ingmar Bjorkman (1997) studied the human resource practice in Chinese homegrown and international joint venture companies. Doug Guthrie (1999) studied institutional changes and pointed out the impact of MNC on Chinese companies that were entering into international capital market and impact of these changes on Chinese political culture. Gary D. Bruton & David Ahlstrom (2002) applied the idea of institution to explain the specialty of China's venture capital market. John Child & Terence Tsai (2005) described the impact of all kinds of Chinese institutional factors on environmental protection of a international corporation in China.

One limitation of existing research is that few scholars have made a comprehensive analysis of enterprise performance in all provinces (cities, districts) in China from both the vertical (i.e., time) and horizontal points of view. In contrast, this paper applies the entropy weight method and cluster analysis to data on the A-share listed companies in Shanghai and Shenzhen stock markets in China across all provinces from 2006 to 2010. Results of the analysis clarify both the regional distribution of companies' economic performance and trends in enterprises' performance in China's four economic regions (the east, the northeast, central China and the west) and each province (city, district) during the period of Eleventh Five-Year Plan so that we can provide national and local governments with a systematic reference to study how to formulate a coordinated, sustainable development policy for the regional economies based on institutional theory and the current performance of regional enterprises.

II. Sample Data and Measurement

A. The Source and Composition of the Sample

The sample includes data of 7174 A-share listed companies in Shanghai and Shenzhen stock markets from RESSET database during the Eleventh Five-Year period (2006-2010), excluding the ST, ST* and companies with half-baked data. There are many potential regional classification schemes, such as eight economic zones, three major economic zones of the east, middle and west, the dichotomy of coastland and inland, ten economic cooperation

zones and three functional regions, and so on (Zizhen Zhang, 2010; Hongling Sun, 2005; Zhongmin Li, 2007; Yanghong Wang, 2008). The 11th Five Year Plan advanced a series of regional development strategies, such as “Western Development”, “Revitalizing the Old Industrial Base in Northeast China” and “Rise of Central China”, “East takes the lead in development”, etc. Considering the authority of national policies and their influence on regional development strategies, we use the divisions in the 11th Five Year Plan, which divides China into four parts: the east, central China, the west and the old northeastern industrial base. Table 1 shows the composition of the samples.

Overall, the spatial distribution of listed companies was imbalanced, with most located in the east and only a few in central and western regions. The top five provinces by number of listed companies were Guangdong, Zhejiang, Shanghai, Beijing and Jiangsu, which are all in the eastern region, whereas the bottom five provinces were Tibet, Qinghai, Ningxia, Hainan and Gansu which, except for Hainan, are in the western region. From the point of view of the increase margin of listed companies in the four economic regions during the five years, Additionally, the rate of growth in the number of listed companies in the east and central China

far exceeded that in the northeast and the west, with the

rate of growth in listed companies in the

east, central China, the northeast and the west given by 27.4%, 35.9%, 13.6% and 14.4% respectively.

B. Index and Weight

1. Index

Enterprise performance is the sum of enterprise business efficiency and managerial performance within a given period of operation. The business efficiency of enterprise is manifested chiefly in profitability, operational capacity, debt-paying ability and development capability, etc. Managerial performance is mainly reflected in the achievements and contributions to the operation, growth and development made by managers in the process of company management (The statistics and evaluation department of the ministry of finance, 1999).

A variety of different measures of company and manager performance have been used. At present, most foreigner analysts use DuPont financial analysis, EVA (Economic Value Added) and BSC (Balanced Score Card) to evaluate enterprise performance, whereas enterprise performance evaluation in our country focuses on profitability, assets

Table 1. omposition of Sample

Region	Province	Sample size					Region	Province	Sample size				
		2006	2007	2008	2009	2010			2006	2007	2008	2009	2010
The East	Zhejiang	97	114	125	138	141	The Northeast	Jilin	28	24	26	29	33
	Guangdong	141	161	170	212	196		Liaoning	39	42	45	45	41
	Jiangsu	96	104	109	119	125		Heilongjiang	21	20	20	21	26
	Shandong	75	78	85	91	85		Subtotal	88	86	91	95	100
	Fujian	39	42	45	53	59	The West	Inner Mongolia	17	17	17	18	20
	Shanghai	131	135	141	144	119		Sichuan	52	49	56	63	49
	Beijing	89	95	100	123	126		Chongqing	21	21	21	21	26
	Hebei	31	30	31	29	40		Qinghai	8	7	6	7	8
	Hainan	13	13	14	13	18		Ningxia	9	9	10	10	10
	Tianjin	21	25	24	27	25		Guizhou	17	17	18	18	19
	Subtotal	733	797	844	949	934		Shaanxi	24	22	22	23	24
The Central	Henan	31	35	36	39	44		Gansu	14	14	16	16	20
	Anhui	43	48	52	57	56		Tibet	6	6	6	7	8
	Jiangxi	21	25	24	24	30		Sinkiang	24	26	27	28	34
	Hubei	53	53	50	61	71		Guangxi	22	22	22	24	25
	Hunan	39	38	41	47	63		Yunnan	22	24	24	24	27
	Shanxi	27	26	26	26	27		Subtotal	236	234	245	259	270
	Subtotal	214	225	229	254	291							
Total Per Year		2006 : 1271		2007 : 1342		2008 : 1409		2009 : 1557		2010 : 1595		Total: 7174	

quality, debt risk, business situation and growth conditions, etc (State-owned Assets Supervision and Administration Commission, 2006). Li Xu and Ruiyu Liu (2004) developed the indicator system of performance evaluation to incorporate both financial and non-financial performance measures. Financial performance includes profitability, operational capacity, debt-paying ability and ability to withstand risks. Non-financial performance includes internal management ability, operation and development ability, which is the ability to learn and create. Ming Xu (2006) built a performance evaluation system of large scale state-owned companies from the following five dimensions: financial performance, customer relationship, internal processes, learning and growing. Jing Liu (2006) has established a performance evaluation system based on the value chain which sets up a series of indices from three factors: financial indicators, non-financial indicators reflecting the internal value chain and non-financial indicators reflecting the external value chain.

For a broad picture, enterprise performance can be measured from two aspects: financial indicators (profitability, operational capacity, debt-paying ability and development capability) and non-financial indicators (innovation ability, market competition ability and human resource management ability). Although these indicators can fully reflect enterprise and management performance, sources of data for all firms are difficult to find and some of the data is confidential to companies. Return on equity (ROE) and return on assets (ROA) are two widely used and broadly available measures of enterprise performance (Cremers, et al., 2005). Brealey and Myers believe ROA describes economic performance better than other indicators (Jun Yao, et al., 2004). Li and Wong (2003) show that ROA is a more stable indicator of economic performance than sales growth or return on sales. Palepu observes that ROE is a common performance indicator in the literature that discusses strategic management (Jun Yao, et al., 2004). Jun Yao (2004) argues that ROA reflects effective use of enterprise resources, whereas ROE reflects efficiency in meeting shareholders' interests, so that ROA and ROE together measure provide a broad measure of enterprise economic performance (Jun Yao, et al., 2004).

Based on these analyses, this paper chooses ROA and ROE as measurements of enterprise performance.

2. Index Weight

The entropy weight method determines the weight to apply to the ROA and ROE performance indicators based on the information content of each indicator (Sui Zhang, et

al., 2010). We use the entropy weight method because it is less subjective than alternative methods of weighting ROA and ROE, such as expert investigation, analytic hierarchy process or principal component analysis.

The following five steps are used to construct an entropy weight:

- Calculate the ROA and ROE for all listed companies in every province (city, district). Because the arithmetic mean is easily affected by extreme data and extremes in ROA are very common (Guanmin Liao, et al., 2012), we use the median, which is free from the influence of extremes, as a measure of central tendency (Yabao Zhou, 2004). For each province (city, district), the median ROA or ROE for listed companies' in the province is used to represent the ROA or ROE of the province.
- Standardization of data matrix. Because the order of magnitude of the indicators is different, it is necessary to standardize the data so that all indicators are comparable (Xiuxia Li, et al., 2011).

Suppose there are n evaluated objects and m evaluation indexes, then the initial data matrix is as follows:

$$X = (x_{ij})_{m \times n} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}$$

In the formula, x_{ij} ($i=1,2, \dots, n; j=1,2, \dots, m$) refers to the measured value of the j -th index belonging to the i -th object.

For an index of benefits x_{ij} , let $r_{ij} = \frac{x_{ij} - \min\{x_{ij}\}}{\max\{x_{ij}\} - \min\{x_{ij}\}}$

For an index of costs x_{ij} , let $r_{ij} = \frac{\max\{x_{ij}\} - x_{ij}}{\max\{x_{ij}\} - \min\{x_{ij}\}}$

Then the standardized matrix is $R = (r_{ij})_{m \times n}$.

- Calculate the entropy of evaluation indexed. The

entropy of the j -th index is $e_j = -\frac{1}{\ln n} \sum_{i=1}^n p_{ij} \ln p_{ij}$

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^n x_{ij}}$$

In the formula, $\sum_{i=1}^n x_{ij}$ ($i=1,2, \dots, n; j=1,2, \dots,$

m), where p_{ij} refers to the proportion of the j -th index belonging to the i -th object. If $p_{ij}=0$, then let $\ln p_{ij}=0$.

- Calculate the variation coefficient of each index j from

1 to m , $g_j = 1 - e_j$.

e. Determine the weight of indexes, given by

$$w_j = g_j / \sum_{j=1}^m g_j$$

Table 2 indicates that the weights that result from these calculations for the two indices of enterprise performance have similar values, from which it follows that they carry similar amounts of information.

C. Evaluation of Enterprise Performance

As mentioned above, for each province (city, district), the median ROA or ROE for listed companies' in the province is used to represent the ROA or ROE of the province. So we can get the value of ROA and ROE for each of the 31 provinces (cities, district).

Let x_{ijt} ($i=1,2,\dots,31$; $j=1,2$; $t=1,2,\dots,5$) refers to the value of the j -th index, where $j=1$ for ROA and $j=2$ for ROE, belonging to the i -th province (city, district) in the t -th year; then

1. The evaluation of enterprise performance in each province (city, district) i in each year t is given by

$$pp_{it} = \sum_{j=1}^2 x_{ijt} \times w_j$$

2. The mean evaluation of enterprise performance in each province (city, district) i during the five years is its arithmetic average across the five years,

$$pp'_i = \frac{1}{5} \sum_{t=1}^5 pp_{it}$$

Table 2. Weight of ROA and ROE (Entropy Method)

Measured Value of Enterprise Performance	Entropy (ej)	Variation Coefficient (gj)	Weight (wj)
ROA	0.9788	0.0212	0.5301
ROE	0.9812	0.0188	0.4699

3. The mean evaluation of enterprise performance in each region k for each year t is the arithmetic average of the evaluation of enterprise performance for the provinces within the region,

$$rp_{kt} = \frac{1}{n} \sum_{i=1}^n pp_{it},$$

where n refers to the number of the provinces, cities or areas belonging to region k .

4. The mean of the evaluation of enterprise performance

in each region k for the five year period is the arithmetic average of the evaluation of enterprise performance for the region for the five years,

$$rp'_k = \frac{1}{5} \sum_{t=1}^5 rp_{kt}$$

III. Analysis

We calculate the evaluations of performance for listed companies in each province (city, district) from 2006 to 2010 using the formulas presented above. To facilitate comparison of the relative values of the evaluation of enterprise performance across provinces and time periods, we apply K-Means Cluster analysis to both the evaluations of enterprise performance within each province for each year and to the mean evaluation of enterprise performance for each province across the five year period. K-means cluster analysis can reveal differences and relationships among the classified objects (individuals or indexes) that are intuitive (Pengfei Ni, et al., 2003). The result of cluster analysis shows that when divided into three groups, the samples are relatively concentrated and squared Euclidean distance which represents closeness degree is smaller. So the regional enterprise performances of 31 provinces (cities, districts) are divided into three types: excellent (E), good (G) and poor (P) according to the values of cluster centers that are listed in Table 3.

A. Analysis on Differences and Variability of Listed Company Performance in Four Economic Regions

Figure 1 shows the results of cluster analysis on the mean evaluations of the performance of listed companies in the four economic regions during the Eleventh Five-year period. Overall, the mean evaluation of performance of listed companies decreases gradually from the east to the west. The types of enterprise performance in eastern and central region companies were mainly excellent and good, whereas the northeastern and western region had enterprise performance evaluations that were all either good or poor.

Figure 2 shows how the mean evaluation of listed company performance in the four economic regions changed over time during the Eleventh Five-year period. Throughout the Eleventh Five-year period, the mean evaluation of performance of listed companies in the east coast and central

Table 3. Enterprise Performance Evaluative Value and Clustering Analysis Result of A-share Listed Companies in Shanghai and Shenzhen Stock Markets During the Eleventh 5-Year Period

Central	Province	Performance Evaluative Value and Type of Regional Enterprises															Mean of Each Region During the Five Years		
		2006			2007			2008			2009			2010			PP_i	T	TP_k
		PP_u	T	TP_{kt}	PP_u	T	TP_{kt}	PP_u	T	TP_{kt}	PP_u	T	TP_{kt}	PP_u	T	TP_{kt}			
The East	Zhejiang	10.4	E	9.3	11.9	E	10.4	12.9	E	10.9	10.9	E	9.4	9.4	E	8.3	11.4	E	9.7
	Guangdong	9.6	E		11.4	E		13	E		10.4	E		8.6	E		11	E	
	Jiangsu	9	G		12	E		12.7	E		11	E		8	G		10.8	E	
	Shandong	10.5	E		11.4	E		11.8	E		10.4	E		9.5	E		10.7	E	
	Fujian	10.2	E		11.1	E		11.9	E		10.1	E		9.2	E		10	E	
	Shanghai	9.1	G		10.2	E		9.5	G		9.2	E		8.1	G		9	G	
	Beijing	10.5	E		11.2	E		12.3	E		10.2	E		9.5	E		8.7	G	
	Hebei	8.9	G		9.2	G		9.4	G		8.2	G		7.9	G		8.5	G	
	Hainan	8.9	G		10.1	E		6.9	P		9.1	E		7.9	G		8.4	G	
	Tianjin	6.3	P		5.3	P		8.3	G		4.3	P		5.3	P		5.1	P	
The Central	Henan	9	G	9.2	11.3	E	10.1	10.8	E	9.5	10.3	E	9.1	8	G	8.2	9.9	E	9.2
	Anhui	10	E		11.9	E		9.4	G		10.9	E		9	E		9.9	E	
	Jiangxi	10.6	E		9.1	G		8.9	G		8.1	G		9.6	E		8.6	G	
	Hubei	8.4	G		9.3	G		9.4	G		8.3	G		7.4	G		8.5	G	
	Hunan	8.5	G		9.7	G		8.9	G		8.7	G		7.5	G		8.5	G	
	Shanxi	8.6	G		9	G		9.5	G		8	G		7.6	G		8.3	G	
The Northeast	Jilin	10.3	E	8.6	6.9	P	7.3	8.8	G	7.9	5.9	P	6.3	9.3	E	7.6	7.9	G	7.5
	Liaoning	7.9	G		7.5	G		8.5	G		6.5	G		6.9	G		7.3	P	
	Heilongjiang	7.7	G		7.6	G		6.3	P		6.6	G		6.7	G		6.8	P	
The West	Inner Mongolia	9.3	G	7.3	9.4	G	7.7	8.3	G	6.5	8.4	G	6.7	8.3	G	6.3	9.1	G	6.9
	Sichuan	9.2	G		9.1	G		9.7	G		8.1	G		8.2	G		8.7	G	
	Chongqing	7.2	P		8.7	G		11.4	E		7.7	G		6.2	P		8.1	G	
	Qinghai	6.7	P		5.4	P		5.4	P		4.4	P		5.7	P		7.4	G	
	Ningxia	8.4	G		6.6	P		6.1	P		5.6	P		7.4	G		7.1	P	
	Guizhou	7.1	P		8.3	G		4.9	P		7.3	G		6.1	P		6.9	P	
	Shaanxi	5.9	P		7.4	G		6.4	P		6.4	P		4.9	P		6.8	P	
	Gansu	5.7	P		8.4	G		6.2	P		7.4	G		4.7	P		6.4	P	
	Tibet	6.4	P		7	P		5.8	P		6	P		5.4	P		6.4	P	
	Sinkiang	7.1	P		7.5	G		6.3	P		6.5	G		6.1	P		6.4	P	
	Guangxi	7.7	G		8.6	G		2.8	P		7.6	G		6.7	G		5.9	P	
	Yunnan	7.4	P		6	P		5.4	P		5	P		6.4	P		5.5	P	

PP_u means Evaluative Value; T means Type; TP_{kt} means Evaluation Mean; PP_i means Evaluative Value; TP_k means Evaluation Mean.

regions always ranked among the best, with companies in the northeast and west apparently lagging.

With unique natural resources, favorable policies and a location advantage, the east coast has bred a large number of companies with abundant capital and sound development momentum, which explains its superior integrated enterprise performance. Central China has managed to maintain its rank second to the east coast throughout the 2006-2010 period

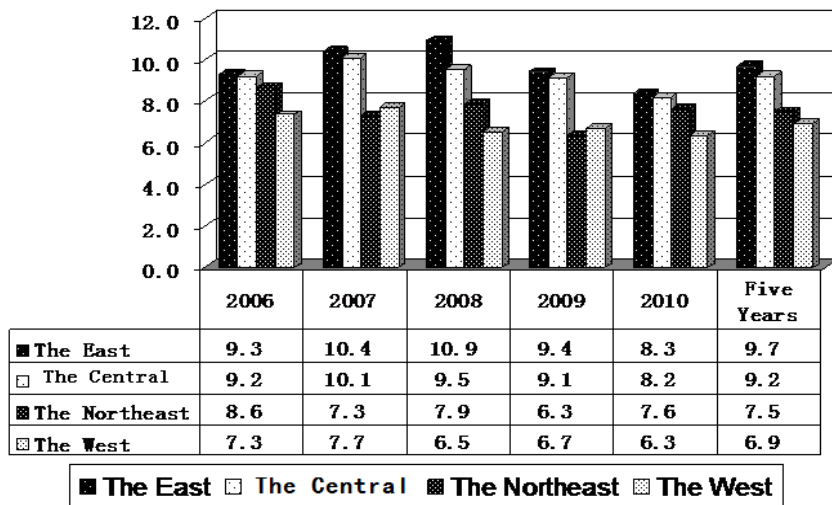
and listed companies in the northeast and west obviously trailed behind the east and central China.

Three northeastern provinces have vast territories, rich products and solid foundation for heavy industry, but they didn't exploit these advantages. In general, enterprise performance of listed companies in the northeast in 2007 and 2009 was worse than companies in the west. The northeast has an old industry base in China with many old

Figure 1. Distribution of Enterprise Performance Type



Figure 2. Comparison of Enterprise Performance in Each Economic Region During Eleven Five-Year Period



and state-owned enterprises and the traditional business paradigms of state-owned enterprises prevented its economic development.

Trends in the evaluation of performance of listed companies in the four economic areas show great volatility

during the Eleventh Five-year period. For example, performance of listed companies in the east rose slightly as a whole before 2008, but dropped almost across the board after 2008. The financial crisis that swept the globe in 2008 had a large impact on economic development in our country,

especially for export-oriented enterprises in east coast, which fell more precipitously than elsewhere.

Management performance of listed companies in the northeast, central China and the west fell slightly during the financial crisis of 2008, but some provinces (cities, districts) bucked the overall trend of depressed performance caused by the financial crisis. One factor in their favor was their lower reliance on exports and a second was the Chinese Government's implementation of a series of coordinated development policies on regional economy, such as "Western Development", "Revitalizing the Old Industrial Base in Northeast China" and "Rise of Central China". In the new environment of regional development, the tendency of modernization and economic growth was assisted by the transfer of relevant factors of production, talents and capital, to the central and western areas, facilitating their growth. In the old northeastern industrial base, relatively abundant natural resources and a strong foundation for industrial technology and developed transportation remained during the financial crisis, which led to no sharp decline in the northeast and did not deter strong development momentum in some provinces.

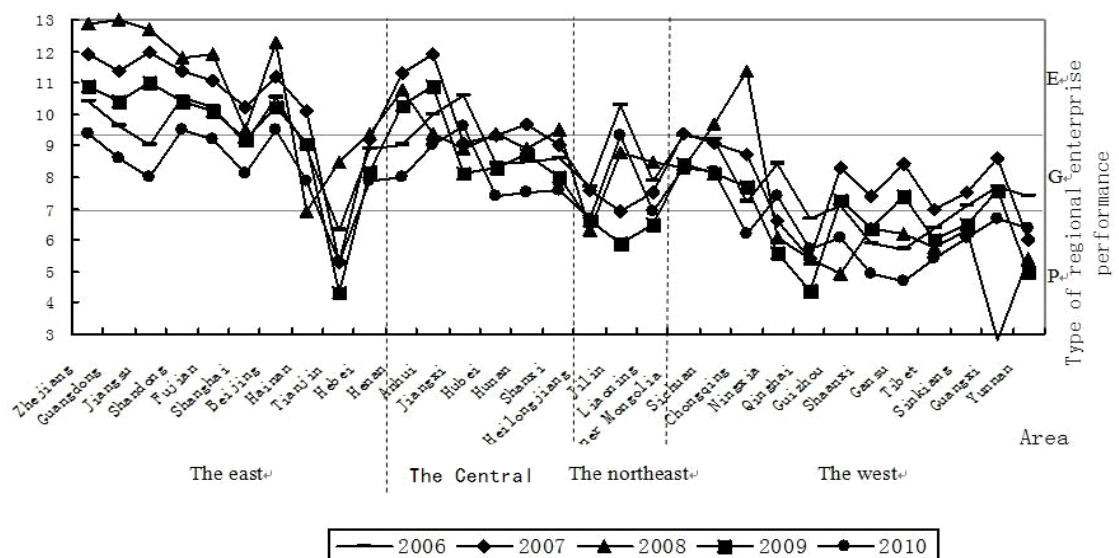
B. Analysis on Differences and Variability of Listed Company Performance in 31 Chinese Provinces (Cities, Districts)

After discussing overall trends within provinces, we provide several brief case studies that contrast performance

among different provinces. Variability of regional enterprise performance in each area is shown in Figure 3. During the Eleventh Five-year period, there were some differences in performance of listed companies in 31 Chinese provinces (cities, districts) and enterprise performance of each province (city, district) fluctuated quite a bit with time. Unbalanced development of listed companies in the 31 provinces (cities, districts) was still obvious during the Eleventh Five-year period, manifested in two ways. First, the spatial distribution of listed companies was imbalanced, with most located in the east and only a few in central and western regions. The top five provinces by number of listed companies were Guangdong, Zhejiang, Shanghai, Beijing and Jiangsu, which are all in the eastern region, whereas the bottom five provinces were Tibet, Qinghai, Ningxia, Hainan and Gansu which, except for Hainan, are in the western region. From the point of view of the increase margin of listed companies in the four economic regions during the five years, Additionally, the rate of growth in the number of listed companies in the east and central China far exceeded that in the northeast and the west, with the rate of growth in listed companies in the east, central China, the northeast and the west given by 27.4%, 35.9%, 13.6% and 14.4% respectively.

The second manifestation of imbalanced growth was the large disparities in performance evaluations of listed companies within each area. The province with the highest performance had a performance index twice as large as the

Figure 3. Variability of Regional Enterprise Performance in Each Area



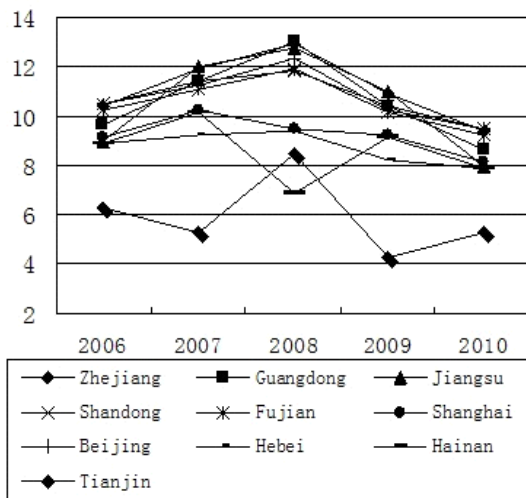
lowest performing province. The top five evaluations of performance among the provinces over the five years were Zhejiang, Guangdong, Jiangsu, Shandong and Fujian which are in the east region, whereas the bottom five were Tianjin, Yunnan, Guangxi, Gansu, Tibet and Sinkiang (Tibet and Sinkiang tied for the last) which, except for Tianjin, are in the west.

As discussed earlier for the regions, management

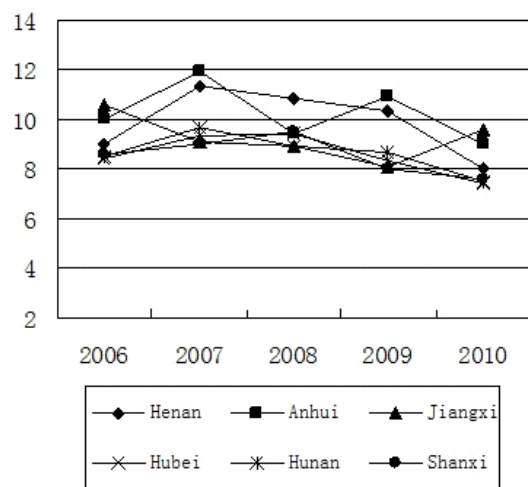
performance of listed companies in each province (city, district) suffered volatility, but with different trends. (See Figure 4)

For example, during the Eleventh Five-year period, management performance of listed companies in Anhui province presented an M-type fluctuation with a sharp downturn in 2008. The overall size of listed companies in Anhui province was relatively small and market share was

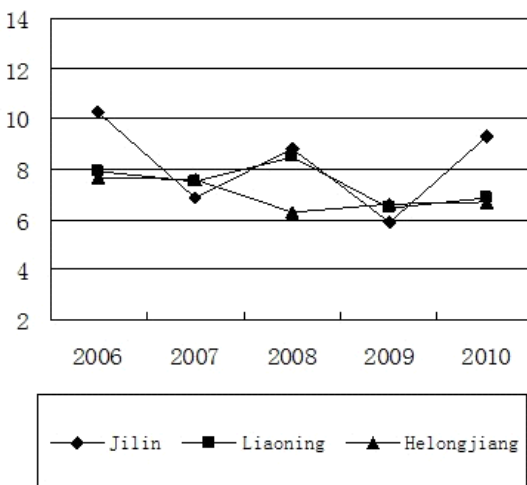
Figure 4. Variability of Management Performance of Listed Companies in Each Province (City, District) During the Eleventh Five-Year Period



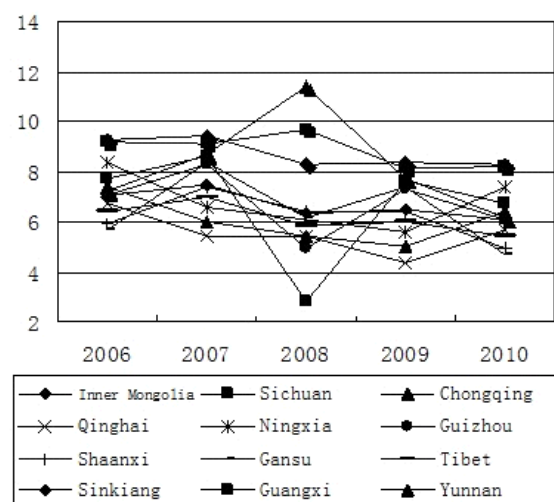
A. Variability of the east



B. Variability of the central



C. Variability of the northeast



D. Variability of the west

low. The asset securitization rate of these was only about 70%, lower than the national average of 132%. Moreover, back-up resources of listed companies was deficient as well. Due to financial crisis in 2008 and the resulting decline in international market demand and falling prices, performance of most listed companies in Anhui province deteriorated. Some companies experiencing decreases in net profit greater than 50%, such as Fengyuan Pharmaceutical, Xinke New Materials, Sanjia technology, Annada company, State-management company and Huaxing Chemical Industry.

Listed companies with ageing products that were also vulnerable to the influence of their industrial structure suffered even more significantly. For example, revenues and profits of State-managed companies producing mainly PE and PVC reduced sharply and suffered huge losses, with Huaxing Chemical Industry reporting a 90% to 100% plunge in year-on-year net profits. But listed companies in Anhui province faced new development opportunities and enterprise performance increased substantially after the establishment of the Wan Jiang urban planning, resource transfers discussed earlier and the promotion of "home appliances to the countryside".

As a second example of the diversity of trends, the performance of listed companies in Jinlin province presented W-type fluctuation of alternate up and down fluctuations. As one of the provinces with an old industrial base, Jinlin province fell behind in the development of an industrial cluster. Currently, the industrial layout and taxes of Jilin province are focused on industries such as Chinese medicine, real estate, rare metals and concrete building materials. But the overall net profit of the four industries is relatively low. Compared with the whole A-share market, other leading industries in Jinlin, such as agricultural products, mines and coal, wood and furniture, chemical fibers and spinning and business and merchandise were in a weak position.

Nevertheless, in 2008 management performance and quality of listed companies in Jinlin province improved markedly. The average EPS and the average return on net assets of A-share listed companies were 13% and 3% higher than the national average, respectively. At the same time, the number of listed companies increased as well. Jinlin province bounced back because it seized the historic opportunities of share reform and restructuring and creatively carried out some capitalization means like stock ownership, merger and acquisition, assets reorganization and debt restructuring, which solved problems of its historical legacy. Additionally, governance structures were further improved, which played an important role in upgrading companies' quality. Moreover, Jilin took the construction of the capital market as an important task to revitalize the old Jilin

industrial base and it provided strong support for development of listed companies. Although the performance of listed companies receded again in 2009, Jilin province the fair and open competitive environment Jinlin created, along with some corresponding industrial policies and regional development policies has led to improved performance of listed companies in 2010.

As with the four regions discussed earlier, performance of listed companies in each province (city, district) showed a general decline after financial crisis in 2008, but some provinces (cities, district) only declined slightly and some even bucked the trend.

The economic performance of listed companies in Hainan, Guizhou and Guangxi declined especially severely. For example, in Hainan only 13 companies were profitable and 3 companies got a profit of over 100 million, 7 companies suffered losses, 6 of which had losses in net profits of more than 100%. These loss-making companies accounted for 30% of all listed companies in Hainan province. The reason for Hainan's deteriorating performance was its narrow industrial base, built mainly on agriculture, tourism and real estate. The foundation of other industries was too weak and became an obstacle to economic development. The lack of support from manufacturing made of economic growth and the development of enterprises in Hainan province much more vulnerable to financial crisis.

Enterprise performance of listed companies in Guizhou and Guangxi also declined sharply in 2008. In Guizhou, the problem is again a narrow industrial base in which most of the listed companies were liquor enterprises. The financial crisis in 2008 led to the rapid plummet of liquor sales in Guizhou province. For example, sales of Wuliangye, National Pits 1573 and Swellfun, compared with the same period last year, declined almost 30% only in the market of Chongqing.

The Guangxi Autonomous Region was also one of the areas with largest decline in enterprise performance in 2008. Product orders of some companies declined sharply from reduced demand at home and abroad. As product sales slumped, inventory pressures became greater, forcing companies to cut back production, limit production or even stop production. Additionally, companies' margins were often squeezed by rising prices for raw materials, fuels and power, while the producer price of their industrial products declined. Some companies suffered losses and these problems led to the poor economic performance of listed companies in Guangxi Autonomous Region.

In contrast to the declining fortunes of the provinces discussed above, Chongqing was among the few places whose regional enterprise performance forged ahead during

the financial crisis of 2008. The Report at the 17th Party Congress pointed out that we should deepen openness in the coastal areas, increase the opening of inland and improve openness along the border, giving Chongqing a new development opportunity. Thus the central government proposed to accelerate the pace in building Chongqing into an important growth polarity of the west, an economic center of the upper reaches of the Yangtze River and a municipality with balanced development of urban and rural areas. Additionally, the State Council issued some advice on promoting the balance of urban and rural reformation and development which made it clear that Chongqing had a very important strategic position in promoting coordinated regional development and China's economic reform and opening. Fueled by a series of policy measures such as fiscal stimulus plan of RMB 400 billion, ten industries revitalization plan, construction of Three Gorges and western development, Chongqing turned financial crisis into an opportunity to develop fast and healthily.

As the center of Bohai Economic Circle, Tianjin occupied the right place at the right time, but its listed company performance continued to slide and was far below the average level of the eastern area, even near the bottom of all provinces (cities, districts). But there was a rebound in 2008 and the overall evaluation of performance of listed companies' in Tianjin turned from poor into good. (See Table 3)

The development of listed companies in Tianjin was universally low and their quality and operating stability were poor. There was still a gap between Tianjin and other developed regions, which was incompatible with sustained and rapid economic development of Tianjin and failed to drive the economy of Tianjin and the surrounding areas forward. As Lei Xin (2012) observed in his paper, the current situation of listed companies in Tianjin could be summarized as follows: few companies with few sizable companies, few good-performing companies and few companies with sustainable financing ability and too many ST listed companies. In addition, leading industries were the traditional industries of real estate, medicine, park construction, port and machine manufacturing and emerging industries were insufficient to form of new source of economic growth in Tianjin.

In June of 2006, the State Council approved the establishment of Tianjin Binhai New Area as an experimental district with comprehensive reforms and introduced a series of supporting policies, such as "prior to carry and try". Performance of listed companies in Tianjin increased by leaps and bounds in response, but it remains to be seen whether listed companies in Tianjin can develop sustainably.

IV. Conclusion and Policy Suggestion

This paper uses the entropy weight method and cluster analysis to conduct empirical research on the economic performance of A-share listed companies in Shanghai and Shenzhen stock markets in China at the provincial level during the Eleventh Five-year period. The conclusions are as follows:

Firstly, cluster analysis was used to divide the economic performance of listed companies in the four economic regions into three groups: excellent, good and poor. We find that regional enterprise performance decreased gradually from a high in the eastern region through the middle region to the western region. In general, regional enterprise performance of the east coast and central region were much better than that of the northeast and west.

Secondly, economic performance of listed companies in the four economic areas and each province (city, district) suffered great volatility during the Eleventh Five-year period. And differences in industrial structure in each area were the main reasons why there were large regional disparities in enterprise management performance.

Thirdly, economic performance of listed companies in the four economic areas and each province (city, district) showed different trends during the Eleventh Five-year period. Performance of listed companies in some provinces (such as Anhui province) presented M-type fluctuation. And some other provinces (for example, Jilin province) presented W-type fluctuation.

Forthly, the global financial crisis in 2008 had a tremendous influence on economic performance of listed companies with a different degree. Management performance of listed companies in some provinces (like Hainan, Guizhou and Guangxi) declined especially sharply in 2008, whereas in other areas (such as Chongqing and Tianjin) performance declined only slightly or even bucked the downward trend in 2008.

The problem of differences in regional economic development is faced by all countries. Regional development and regional enterprise development interact and promote each other. Balanced development of regional enterprises requires coordinating regional economic development and reducing regional differences mean a great deal. Based on Institutions and Economic Theory, this paper puts forward some suggestions from the perspective of policy and institution.

Firstly, we should adhere to regional economy coordinated development policies in order to reduce regional differences and promote equilibrium of regional economies with sustainable growth. Each region should take advantage of regional economic development policies.

Secondly, the government should transform its functions

and promote ability of institutional supply. Accelerate the improvement of macro-regulation system and stress on macro planning, policy-making, coordination and guidance. Further exit from microeconomic fields and use economic and legal means more often to regulate economic activities.

Thirdly, regions need to give full play to their comparative advantages and upgrade regional core competition. China's four economic regions vary in resource endowment and strengths. This diversity provides each region with a comparative advantage it can exploit to help both itself and other regions that it can trade with.

Finally, the regions should break geographical constraints, consolidate spatial relationships, learn from each other and achieve common progress. Following the tendency of economic globalization to allocate factors of production optimally, we should encourage orderly transfer of industries and reasonable flow of factors across regions. By cooperation and exchange, companies in each region can better meet their own needs of development, complement each other's advantages and promote benign interaction, thus improving economic efficiency for the nation as a whole.

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