Creative Industries Development and Efficiency in China

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Abstract. China is becoming a leading player in the world market of creative goods and service.

In this paper we first seek to explore the development and structure of urban creative industries in China. It indicates that China's city creative industries is fast increasing during the period of 2004-2008. Secondly, a Data Envelopment Analysis (DEA) model, based on the data of China's 36 capital and/or sub-provincial cities, is used to estimate the Technical Efficiency (TE) of urban creative industries, where the efficiency scores are decomposed into the Pure Technical Efficiency (PTE) and Scale Efficiency (SE). Due to poor input utilization and scale inefficiency, it shows most of cities in China are falling into the situation with low efficiency development on creative sectors. Finally, the paper provides some implications for policy makers on how to increase creative industries efficiency.

Keywords. Creative industries, technology efficiency, Data Envelopment Agreement (DEA).

1 Introduction

As our society moves into the so-called information age when the economic growth is greatly driven by innovation and creativity, the creative industries as one of most dynamic emerging sectors are growing rapidly and becoming a new engine of the world economic growth. UNCTAD (2010) shows that the world trade of creative goods and services continues its expansion in 2008, reaching \$592 billion with an annual growth rate of 14 per cent during the period of 2002-2008, despite a decline of 12 per cent in global trade due to financial crisis. China has become a leading player in the world market for creative goods with an impressive 20 per cent exporting market share during the period from 2000 to 2008 (UNCTAD, 2010).

It is suggested creative industries is on the huge growth in the contemporary economy. Yusuf & Nabeshima (2005) highlight the economic center of gravity of the leading cities is changing from manufacturing to creative industries. To lead growth and own comparative advantage, cities need to evolve or remain as the centers of creative industries or service-providing hubs. The existing studies show the development of creative industries or the creative class plays an increasing role in driving and facilitating regional wealth and employment growth (Asheim & Hansen, 2009; Boschma & Fritsch, 2009; Rumpel et al., 2010; Cooke & De Propriis, 2011). Creative industries rely on various factors, such as word of mouth, taste, culture, and popularity, in which individual choices are dominated by information feedback over social networks rather than innate preferences and price signals (Potts et al., 2008). Therefore, the creative industries should be explored by multidisciplinary approach (Pratt, 2013; Andres & Chapain, 2013; Kacerauskas, 2013), rather than only by case study or policy science perspective. Kacerauskas (2013) argues the analysis on creative and cultural industries should refer to philosophical, sociological and communication aspects. However, recent research lacks of paying attention to the

growth of creative industries efficiency. As a result the efficiency score of the creative industries at the regional level or sector level is still under explored, particularly in China.

In this paper we attempt to respond to the existing unexplained questions and verify: how much efficiency scores does the creative industries achieve in China. Based on the data of China’s 36 capital and/or sub-provincial cities, a data envelopment analysis (DEA) model is applied to assess technology efficiency of China’s city creative industries (including pure technical efficiency and scale efficiency). The results show the technology efficiency score of urban creative industries is 58.3% during the period of 2002-2008 in China, including pure technical efficiency score of 66.3% and scale efficiency score of 89.3%. In general, due to poor input utilization and scale inefficiency, it shows most of cities in China are falling into the situation with low efficiency development on creative groups. This study not only can be helpful to understand problems hiding in China’s creative industries despite of its fast growing but also provides a representative case for the world creative industries development from the biggest developing country in China.

The development structure of creative industries in China is depicted in the following section (Section 2). China’s CIA at the city level is discussed in Section 3. China’s city creative industries efficiency is estimated and analyzed in Section 4. The last section is the conclusions.

2 The development of creative industries in china

The participation in global markets for producing creative goods and services is extremely strong in the advanced economies. In recent years the rise of the creative industries are unprecedented in speed and scale in the developing economies, particularly in China. China is becoming a leading player in the world trade of creative goods, accounting for 20 per cent of world market. In 2008 China is turned out to be the largest trade surplus in creative goods with net exports of 79 billion, while the United States has the largest trade deficits in creative goods with net imports of 55 billion (UNCTAD, 2010).

Table 1 presents the development of China’s creative industries compared to the general industry during the period of 2004-2008. The trend growth rate of the number of creative firm is calculated to be close to 20.11% per year while the growth rate of new firm in general industries appears to be 13.16% a year throughout the period of 2004-2008. The employment in the creative sectors grows 11.97% per year over 2004-2008, compared to 7.78% of employment growth for general industries. In 2008 the creative industries produced 4648.64 billion yuan in operating revenue with an average annual growth rate (AAGR) of 25.71% for 2004-2008, in contrast, the annual growth rate of operating revenue reach up to 34.05% in general industries.

Table 1. The development of creative industries in China.

Category	Industry	2004	2008	AAGR (%)
The number of firms	Creative industries (CI) (1000)	378.96	683.78	20.11
	General industries (GI) (1000)	3249.34	4959.67	13.16
	The share of CI in GI (%)	11.66	13.79	4.55
Employ-ment	Creative industries (million workers)	9.43	13.94	11.97
	General industries (million workers)	166.93	218.89	7.78
	The share of CI in GI (%)	5.65	6.37	3.19
Income	Creative industries (in billion of RMB)	2291.66	4648.64	25.71
	General industries (in billion of RMB)	44097.65	104167.2	34.05
	The share of CI in GI (%)	5.20	4.46	-3.53

Source: Author’s calculations based on the China Economic Census Yearbook (2010).

In 2008 there are 683 781 creative firms registered in China, accounting for 13.79% in all registered firms, while the employment of creative industries is 13.94 million yuan, accounting for 6.37% of all employment in China. The revenue generated by creative firms is 4648.64 billion yuan, but accounting for 4.46% only of all industries revenue. It shows the proportion of business income of the creative industries in all industries revenue (i.e. 4.46%) is slightly less than the share of creative employment in total employment (i.e. 6.37%), but considerably less than the ratio of creative firm in all firms (i.e. 13.79%). It indicates that the average size of creative firms is slightly smaller than other firms, and the development of business incomes in creative industries is lagged behind general industries probably due to productivity shortfalls.

Data for the share of creative industries in general industries illustrated in Table 1 indicates that 13.79 per cent creative firms produce 6.37 per cent creative employments but only generate 4.46 per cent revenue incomes in all industries in 2008. Table 1 also shows a negative score (-3.53%) of the AAGR on operating revenue of creative industries during the period of 2004-2008, while the creative firms and employments are both highly increased by 4.55% and 3.19% respectively per year over the same period. In other words, it inputs the same creative firms and employments but outputs less incomes, implying there is serious inequality between the inputs and outputs of China’s creative industries.

It is inferred that China’s creative industries may fall into low efficiency by the observation that the share of creative industries revenue in total revenue is much less than the proportion of creative employment in total employment as revealed in Table 1. However, this argument may suffer from a suspicion because there is not sufficient empirical evidence to calculate how inefficient is the creative industries in China. To deal with this suspicion, empirically, the efficiency of creative industries by different sectors and regions will be estimated in Section 3.

3 China’s city creative industries efficiency

Data envelopment analysis (DEA) is a mathematical programming approach to provide a relative efficiency assessment for a group of decision making units (DMU) by the ratio of inputs and outputs. Determining whether a DMU is efficient from the observed data is equivalent to testing whether the DMU is on the “frontier” of the production possibility set (Wei, 2000). In this paper, the variable returns to scale (VRS) model of DEA is used to calculate city efficiency of creative industries in China, where the VRS model allows breaking technical efficiency (TE) into two components: pure technical efficiency (PTE) and scale efficiency (SE). The PTE measures how a DMU utilizes the resources under exogenous environments, while the SE is the potential productivity gain from achieving optimal size of a firm (Wei, 2000).

Table 2. Summary statistics for the input and output data.

Inputs	Unit	Mean	St. dv.
Employment of creative industries	No. of workers	275711	353687
Total asset of creative industries	10 billion Yuan	492.40	995.19
Output	Unit	Mean	St. dv.
Operating revenue of creative industries	10 billion Yuan	93.30	169.28

Source: Author’s calculations based on the China Economic Census Yearbook (2010).

The input and output variables selected should be best representative quality in estimating the efficiency. The DEA model, in this paper, includes two inputs and a single output. The output corresponds to the operating revenue of creative industries, while the input is measured by creative employment and total asset of creative industries. The data of inputs and output based on China’s 36 capital and/or sub-capital cities all are from *China Economic Census Yearbook* (National Bureau of Statistic of China, 2010). Input and output variables have been identified in Table 2.

Table 3 presents the TE, PTE and SE scores of creative industries of top 10 and bottom 10 selected cities in 2008. On average, the technical efficiency score of China’s creative industries is 58% in 2008, indicating 42% of efficiency has

been lost. There are 15 cities (accounting for 42% of the sample) whose efficiency scores of creative industries have exceeded 60% (see Table 3). Nanchang and Urumchi being with TE scores of 100% are on the “frontier” of the production, suggesting these two cities have achieved the point of best relative efficiency in creative sectors, while Xining is found to be the least efficient relatively with TE scores of 27%. The TE score of top 10 cities are turned out to be more than 70%, in which 8 out of 10 cities, i.e. Urumchi, Nanchang, Beijing, Xi-an, Guangzhou, Shanghai, Chengdu and Lhasa are fully efficient on PTE score.

Table 3. Efficiency scores in urban China.

Top10 cities	Technical efficiency	Pure technical efficiency	Scale efficiency
Nanchang	1	1	1
Urumchi	1	1	1
Beijing	0.892	1	0.892
Changchun	0.874	0.968	0.902
Xi'an	0.842	1	0.842
Guangzhou	0.811	1	0.811
Shanghai	0.790	1	0.790
Chengdu	0.757	1	0.757
Jinan	0.752	0.88	0.854
Hohhot	0.749	0.763	0.981
Bottom 10 cities	Technical efficiency	Pure technical efficiency	Scale efficiency
Wuhan	0.451	0.487	0.926
Nanning	0.442	0.451	0.980
Harbin	0.439	0.439	0.999
Shenyang	0.423	0.428	0.989
Yinchuan	0.394	0.487	0.809
Guiyang	0.366	0.423	0.865
Tianjin	0.358	0.374	0.958
Lanzhou	0.302	0.326	0.927
Haikou	0.298	0.382	0.780
Xining	0.270	0.438	0.616
Mean	0.583	0.663	0.893

The mean score of scale efficiency is calculated as being 89.3% in creative industries, which is slightly higher than its TE scores (58.3%) and PTE scores (66.3%). In 2008, 30 out of 36 cities (approximately accounting for 83% of the sample) whose scale efficiency scores have exceeded 80%. However, 22 out of 36 cities (accounting for 61% of the sample) exhibit decreasing returns to scale on the production frontier of creative industries, implying the size of creative firm in those cities are engaged in production on a non-optimal scale. Alternatively, it may be a good way to increase their efficiency of creative industries by optimizing the size of creative firm appropriately.

If the cities aim to increase their technology efficiency of creative industries, both the PTE and SE should be paid attention to. Table 3 shows that some cities such as Lanzhou and Tianjin are calculated as low TE scores due to extremely PTE scores although they possess relatively high SE scores. In contrast, Zhengzhou is on the best efficient of scale, but its PTE score is only 48.2 per cent, leading to a relatively low technical efficiency.

Table 4. Efficiency scores estimated by creative sub-sectors

Creative sub-sectors	Technical efficiency	Pure technical efficiency	Scale efficiency
Software and computer services	0.689	0.758	0.911

Design	0.685	0.790	0.871
Performing arts and publishing	0.613	0.655	0.938
Leisure and Entertainment	0.572	0.666	0.858
Audio visuals	0.500	0.618	0.813
Creative R&D	0.396	0.474	0.879
Crafts and fashion	0.372	0.545	0.703
Advertising	0.301	0.406	0.830
Mean of creative sectors	0.583	0.663	0.893

Notes: Audio visuals include film, music, television and radio.

Table 4 presents the efficiency scores of creative industries by sub-sectors. It shows that China’s software industry owns the highest technical efficiency scores (i.e. 68.9%), including PTE scores of 75.8% and SE scores of 91.1% in 2008. It is suggested the software industry has been growing rapidly and effectively over the last decades in China and boosts economic growth significantly (Yang et al., 2005), resulting in a higher technical efficiency. The TE scores of designing service (68.5%) and performing arts & publishing (61.3%) are found to be more than the average level (58.3%), while advertising is being on the least inefficient with TE score of 30.1% out of 8 creative sectors.

In summary, China’s creative industries is experiencing tremendous growth over the world, but its productive efficiency and the ability to create business profit still have a big increasing room.

4 Conclusion

This paper, first explores the development and structure of China’s creative industries, including the growth and development of the number of creative firm, creative employment and operating revenue. This exploration implies that China’s creative industries is at the low efficiency level despite fast development. The DEA model, based on the data of China’s 36 capital and/or sub-provincial cities, is used to investigate technology efficiency of China’s city creative industries (including pure technical efficiency and scale efficiency). The empirical result shows the technology efficiency (particular in pure technology efficiency) of China’s city creative industries is indeed relatively low. On average, the technical efficiency score of China’s creative industries is estimated to be 58% in 2008. We suggest, on the one hand, the development of clustering of smaller creative firms is becoming an effective way to boost its efficiency, because most of cities in China now exhibit decreasing returns to scale on creative industries productivity. On the other hand, the pure technology efficiency of the creative groups should be much more increased by applying more new technologies and new business mode.

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