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Overcapacity in China after Economic Crisis: In Relation to Industrial Location†

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Abstract: The purpose of this study is to analyse the industrial location in China in the late 2000s by using the ratio of production value in the top eight provinces and the locational Gini coefficient. The Xi Jinping administration maintains economic policies from the former administration and aims to shift China's economic growth pattern from investment-led and export-led to consumption-led. However, there was an economic slowdown after the global economic crisis. The dependence on investment is still strong. The redundant construction reoccurred in the late 2000s, and consequently, the overcapacity became a more serious concern. The industrial location became more dispersed and more inefficient in the late 2000s. It seems reasonable to think that this was due to local protectionism and serious overcapacity rather than by the progress of domestic market integration. China introduced market mechanism in the reform era. The market became the main coordination system in economic activities and the contribution of private sector to gross domestic product increased. However, local protectionism remains and the market is still segmented; thus, the nationally-integrated market has not yet been formed.

Keywords: Industrial location, redundant construction, production overcapacity, segmented market
JEL Classification Numbers: O11, O18, R12

1. Introduction

China introduced the market economy mechanism in the reform era. Many foreign-funded enterprises have been set up in coastal areas. China took the advantage of backwardness such as the low labour cost and the advanced technology imported from developed countries and succeeded in 'taking off'. The high propensity to invest has also contributed to China's economic development. However, the regional development strategy that prioritised coastal areas led to regional disparities. In addition, the advantage of backwardness will be lost with economic development. Therefore, the shift of economic growth pattern towards domestic demand-led type, especially towards consumption-led type is a major challenge for China. However, as the economic growth rate declined due to the 2008 global economic crisis, the dependence on investment strengthened. In the latter half of the 2000s, the investment volume has expanded significantly, while the investment efficiency has declined. As the economic growth rate declined, production overcapacity became apparent.

This study analyses the industrial location in China in the late 2000s. The industrial location in China

Table 1. GDP composition

	GDP	Final Consumption Expenditures		Gross Capital Formation		Net Exports of Goods and Services
			Household Consumption		Gross Fixed Capital Formation	
1978	100.0	62.1	48.8	38.2	29.8	-0.3
1980	100.0	65.5	51.5	34.8	28.7	-0.3
1990	100.0	63.3	49.7	34.0	23.9	2.7
2000	100.0	63.7	47.0	33.9	32.9	2.4
2005	100.0	54.1	40.1	40.5	39.5	5.4
2010	100.0	49.1	35.9	47.2	44.6	3.7
2014	100.0	51.4	37.9	45.9	44.0	2.7

Note: GDP is calculated by expenditure approach.

Source: China Statistical Yearbook, 2015

Table2. Rate of investment and Marginal Capital Coefficient

	High-Growth Period	Rate of Economic Growth (Annual Average, %)	Investment/GDP (nominal, %)	Marginal Capital Coefficient
Korea	1986-1990	9.65	30.09	3.12
Indonesia	1989-1993	8.30	26.79	3.23
Malaysia	1992-1996	9.56	40.37	4.22
Philippines	1986-1990	4.74	19.01	4.01
Thailand	1987-1991	10.94	34.99	3.20
Japan	1966-1970	11.56	33.50	2.90
China	1981-1989	10.50	35.91	3.42
	1990-1999	10.66	37.82	3.55
	2000-2005	9.76	39.74	4.07
	2006-2011	10.54	45.75	4.34

Source: Miura (2013), p.103

has been more concentrated gradually since the late 1980s (Kato, 2003). However, I believe that production overcapacity in the late 2000s reversed this trend. This paper is structured as follows. In section 2, I explain the shift of economic growth pattern. In section 3, I discuss regarding redundant construction and production overcapacity and point out the low investment efficiency in China. In section 4, I provide a review of previous studies on industrial location in China and consider the change of industrial location in 2000s. In section 5, I briefly explain about inter-regional integration and industrial location.

2. Growth pattern shift in China

In this section, I explain regarding China's GDP composition and compare the investment rates between Asian countries.

The growth pattern in China is characterised as investment-led and export-led. Table 1 shows China's GDP composition. Its gross capital formation rate has been increasing since the 1990s. Moreover, the household consumption rate had been decreasing from 1980 to 2010, although it has increased after 2010.

Table 2 shows the investment rate and marginal capital coefficient in Asian countries. The marginal capital coefficient is an index that indicates the investment efficiency; the investment efficiency is high when the index is low.

China's investment rate from 2006 to 2011 is relatively higher, and the marginal capital coefficient is higher compared to the high growth period in other Asian countries. Further, China's investment efficiency has been worse since the 1980s.

Xi Jinping has expressed strong concerns about the expansion of the public sector due to redundant construction.[1] The growth pattern shift from investment-led and export-led to consumption-led is a big challenge for China. It is one of the main economic policies[2] in the 12th Five-Year Plan (2011-2015) and the report to the 18th National Congress (2012), which forms the policy basis for the Xi Jinping administration (Miura, 2013).

3. Redundant construction and production overcapacity

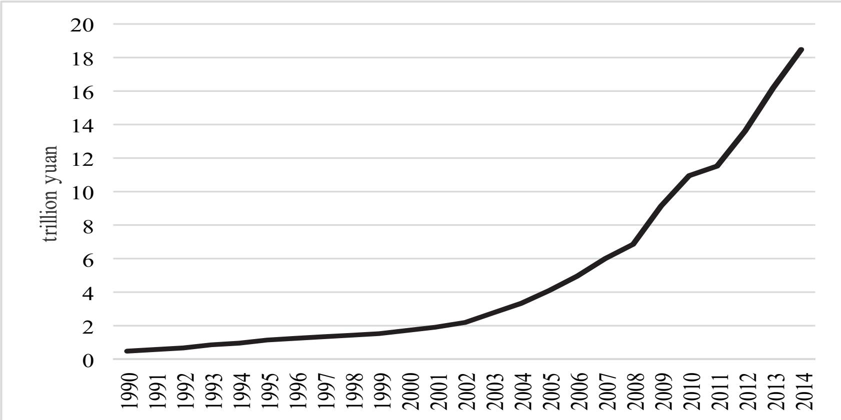
In this section, I explain regarding redundant construction and production overcapacity and show that the investment efficiency in China is low. Redundant construction means investment in the same industry or product in each region, which leads to excessive production capacity (Kato, 2003, p. 108).

3.1. Problem of heavy dependence on fixed asset investment

Heavy dependence on fixed asset investment to sustain China's high growth has created overcapacity problem in a number of industries in the Chinese manufacturing sector in the 2000s. Overcapacity can be defined as the difference between the potential level of production when facility is fully utilised and the level of production actually achieved. When there is too much idle production capacity in an industry, meaning that investment by companies in the industry cannot generate expected returns, it results in lower profits or even losses in the industry.

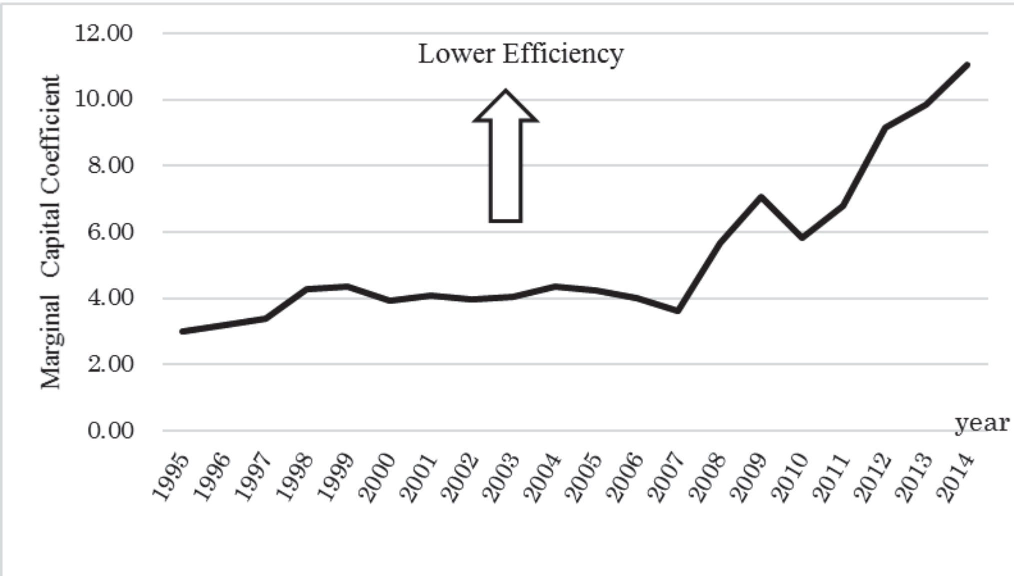
External demand, especially from the developed world, has weakened since late 2008 due to the global financial crisis. The central government has tried to reduce the capacity since the early 2000s; however, the result was limited as the overcapacity problem was intensified by a massive expansion in industrial capacity following the large-scale fiscal stimulus in 2009. Besides, local governments

Figure 1. Trend of total investment in fixed assets



Note: Calculated at 1990 constant prices
Source: China Statistical Yearbook

Figure 2. Trend of Marginal Capital Coefficient



Note: Marginal Capital Coefficient = (I/NGDP)/△Y', I: Total investment in fixed assets (nominal), NGDP: Nominal GDP, △Y': Real GDP growth
Source: China Statistical Yearbook

continued to allow an expansion in industrial production capacity in specific industries in order to support local GDP growth and increase fiscal revenue through land sales and taxes (Tsugami, 2013, pp. 90–91).

Therefore, reducing overcapacity in the Chinese industrial sector did not have a significant improvement in the past few years.

3.2. Investment in China: Volume increasing and efficiency decreasing

Figure 1 shows that the investment in fixed assets has been increasing, especially since the late 2000s.[3] Figure 2 shows the trend of marginal capital coefficient. The higher marginal capital coefficient implies lower investment efficiency. The investment efficiency has been decreasing since the late 2000s.

3.3. Redundant construction and overcapacity

There seems to be a correlation between the decline in investment efficiency and the reoccurrence of redundant construction and the deepening of production overcapacity in the late 2000s. Redundant construction has been a problem in the reform era and did not completely disappear even though marketisation has progressed.

On 30 September 2009, the State Council ratified the new policy for repressing overcapacity and redundant construction. Serious overcapacity occurred in eight industries such as steel, cement, flat glass, coal chemistry, amorphous silicon, facilities for wind-powered electricity, electrolytic aluminium, and shipbuilding. Much of the overcapacity stemmed from the inefficient allocation of fixed-asset investment attached to the Chinese government's ¥4 trillion (US$585 billion) economic stimulus package and excessive lending from commercial banks.

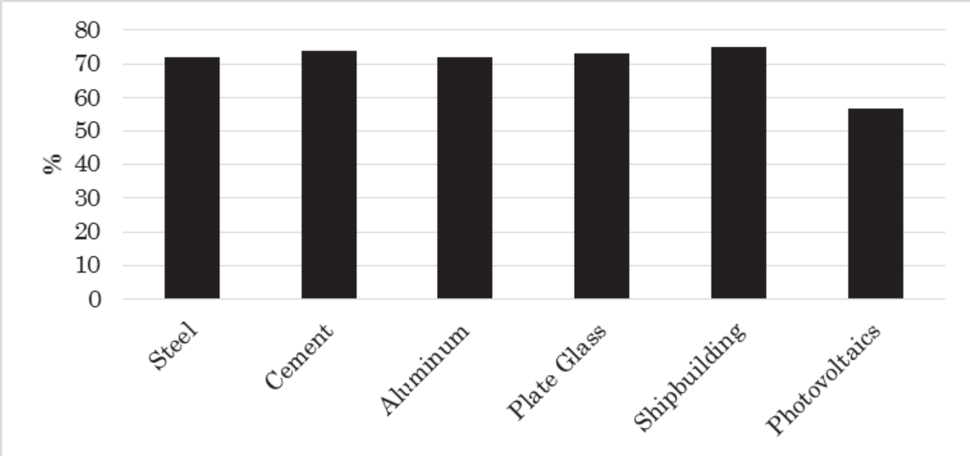
The State Council warned of overcapacity in emerging sectors such as wind power and amorphous silicon, which is material for solar cells. These industries are the emerging sectors that the central government encouraged and developed to promote global warming countermeasures and realise energy-saving society. Each local government monitored the policy trend of the central government and established business simultaneously, which resulted in excessive production capacity.

The National Development and Reform Commission (NDRC) was concerned about the excessive investment in steel, cement, and flat glass. The competition for investment in facilities occurred in these industries because it was expected that the increase in demand would be brought by ¥4 trillion stimulus plan. In these industries, investors are too keen on competing for share to curb the urge to reply to the competitors' movement of expanding facilities (Tsugami, 2011, p. 91).

3.4. Capacity utilisation of industries

Figure 3 shows the capacity utilisation of industries with severe excessive capacity in 2012. A capacity utilisation of less than 80 per cent indicates that the capacity of the industry is excessive; that of less than 70 per cent could trigger vicious competition. According to figure 3, the capacity is excessive in all

Figure 3. Capacity utilization of industries with severe excess capacity, 2012



Source: The State Council of the People's Republic of China

Table 3. Rate of capacity utilization

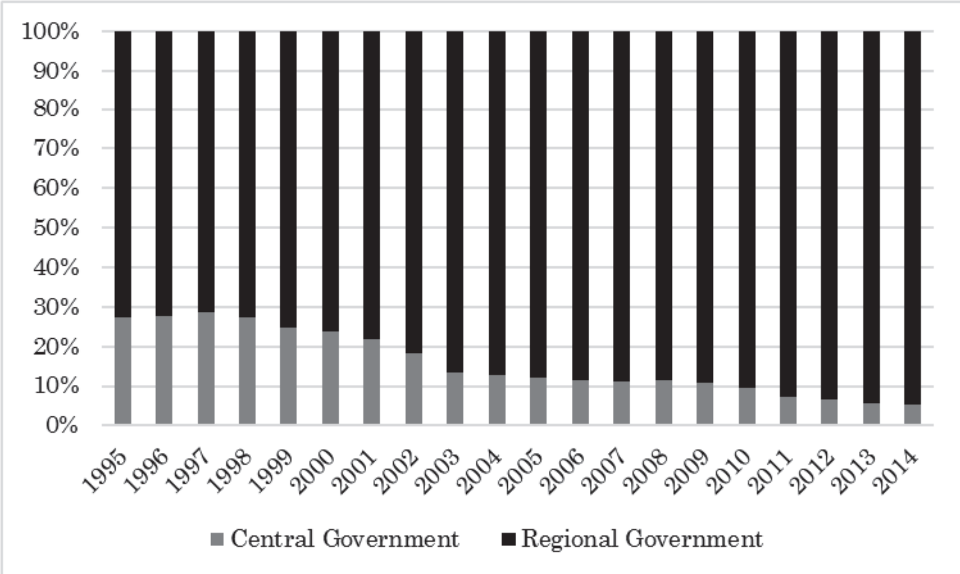
	2002	2005	2008	2011	2012
Petroleum Processing, Coking and Nuclear Fuel Processing	63.80	68.10	69.20	73.30	74.60
Raw Chemical Material & Chemical Products	58.30	74.90	61.90	63.90	63.60
Medical and Pharmaceutical Products	96.20	87.20	102.20	92.10	86.80
Chemical Fiber	45.40	47.00	45.90	48.80	48.80
Rubber Products	84.50	84.20	71.90	71.10	71.10
Plastic Products	87.20	93.70	98.80	91.80	87.90
Nonmetal Mineral Products	60.70	70.90	70.60	71.10	69.20
Smelting & Pressing of Ferrous Metals	55.00	64.80	58.20	80.50	72.00
Smelting & Pressing of Non-ferrous Metals	60.30	67.70	49.10	58.60	57.40
Metal Products	93.20	98.70	87.60	90.80	89.90
Ordinary Machinery Manufacturing	96.10	87.20	97.00	74.60	67.10
Special Equipment Manufacturing	109.40	119.00	81.40	71.60	70.20
Transport Equipment Manufacturing	88.40	98.40	92.90	68.80	67.40
Electric Machines and Apparatuses Manufacturing	82.70	87.20	88.10	66.00	64.70
Communications Equipment, Computer and Other Electronic Equipment Manufacturing	95.00	94.80	92.50	63.40	62.10
Instruments, Meters, Cultural and Office Machinery Manufacture	87.50	83.20	80.50	60.80	59.60

Notes: %

Source: Wei (2014), p. 29

industries. The capacity utilisation is particularly low in the solar power industry, which is the emerging industry encouraged and developed by the central government in order to promote global warming

Figure 4. Trend of total investment in fixed assets



Note: Calculated at 1990 constant prices
Source: China Statistical Yearbook

countermeasures and realise energy-saving society. Each local government monitored the policy trend of the central government and established business simultaneously, which resulted in excessive production capacity.

Table 3 shows the capacity utilisation rate in capital-intensive industries. According to this table, the capacity utilisation rate is low, especially in which the State Council announced that serious overcapacity occurred.

After 2003, the central government recognised excessive investment and production as a serious problem and presented policies to resolve it (Bank of Tokyo-Mitsubishi UFG, 2013, p. 4).

However, excessive investment did not stop and redundant construction occurred. I provide four reasons to support this claim. The first is the administrative nature of investment mechanism. In China, local officials face intensive competition for their promotion. GRP (Gross Regional Product) growth is the most typical standard of performance in their region. They want to raise GRP for their promotion. It is easier to increase investment than consumption and net-export for a short period. Moreover, local governments sometimes make decisions contrary to the policies set by the central government. The second is the relationship between redundant construction and fiscal structure. That is, investment downsizing and dispersing due to the fiscal tightness of local governments. The third is that the production overcapacity is not eliminated due to the lack of exit mechanism, because local governments prefer not to reduce fiscal revenue and employment. The fourth is that many projects are led by local governments. Figure 4 depicts the rate of total investment in fixed assets by jurisdiction of project management, that is, central government or local governments. This table shows that many projects are led by local governments (Miura, 2013, p. 105).

3.5. Political power of local government

In China, marketisation has progressed in the reform era. However, local protectionism prevented the improvement of market integration in the 1980s. Local protectionism is the protective policy local governments implement for the development of local economy, for example, they prevent the outflow of natural resources that are extracted in their own region or prevent the inflow of the products made in other regions.[4] Although market integration has improved gradually in the 1990s, it does not mean that local protectionism completely disappeared. According to the research on local protection conducted from March to June 2003, local protection was remarkable against several sectors such as tobacco, alcoholic beverages, automobiles, food production, agricultural products, medical and pharmaceutical products, electricity production and supply, chemical products, beverage production, and agricultural and sideline food processing (Li et al., 2004).

As mentioned above, many projects are led by local governments and local protectionism still exists. This results in redundant construction and production overcapacity.

4. Industrial location trend in the late 2000s

4.1. Previous studies on industrial location in China

Here, I provide a review of previous studies on industrial location in China.

Young (2000) points out that the structure of industries between provinces was becoming similar to the indicator calculated by using the output value by industry, which shows that the difference of industrial structure between regions was decreasing from 1978 to 1997.

Bai et al. (2004) calculate a measure of regional specialisation called Hoover's coefficient of localisation by using output data of 32 industries in 29 Chinese regions and shows that regional specialisation of Chinese industries increased in the 1990s.

Naughton (2000) shows, by using data of the provincial input-output tables, that the growth of inter-provincial trade in 1987–1992 exceeded that of provincial GDP and foreign trade during the same period; inter-provincial trade increased rapidly between 1987 and 1992. It means that regional specialisation of industries increased.

Batisse and Poncet (2003) note the levels of geographical concentration of 31 sectors and show that the industries in resource intensive sectors, the locations of which are concentrated, are spatially tied to the production area of natural resources. In contrast, industries in market-oriented sectors such as electric equipment and machinery, textile goods, electronics and instruments, the locations of which are dispersed, are located near the market.

Figure 5. Dispersed location and concentrated location

a) Dispersed location

1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

b) Concentrated location

25				

Source） Made by author

Li and Fan (2008) measure the agglomeration degree of 20 manufacturing industries from 1999 to 2006 and its tendency by using the index of industrial agglomeration developed by Ellison and Glaeser (E-G index) and show that the level of agglomeration ascended in particular.

Lu and Tao (2009) investigate the trends and determinants of the geographic concentration of China's manufacturing industries using large firm-level data for the period 1998–2005. It is found that the extent of industrial agglomeration in China, measured by the E-G index, has increased steadily throughout the sample period, although it is still much lower than those of selected developed countries such as France, the United Kingdom, and the United States.

Wang et al. (2010) analyse the locations of manufacturing firms from 1998 to 2007. According to their analysis, regional concentration of manufacturing firms into the eastern area such as Jiangsu, Zhejiang, Shandong provinces, etc. had progressed from 1998 to 2004; however, the relocation from the eastern area such as Guangdong and Jiangsu provinces, Shanghai city, etc. to central area and northern coastal area had progressed from 2004 to 2007. They consider that China entered the 'dispersion' period in the mid-2000s. In addition, they view it as the improvement of regional integration.

From the above, previous studies can be summarised as follows. First, industrial location became more concentrated from the late 1980s to the mid-2000s. Second, the influence of local protectionism on industrial location was reduced and became weaker than that of other factors from the 1990s (Batisse and Poncet, 2004; Lu and Tao, 2009). Third, industrial location came to be taken for granted that it became dispersed due to the emergence of 'domestic flying geese' pattern and regional integration developed after the mid-2000s (Wang et al., 2010).

Hence, I would like to pose a hypothesis on industrial location. In China, industrial location became dispersed in the late 2000s, as local protectionism still remains and overcapacity problem has been mainly provoked by local government as mentioned above.

4.2. Industrial location in the 2000s

I examine the industrial location in China by using two indicators after explaining what the concentrated or dispersed location is.

Table 4. Trend of CN8

Industries	1999	2002	2005	2008	2011
Coal Mining & Dressing	75.11	76.35	76.44	75.47	73.54
Petroleum and Natural Gas Extraction	100.00	96.68	86.96	81.34	79.79
Ferrous Metal Mining & Dressing	78.20	77.77	69.67	72.10	73.18
Non-ferrous Metal Ores Mining & Dressing	73.79	73.51	77.61	72.39	77.25
Non-metal Ores Mining & Dressing	65.92	66.37	69.69	66.20	66.24
Other Mining Industries	-	-	100.00	97.80	97.50
Logging And Transport Of Timber And Bamboo	94.60	98.87	-	-	-
Agricultural and Sideline Foods Processing	63.80	67.36	68.40	66.24	61.98
Food Production	66.47	64.95	64.89	62.56	58.47
Beverage Production	62.27	62.49	62.44	60.00	60.88
Tobacco Products Processing	68.19	65.79	68.70	64.17	64.21
Textile Industry	82.06	83.63	86.47	86.68	84.43
Clothes, Shoes and Hat Manufacture	88.60	90.04	89.94	88.73	80.41
Leather, Furs, Down and Related Products	88.40	91.33	89.37	88.60	85.68
Timber Processing, Bamboo, Cane, Palm Fiber and Straw Products	70.46	71.13	71.32	72.01	68.47
Furniture Manufacturing	73.15	78.02	83.52	82.67	76.47
Papermaking and Paper Products	72.77	76.97	79.58	79.20	74.08
Priting and Record Medium Reproduction	65.54	67.64	73.21	70.53	66.73
Cultural, Educational and Sports Articles Production	95.20	95.10	95.50	93.32	89.38
Petroleum Processing, Coking and Nuclear Fuel Processing	65.47	65.35	61.91	61.05	58.64
Raw Chemical Material & Chemical Products	63.02	67.17	69.69	69.81	67.37
Medical and Pharmaceutical Products	55.82	57.40	58.94	60.00	60.56
Chemical Fiber	83.95	85.95	88.66	90.68	91.71
Rubber Products	72.48	76.32	81.04	80.88	80.84
Plastic Products	81.58	81.82	82.49	69.72	73.47
Nonmetal Mineral Products	65.98	65.64	70.02	69.58	63.27
Smelting & Pressing of Ferrous Metals	62.77	62.84	65.67	64.24	63.76
Smelting & Pressing of Non-ferrous Metals	53.80	54.26	60.29	64.27	63.32
Metal Products	80.26	82.16	83.69	81.03	74.42
Common Machines	76.68	77.55	-	-	-
Ordinary Machinery Manufacturing	-	-	78.81	78.75	74.29
Special Equipment Manufacturing	72.37	72.77	71.33	69.72	69.66
Transport Equipment Manufacturing	67.54	68.40	64.66	80.52	64.29
Electric Machines and Apparatuses Manufacturing	79.84	81.83	83.41	80.52	77.73
Communications Equipment, Computer and Other Electronic Equipment Manufacturing	85.39	88.92	94.00	92.41	86.20
Instruments, Meters, Cultural and Office Machinery Manufacture	83.33	83.76	87.50	82.53	82.14
Craftwork and Other Manufactures	-	-	87.14	85.75	78.75
Waste Resources and Old Material Recycling and Processing	-	-	89.44	83.34	79.64
Electricity and Heating Production and Supply	57.91	57.45	58.19	55.11	54.49
Fuel Gas Production and Supply	65.25	66.94	68.17	72.04	66.03
Water Production and Supply	64.66	59.76	63.36	66.44	63.59
All Industries	64.61	66.04	67.77	67.50	61.50

Note: Underline the data which declines compared to the previous year.

Source: China Data Online

Table 5. Trend of locational Gini Coefficient

Industries	1999	2002	2005	2008	2011
Coal Mining & Dressing	0.665	0.682	0.686	0.676	0.674
Petroleum and Natural Gas Extraction	0.901	0.842	0.752	0.724	0.740
Ferrous Metal Mining & Dressing	0.647	0.663	0.630	0.636	0.622
Non-ferrous Metal Ores Mining & Dressing	0.667	0.664	0.699	0.652	0.624
Non-metal Ores Mining & Dressing	0.330	0.341	0.420	0.391	0.413
Other Mining Industries	-	-	0.870	0.790	0.805
Logging And Transport Of Timber And Bamboo	0.917	0.903	-	-	-
Agricultural and Sideline Foods Processing	0.296	0.348	0.382	0.369	0.340
Food Production	0.224	0.278	0.312	0.318	0.287
Beverage Production	0.257	0.248	0.263	0.318	0.329
Tobacco Products Processing	0.615	0.585	0.619	0.515	0.507
Textile Industry	0.339	0.366	0.396	0.393	0.385
Clothes, Shoes and Hat Manufacture	0.391	0.394	0.399	0.379	0.352
Leather, Furs, Down and Related Products	0.432	0.464	0.457	0.486	0.519
Timber Processing, Bamboo, Cane, Palm Fiber and Straw Products	0.248	0.222	0.274	0.320	0.353
Furniture Manufacturing	0.284	0.321	0.349	0.362	0.361
Papermaking and Paper Products	0.221	0.239	0.280	0.260	0.250
Priting and Record Medium Reproduction	0.259	0.297	0.307	0.281	0.265
Cultural, Educational and Sports Articles Production	0.485	0.460	0.455	0.475	0.482
Petroleum Processing, Coking and Nuclear Fuel Processing	0.373	0.424	0.406	0.397	0.372
Raw Chemical Material & Chemical Products	0.168	0.145	0.187	0.185	0.191
Medical and Pharmaceutical Products	0.241	0.257	0.237	0.253	0.226
Chemical Fiber	0.382	0.457	0.577	0.610	0.670
Rubber Products	0.294	0.371	0.349	0.335	0.409
Plastic Products	0.310	0.292	0.304	0.202	0.286
Nonmetal Mineral Products	0.184	0.190	0.230	0.249	0.244
Smelting & Pressing of Ferrous Metals	0.407	0.401	0.378	0.367	0.350
Smelting & Pressing of Non-ferrous Metals	0.364	0.382	0.378	0.368	0.375
Metal Products	0.252	0.257	0.254	0.247	0.241
Common Machines	0.289	0.304	-	-	-
Ordinary Machinery Manufacturing	-	-	0.284	0.275	0.271
Special Equipment Manufacturing	0.303	0.275	0.199	0.202	0.240
Transport Equipment Manufacturing	0.357	0.378	0.341	0.278	0.325
Electric Machines and Apparatuses Manufacturing	0.253	0.268	0.294	0.278	0.293
Communications Equipment, Computer and Other Electronic Equipment Manufacturing	0.478	0.483	0.511	0.515	0.513
Instruments, Meters, Cultural and Office Machinery Manufacture	0.412	0.408	0.411	0.379	0.430
Craftwork and Other Manufactures	-	-	0.397	0.404	0.385
Waste Resources and Old Material Recycling and Processing	-	-	0.519	0.496	0.488
Electricity and Heating Production and Supply	0.218	0.253	0.203	0.218	0.216
Fuel Gas Production and Supply	0.332	0.315	0.379	0.379	0.372
Water Production and Supply	0.292	0.253	0.276	0.294	0.277

Note: Underline the data which declines compared to the previous year.

Source: China Data Online

Table 6. Trend of locational Gini Coefficient of industries where excessive investment occurred

Industries	1999	2002	2005	2008	2011
Raw Chemical Material & Chemical Products	0.168	0.145	0.187	0.185	0.191
Nonmetal Mineral Products	0.184	0.190	0.230	0.249	0.244
Smelting & Pressing of Ferrous Metals	0.407	0.401	0.378	0.367	0.350
Transport Equipment Manufacturing	0.357	0.378	0.341	0.278	0.325
Electric Machines and Apparatuses Manufacturing	0.253	0.268	0.294	0.278	0.293
Communications Equipment, Computer and Other Electronic Equipment Manufacturing	0.478	0.483	0.511	0.515	0.513

Source: China Data Online

Table 7. Ranking of locational Gini Coefficient

Industries	1999	2002	2005	2008	2011
Raw Chemical Material & Chemical Products	28	28	29	29	29
Nonmetal Mineral Products	27	27	27	25	25
Smelting & Pressing of Ferrous Metals	6	8	12	13	15
Transport Equipment Manufacturing	11	11	16	20	18
Electric Machines and Apparatuses Manufacturing	21	21	20	20	19
Communications Equipment, Computer and Other Electronic Equipment Manufacturing	3	2	3	3	3
Number of Industries	28	28	29	29	29

Source: China Data Online

4.2.1. Concentration and dispersion

Assume that production capacity is 25 in both locations 1 and 2. In location 1, each region has one production capacity. I regard this location as completely dispersed. In location 2, only region 1 monopolises all capacities. I regard this location as completely concentrated (Figure 5).

4.2.2. CN8

CN8 is the ratio of production value in the top eight provinces. The higher CN8 indicates that location becomes more concentrated.

Table 4 shows that the number of industries where CN8 declines compared to the previous year has increased in the late 2000s. This means that there is a tendency of less concentrated location.

The number of industries where CN8 was under 80 per cent has decreased in the late 2000s. This also means that there is a tendency of less concentrated, more dispersed location.

4.2.3. Locational Gini Coefficient

The Gini coefficient is one of the most used measures for regional concentration—the value of 1 implies a maximum concentration in one single location and 0 implies a perfectly even distribution

Table 8. Ranking of production value, number of employee, tax

Production Value	Industries	Share (%)
1	Smelting & Pressing of Ferrous Metals	8.8
2	Communications Equipment, Computer and Other Electronic Equipment Manufacturing	8.8
3	Transport Equipment Manufacturing	8.7
4	Raw Chemical Material & Chemical Products	8.4
5	Electric Machines and Apparatuses Manufacturing	7.1
Employee	Industries	Share (%)
1	Communications Equipment, Computer and Other Electronic Equipment Manufacturing	10.5
2	Electric Machines and Apparatuses Manufacturing	7.7
3	Textile	7.6
4	Transport Equipment Manufacturing	7.4
5	Nonmetal Mineral Products	6.6
Tax	Industries	Share (%)
1	Transport Equipment Manufacturing	9.8
2	Raw Chemical Material & Chemical Products	8.7
3	Nonmetal Mineral Products	7.3
4	Electric Machines and Apparatuses Manufacturing	6.5
5	Communications Equipment, Computer and Other Electronic Equipment Manufacturing	6.5

Source: China Data Online, China Statistical Yearbook

across regions. I calculate the locational Gini coefficient in 1999, 2002, 2005, 2008, and 2011 at the provincial level.

Table 5 shows that the locational Gini coefficient declines in more industries after 2005, which indicates that industrial location had a tendency of dispersion.

According to Tables 6 and 7, the locations of six industries where excessive investment occurred became geographically more dispersed in the late 2000s or was constantly dispersed during the 2000s, which indicates that redundant constructions occurred in these industries and each local government prefers to invest in them.

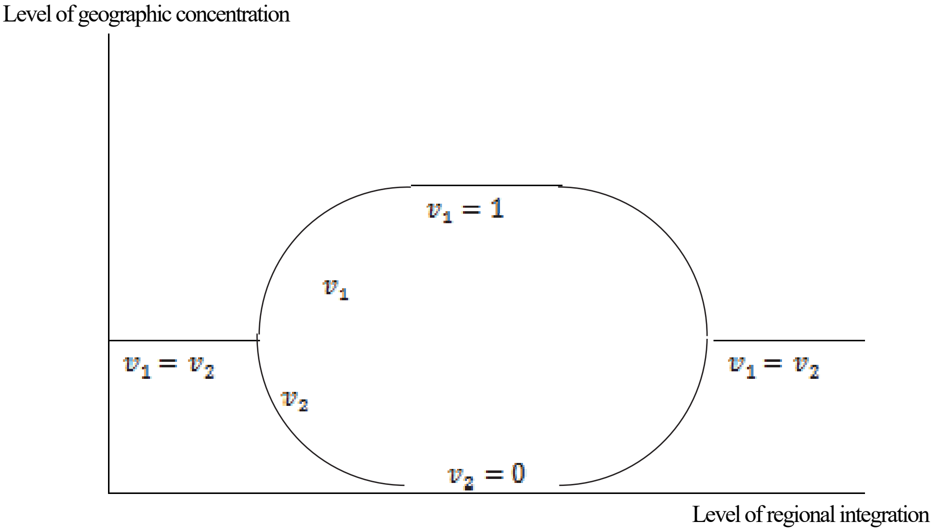
As for production value, number of employees, taxes, the shares of the sectors in which the State Council announced that serious overcapacity occurred are relatively high (Table 8). Local governments depend strongly on output value, employees, taxes derived from them.

5. Inter-regional integration and industrial location

5.1. Correlation between inter-regional integration and industrial location

Here, I explain the correlation between inter-regional integration and industrial location. Figure 6

Figure 6. Correlation between inter-regional integration and industrial location



Source: Fan, 2004, p.43

Table 9. Forces affecting geographical concentration

Centripetal forces	Centrifugal forces
Market size effects (linkages)	Immobile factors
Thick labor markets	Land rents
Pure external economies	Pure external diseconomies

Source: Krugman, 1999

theoretically shows the industrial location trend. Assuming that there are two regions, both of which are the same resource endowments, on the initial condition, there is no inter-regional interdependency because of any inter-regional traffic system. Then, people and industries will be concentrated in region 1, which has better condition for them to live and locate. Thus, they can receive the agglomeration effect. As the land rent and labour cost rises, congestion becomes serious, and agglomeration diseconomy becomes strong, people and industries will go to other regions.

5.2. Forces affecting geographical concentration

Table 9 shows the centripetal and centrifugal forces affecting industrial location. Three centripetal forces are the three classic Marshallian sources of external economies. A large local market creates both 'backward linkages'—that is, sites with good access to large markets are preferred locations for the production of goods subject to economies of scale—and 'forward linkages'—a large local market supports the local production of intermediate goods, lowering costs for downstream producers. An industrial concentration supports a thick local labour market, especially for specialised skills, so that employees find it easier to find employers and vice versa. Moreover, a local concentration of economic activity may create more or less pure external economies through information spillovers.

The three centrifugal forces are immobile factors, land rents, and external diseconomies. Immobile factors—certainly land and natural resources, and in an international context, people as well—militate against concentration of production, both from the supply side (some production must go to where the workers are) and from the demand side (dispersed factors create a dispersed market, and some production will have an incentive to locate close to the consumers). Concentrations of economic activity generate increased demand for local land, driving up land rents and thereby providing a disincentive for further concentration. Therefore, concentrations of activity can generate more or less pure external diseconomies such as congestion (Krugman, 1999, p. 143).

5.3. Industrial location in China after 1949

In China, there is almost the same tendency for the industrial location as mentioned above. The location was dispersed when the People's Republic of China was founded, became concentrated in the mid-1980s, and again became dispersed in the late 2000s.

From 1949 to 1978, industrial location were dispersed. During this period, each region promoted economic development based on self-reliance, and industrial structures became similar between regions.

From 1978 to the mid-1980s, it continued dispersing despite the introduction of market mechanism. Development strategy transformed from its focus on fairness to efficiency and to coastal areas. However, local governments' power became stronger because of the fiscal decentralisation. Therefore, local protectionism appeared and the market was segmented between regions.

From the mid-1980s to mid-2000s, the location shifted to become concentrated. During this period, the effort towards a market economy accelerated. The location in many industries was concentrated in coastal areas, especially export-oriented foreign-funded enterprises and private enterprises.

From the mid-2000s, the location shifted to become dispersed again. The market economy has been developing since 1978 in China; however, local protectionism remained and serious overcapacity occurred at the backdrop of acute inter-regional competition.

There is an opinion that China's industrial location already entered the stage of more dispersed location in the late 2000s, which means improvement in inter-regional integration.

However, capital movement in China is still limited by the remaining local protectionism. Therefore, it is thought that the tendency for the location to be more dispersed in the late 2000s was influenced by overcapacity and redundant construction.

6. Conclusion

The Xi Jinping administration maintains the economic policies from the former administration and aims to shift China's economic growth pattern from investment-led and export-led to consumption-led.

However, there was an economic slowdown after the global economic crisis. And the dependence on investment is still strong. Redundant constructions reoccurred in the late 2000s, and consequently, the overcapacity issue became more serious.

The industrial locations became more dispersed and more inefficient in the late 2000s. It seems reasonable to think that more dispersed locations after the late 2000s was brought by the remaining local protectionism and serious overcapacity rather than by the progress of domestic market integration.

China introduced market mechanism in the reform era. The market became the main coordination system in economic activities (Kato and Kubo, 2009, p. 11) and the ratio of private sector to GDP increased. However, local protectionism remains and the market is still segmented; therefore, the nationally integrated market has not yet been formed. It might take a long time to form the economic system in which the market works well.

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Notes

[1] I explain on redundant construction in section 3.

[2] The other contents about the change of economic growth pattern other than the change from investment-led and export-led growth to consumption-led are as follows: (1) shift of economic model from resource-wasting to resource-saving, (2) increase in the contribution to innovation and human capital, (3) promotion of service sector and strategic emerging industries, and (4) reduction of gap between rural and urban areas (Miura, 2013, p. 100).

[3] See Bank of Tokyo-Mitsubishi UFG (2013).

[4] I will re-examine about local protectionism in section 5.

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