Provincial Economic Growth and Industrial Structure in China: An Index Approach

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Abstract

This study examines the relation between provincial economic growth and industrial structure in China. To understand China's state of and changes in industrial structure, this study suggests several indices. First, we use the state of industrial structure as an index; that is, a lower ratio reflects a higher GDP share of the primary industry and a higher ratio reflects a higher GDP share of the tertiary industry. We estimate two indices using GRP structure (*GI*) and labor structure (*LI*) for 31 provinces. Then, we use changes in industrial structure as an index; that is, we compare the differences of the share of the above-mentioned indices between categories, times, and regions. Through the results thus obtained and comparing these results with per capita GRP, the study shows several findings. First, although provincial per capita GRP is diverging during periods, both indices (*GI* and *LI*) are converging strongly. It implies that industrial structure moves toward higher-level industry (tertiary industry) in each province simultaneously. This reflects the Petty-Clark's law (Clark, 1940; and Petty, 1690). Second, the converging speed of each index is different. The converging speed of GRP (*GI*) is higher than that of labor (*LI*). This indicates that labor structure makes slower progress than GRP structure. Third, the relation between the difference of each index and per capita GRP indicates that lower-growth provinces showed a higher gap. This indicates that the adjustment speed of industrial structure is one reason for regional disparity in China.

JEL classification: C43, D39, L16, O53
Keywords: Provincial Economic Growth; Industrial Structure; China; Index

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1. Introduction

It is well known that China has experienced continuing high economic growth since its reforms after the 1980s. The upgrade of the industrial structure can be considered as a factor responsible for the high economic growth. This study investigates the transition of the industrial structure during the high economic growth period in China. Research in this area has long been performed and there are many simple descriptive researches (e.g., Bramall, 2000 and Dutta, 2005)[1]. However, this study adds some devices to a simple research and provides more analytical results.

From past researches, it is known that higher economic growth is followed by an industrial structure upgrade from primary industry to tertiary industry (e.g., Chenery, 1960; Chenery et al., 1986; Chenery et al., 1962; Chenery and Syrquin, 1975; Clark, 1940; Kuznets, 1971; and Petty, 1690)[2]. It can also be said that a transformation from a farming society to an industrialized society and a society of service industries is a phenomenon observed in many advanced countries, and that this shift is universal. However, developing countries do not necessarily take the same course, because the conditions currently required for an upgrade differ from those in the past.

Compared with developed countries, a large share of the population in developing countries works in agriculture and/or traditional sector(s), and it is very difficult for such workers to shift to the industrial sector. It was also possible for the previous industrialized societies to shift gradually from labor-intensive to capital-intensive industry. However, when developing countries became capable of acquiring advanced technologies from the developed countries at comparatively low cost, it became possible to undertake capital-intensive industrialization more quickly in developing countries. This also made it impossible for people in the agricultural sector in developing countries to shift to the industrial sector. It is continuously observed that a part of the population in the agricultural sector engage in an informal service industry,

[1] Many Chinese scholars also analyzed the structural change in China (e.g., Fu, 2010; Liu and Zhang, 2008; Xu, 2004; and Zhang and He, 2010). In his contribution, Fu (2010) suggests an original indicator that uses trigonometry to understand industrial structure.

[2] Echevarria (1997) and Laitner (2000) provided several theoretical explanations of the relationship between structural change and economic growth.

as is observed in the service sector. On the other hand, it became easier for them to obtain information instantaneously due to the spread of information and technology by the Internet and therefore the digital divide between the developed and the developing countries has almost disappeared. In this manner, during the transition of the industrial structure, such people can also move directly to the service sector.

In other words, as a result of these changes in circumstances, the current discussion regarding the upgrade of the industrial structure is also different from that in the past. Moreover, compared with the developed countries that have upgraded sufficiently, developing countries like China are on their way to an upgrade. Needless to say, China has a large rural farming population. However, the source of economic growth is in urban areas, which involves industries and the service sector. Therefore, the economic disparity between urban and rural areas is large. This is a major problem for the economic development of China (e.g., Ramstetter et al., 2009; and Sakamoto and Islam, 2008). To resolve this problem, it is necessary to shift population from rural areas to urban areas and upgrade the industrial structure (e.g., Wu and Yao, 2003). This indicates that there remains an area to be verified regarding China's economic growth and its industrial structure transition.

To understand the changes in the industrial structure, this study introduces a mid/long-term view of China and suggests an easy index that shows the transition in the industrial structure. As a result, the purpose of the study is to show the differences between this index and the current descriptive analysis technique. The calculation of this index is very easy. However, it has not yet been used in current studies. Therefore, the purpose of this study will be attained if this index is widely introduced.

Hereinafter the analysis technique is introduced, the current state of China is analyzed using this technique, and the analysis results are presented.

2. Index Definition

The share of each industry on the whole is examined when the upgrade of the industrial structure is analyzed, and the method of analyzing the change in the share description is usually general. Although, it is possible to make an adequate analysis using such a method, there is a problem: neither the state of, nor the changes in the industrial structure can be analyzed in one figure. Therefore, this study introduces several simple indices to understand both the state of and changes in industrial structure.

First, we introduce an index to understand the state of industrial structure, which simply applies a weight to the share of each industry and sums these weights to arrive at one figure. For instance, it assumes the following index regarding the GDP share of each industry in province *i* and time *t*.

2.1. GDP index ($GI_{i,t}$)

$$GI_{i,t} = \frac{PGS_{i,t} + 2SGS_{i,t} + 3TGS_{i,t} - 100}{2} \quad (1)$$[3]

$PGS_{i,t}$: GDP share of primary industry (%)

$SGS_{i,t}$: GDP share of secondary industry (%)

$TGS_{i,t}$: GDP share of tertiary industry (%)

As mentioned above, this index is extremely simple. In other words, the weight applied is assumed to be about two times the GDP share of secondary industry and about three times the share of tertiary industry. An easy adjustment was made for this result, and it became a range from 0 to 100 (%). According to this index, 0 indicates that all of GDP comprises of the share of the primary industry and 100 indicates that all of GDP comprises of the share of tertiary industry. Moreover, 50 indicates that all of GDP comprises of the share of secondary industry. Incidentally, the pattern of the industrial structure in which a certain figure is shown may exist only innumerably when this index is used. For instance, when the index shows 50, the following patterns are considered: 100% for secondary industry, 50% for both primary and tertiary industries and 10% for both primary and tertiary and another 80% for secondary. Many industrial structural patterns are created in this manner, to provide one index value. However, in the short

[3] Since *PGS* + *SGS* + *TGS* = 100 (%), this equation becomes *GI* = 0.5*SGS* + *TGS*. Strictly speaking, this index will be measured from the real value of the GDP shares of the secondary and the tertiary industries. Certainly, the weight (0.5) applied on the secondary industry can be changed. However, changing this weight does not have an essential influence on the analysis.

term, it is not possible to change the industrial structure greatly or suddenly and therefore they are interpreted to be the same level (state) of industrial structure in this study.

It is also possible to apply this index to another share. Next, we introduce an index for the employed labor share.

2.2. Labor index ($LI_{i,t}$)

$$LI_{i,t} = \frac{PLS_{i,t} + 2SLS_{i,t} + 3TLS_{i,t} - 100}{2} \quad (2)$$

$PLS_{i,t}$: share of labor in primary industry (%)
$SLS_{i,t}$: share of labor in secondary industry (%)
$TLS_{i,t}$: share of labor in tertiary industry (%)

Needless to say, it is identical to the above formula, except that the industrial share of GDP is replaced by the industrial share of employed labor.

Moreover, the study assumes another index to compare these two indices.

2.3. Share difference ($SD_{i,t}$)

$$SD_{i,t} = \sqrt{\frac{\left(PGS_{i,t} - PLS_{i,t}\right)^2 + \left(SGS_{i,t} - SLS_{i,t}\right)^2 + \left(TGS_{i,t} - TLS_{i,t}\right)^2}{2}} \quad (3)$$

$SD_{i,t}$ is the sum total of the squared difference between the GDP and labor shares in each industry. Moreover, some adjustment is given for this result in a range from 0 to 100 (%). For example, if the shares of GDP and labor are quite similar in each industry, the index shows 0, and if the shares vary greatly, it shows 100. In other words, the index shows 0 when labor productivity (GDP/labor) does not differ between industries and it shows 100 when labor productivity varies greatly between industries.

2.4. Index difference ($ID_{i,t}$)

$$ID_{i,t} = GI_{i,t} - LI_{i,t} \quad (4)$$

$ID_{i,t}$ is simply the difference between the $GI_{i,t}$ and the $LI_{i,t}$ indices. $ID_{i,t}$ is expected to have a similar relation with $SD_{i,t}$. However, because there are more than one industrial structural pattern of $GI_{i,t}$ and $LI_{i,t}$ that composes $ID_{i,t}$, it may not have a similar relation with $SD_{i,t}$. Moreover, since structural changes in labor occur more slowly than structural changes in GDP, $ID_{i,t}$ generally indicates an approximately positive value.

3. Results

All these indices were measured for the Chinese national economy and for 31 provincial economies in particular. A long-term measurement makes comparison possible and therefore we can measure the indices for the Chinese national economy from 1952 to 2008. On the other hand, there is some incompleteness in the past provincial data, and the measurement period is therefore assumed to be from 1985 to 2008 at the provincial level. This provides a sufficient period to observe economic fluctuations after the reform, although it is a mid-term analysis of the provincial level. This study uses data acquired from the *All China Data Center* (http://chinadataonline.org/).

3.1. National level

Figure 1 provides a measurement of each index of the Chinese national economy. GDP per capita in this figure is calculated at 2005 prices, and the adjustment introduced is provided in the note to Figure 1. It is found that both *GI* and *LI* indices rose as GDP per capita rose. It can thus be presumed that the upgrade of industrial structure is reasonably well advanced. This reflects the Petty-Clark's law (Clark, 1940; and Petty, 1690).

Next, regarding the level and the speed of the upgrade, the figure shows that the upgrade of GDP is more extensive than that of labor. In other words, structural changes in labor occur more slowly than those in GDP, and this implies that work changes a little later in rural areas.

However, it is also found that the difference of two indices contracted after 1990. It is clear that the index of *ID* is in a downtrend in the figure, but the index of *SD* does not seem to have fallen as much. It should also be noted that the higher speed of the structural changes in labor is a recent tendency.

3.2 Provincial level

Next, we calculated the same index for the industrial structure at the provincial level. The measurement period was 1985–2008. Because it is inefficient to present all the measurement results, we examined the regional (provincial) disparity of each index. Figure 2 shows the measurement of the coefficient of variation (CoV), in which the differences in the numbers of the provincial population are considered for each index. First, the disparity in GDP per capita is high as a level, but there is less change, or the downtrend is less pronounced. On the other hand, the CoV of the *GI* index is small and has a decreasing tendency. In other words, the industrial structure of GDP is relatively similar across provinces, and there is a convergence tendency. Next, it is also found that the CoV of the *LI* index has a decreasing and convergence tendency, and the structure of labor becomes similar. However, compared with GDP, the area for further structural adjustment of labor remains. Third, the CoV changed and began to rise again on the boundary of about 1990 for the *SD* and *ID* indices. It can be said that the difference in the degree of industrial structure between GDP and labor is not similar across provinces. This reflects the existence of many provinces, in which the labor structures have not changed much, but the structures have changed at the GDP level. Therefore, this suggests the hypothesis that the progress of industrial structural change has created provincial income disparity.

Then, to examine the features of provincial disparity in detail, we examined the provincial ranking of each index. The first panel of Table 1 is the provincial ranking of GDP per capita calculated at 2005 prices. The table introduces the three highest and lowest provinces. As for the highest three, only Beijing, Shanghai, and Tianjin entered the ranking. As for the lowest three, Guizhou always entered the ranking, and although it was ranked with other provinces, it was fixed with Yunnan and Gansu after 2000.

The second panel of Table 1 is the ranking of *GI* index. The highest three have not changed for 20 years, and are in the order of Beijing, Shanghai, and Tianjin. They are still rising every year, although the index measures them as comparatively high, because the industrial structure of these provinces (cities) is urban type. On the other hand, the lowest three provinces keep changing and are among Anhui, Henan, Hainan, Yunnan, Tibet, and Xinjiang.

The third panel of Table 1 shows the ranking of the *LI* index. The highest three provinces are exactly the same as those in *GI* index. The lowest three provinces are relatively different from *GI* and are usually Guizhou, Yunnan, and Tibet. This indicates that industrial structures are not balanced across the provinces.

The fourth panel of Table 1 shows ranking of the *SD* index. To reflect the correlation, the highest rank is replaced by the lowest rank. Beijing, Shanghai, and Tianjin still appear as the lowest three provinces, even though there have been some changes. Guizhou, Yunnan, and Tibet are the main provinces that appear as the highest three provinces, even though they too change relatively.

The last panel of Table 1 is a ranking of the *ID* index, and neither the lowest rank nor the highest rank differs greatly from that of the *SD* index.

3.3 Time series comparison

In this section, we offer another method of comparison, namely the time series method as an application of *SD* and *ID*. In this case, *SD* and *ID* are modified following the format:

$$SDG_{i,t} = \sqrt{\frac{\left(PGS_{i,2008} - PGS_{i,t}\right)^2 + \left(SGS_{i,2008} - SGS_{i,t}\right)^2 + \left(TGS_{i,2008} - TGS_{i,t}\right)^2}{2}} \quad (3\text{-}1\text{-}1)$$

$$SDL_{i,t} = \sqrt{\frac{\left(PLS_{i,2008} - PLS_{i,t}\right)^2 + \left(SLS_{i,2008} - SLS_{i,t}\right)^2 + \left(TLS_{i,2008} - TLS_{i,t}\right)^2}{2}} \quad (3\text{-}2\text{-}1)$$

$$IDG_{i,t} = GI_{i,2008} - GI_{i,t} \quad (4\text{-}1\text{-}1)$$

$$IDL_{i,t} = LI_{i,2008} - LI_{i,t} \quad (4\text{-}2\text{-}1)$$

$SDG_{i,t}$ and $SDL_{i,t}$ are applications of $SD_{i,t}$ for time series comparison. In this study, we assume 2008 as the benchmark year, because 2008 is the end of the year in our study. Thus, these indices will show the recent extent of these differences. Moreover, the largeness and smallness of these indices will enable us to show the speed of change in the industrial structure. If a larger value is indicated, it will be shown to have changed the industrial structure greatly (fast), until the most recent structure. Otherwise, it becomes an opposite interpretation. $IDG_{i,t}$ and $IDL_{i,t}$ are also applications of $ID_{i,t}$ for time series comparison and again we assume 2008 as the benchmark year.

These indices can be interpreted in percentage terms. For example, if it shows 30%, this suggests a 30% industrial structure upgrade between the comparison year and the benchmark year. Table 2 shows the result of the *SDG* and *IDG* of the GDP share. This table displays the result at the national level of China, and shows the arithmetic averages of 31 provinces.

Needless to say, the change in the three years from 2005 to 2008 is smaller than that for the 23 years from 1985 to 2008. In 1985, Tianjin had an industrial structure that most nearly approaches that of 2008. However, because the *IDG* of Tianjin is negative in its results after 1995, its industrial structure in 2008 is not necessarily the most upgraded one. Shanghai is also comparatively poor in changing the industrial structure, because its structure had already been upgraded in 1985. The feature that explains the regional income disparity is not observable, although some provinces including Anhui, Hubei, and Tibet have changed greatly in terms of industrial structure.

Table 3 shows the results of the *SDL* and *IDL* of the share of labor. It can be said that the change in the share in the eight years from 2000 to 2008 is somewhat large when compared with the same index of GDP, although such a feature is not seen here. Judging from these results, it may not be appropriate to use this index to explain regional disparity. One reason is that the absolute value of this share is different for each province. However, this time series comparison is effective as an index that shows the adjustment speed of the share of each province itself. Therefore, it can be presumed that the time series index is also a tool to analyze the changes in the industrial structure.

3.4 Regional comparison

Another method to apply *SD* and *ID* is a comparison with a specific region. The method of specifying the region can be devised in various ways. One involves a comparison with the region in which the industrial structures have been upgraded most. From Table 1, this region approximately becomes Beijing. Therefore, the model is modified as follows.

$$SDG_{i,t} = \sqrt{\frac{\left(PGS_{BJ,t} - PGS_{i,t}\right)^2 + \left(SGS_{BJ,t} - SGS_{i,t}\right)^2 + \left(TGS_{BJ,t} - TGS_{i,t}\right)^2}{2}} \quad \text{(3-1-2)}$$

$$SDL_{i,t} = \sqrt{\frac{\left(PLS_{BJ,t} - PLS_{i,t}\right)^2 + \left(SLS_{BJ,t} - SLS_{i,t}\right)^2 + \left(TLS_{BJ,t} - TLS_{i,t}\right)^2}{2}} \quad \text{(3-2-2)}$$

$$IDG_{i,t} = GI_{BJ,t} - GI_{i,t} \quad \text{(4-1-2)}$$

$$IDL_{i,t} = LI_{BJ,t} - LI_{i,t} \quad \text{(4-2-2)}$$

Table 4 shows the results of *SDG* and *IDG* of the GDP share, and Table 5 shows the results of *SDL* and *IDL* of the labor share. These are the comparisons with Beijing as the base region. Needless to say, if the index approaches the industrial structure in Beijing, it becomes small. However, according to these tables, this tendency is not seen at all. There is a case where the index is increasing. Why is this? If we think simply, Beijing has upgraded the industrial structure faster than other provinces, or they are slower than Beijing's progress speed. It may also not be appropriate to use this index for regional disparity. Because the industrial structure in Beijing has already become an urban-type (tertiary-oriented) structure, the gap in the industrial structure with other regions is large.

Therefore, it takes another object region.

We calculate the same indices by assuming China as the base region. In this case the model is modified as follows.

$$SDG_{i,t} = \sqrt{\frac{\left(PGS_{China,t} - PGS_{i,t}\right)^2 + \left(SGS_{China,t} - SGS_{i,t}\right)^2 + \left(TGS_{China,t} - TGS_{i,t}\right)^2}{2}} \quad (3\text{-}1\text{-}3)$$

$$SDL_{i,t} = \sqrt{\frac{\left(PLS_{China,t} - PLS_{i,t}\right)^2 + \left(SLS_{China,t} - SLS_{i,t}\right)^2 + \left(TLS_{China,t} - TLS_{i,t}\right)^2}{2}} \quad (3\text{-}2\text{-}3)$$

$$IDG_{i,t} = \left|GI_{China,t} - GI_{i,t}\right| \quad (4\text{-}1\text{-}3)$$

$$IDL_{i,t} = \left|LI_{China,t} - LI_{i,t}\right| \quad (4\text{-}2\text{-}3)$$

Note that this is assumed to be the absolute value to avoid subtracting the case from the comparison, because the *ID* of China is considered a mean value. Table 6 shows the result of the *SDG* and *IDG* of the GDP share and Table 7 shows the results of the *SDL* and *IDL* of the share of labor. According to these tables, the provincial average of all indices has gradually become small. This indicates that the industrial structure of each region is approaching the average. In other words, there is a convergence tendency in the industrial structure. However, the convergence speed of GDP structure becomes faster, given the evidence that the averages of GDP indices (*SDG* and *IDG*) are smaller than those of labor (*SDL* and *IDL*). Therefore, the above-mentioned (section 3.2) tendency can be confirmed by such an analysis.

3.5 Correlation with income disparity

The result of each index was observed by specifying the details of the province in the previous analysis. This result is fairly similar among the rising provinces, and there may exist some relation between the income disparity across provinces and differences in the industrial structure. It is then necessary to examine this relation statistically.

Table 8 shows the correlation between GDP per capita and each index at the provincial level. A statistical test was carried out and the t-value was calculated for the correlation coefficient. It is found that a high correlation over almost all periods and all indices is seen in the table. The t-value also shows the highest value, which is statistically insignificant. It can be said that the industrial structure of the higher income province is also upgraded at the provincial level. Moreover, the difference in the degree of industrial structure of the higher income province is small. In other words, this suggests that the progress of the upgrade of the industrial structure, and the gap in the industrial structure between GDP and labor are partial factors in the provincial income disparity.

4. Concluding Remarks

In this study, we analyzed China's economic growth and changes in the industrial structure using a simple original index. We clarified the state of industrial structure in China and changes in it (at both the national and provincial level) in numerical values, according to this index. The following findings are obtained from this study. First, it can be presumed that China has upgraded its industrial structure with economic growth from a long-term viewpoint. This is similar to the phenomenon observed in developed countries. Next, the speed of the upgrade in labor is slower than that of GDP, judging from the fact that the index of labor is lower than that of GDP, although recently it has begun to catch up relatively. The regional disparity based on both the *SD* and *ID* indices does not decrease, although the regional disparity based on both the *GI* and *LI* indices is decreasing. The speed of upgrades in labor is slower than that of GDP and it may be the cause of the economic disparity among provinces, even though the industrial structure has been upgraded. This therefore suggests that it is crucial to upgrade the structure of labor at the provincial level.

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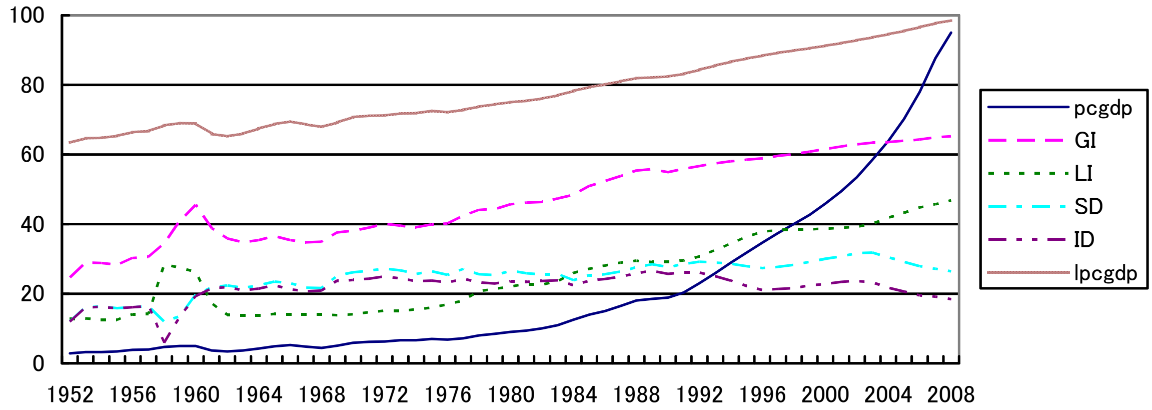
Figure 1 Index result in China's case (1952–2008)



(Note) pcgdp = 2005 prices GDP per capita in China / 200.
lpcgdp = ln (2005 prices GDP per capita in China) * 10.

Figure 2 Population weighted coefficient of variation in each index (1985–2008)

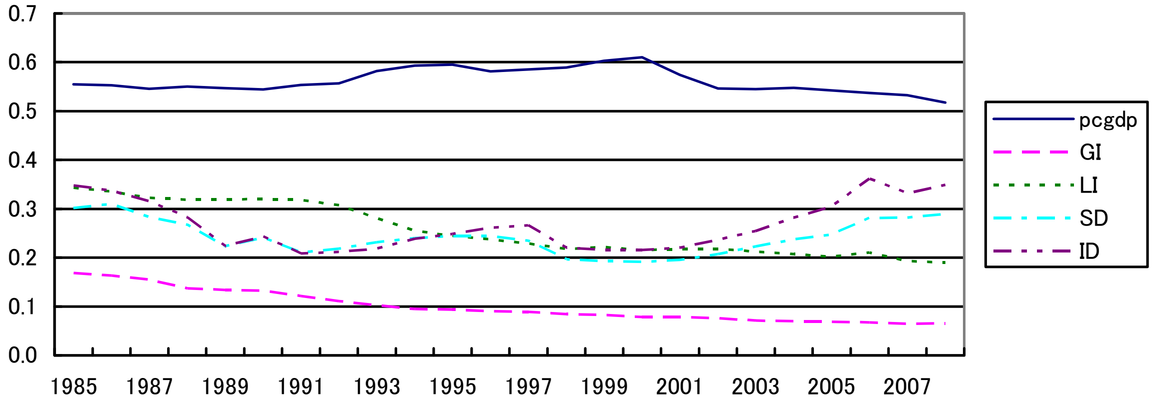


Table 1 Ranking of each index (highest 3 provinces and lowest 3 provinces)

pcgdp (high ratio is better)												
	Highest 3						Lowest 3					
1985	SH	10,384	BJ	9,860	TJ	6,262	AH	1,510	GS	1,469	GZ	1,299
1990	BJ	13,539	SH	12,939	TJ	7,519	GX	1,941	AH	1,848	GZ	1,653
1995	SH	23,472	BJ	22,788	TJ	12,610	GS	3,088	AH	2,501	GZ	2,363
2000	SH	39,654	BJ	35,382	TJ	21,086	GX	5,140	GS	4,533	GZ	3,263
2005	SH	51,474	BJ	45,444	TJ	35,783	YN	7,835	GS	7,477	GZ	5,052
2008	SH	68,626	BJ	57,650	TJ	49,604	YN	10,716	GS	10,166	GZ	7,326
GI (high ratio is better)												
	Highest 3						Lowest 3					
1985	BJ	72.43	SH	69.35	TJ	65.18	BE	38.20	HB	37.55	AH	36.85
1990	BJ	77.56	SH	71.84	TJ	66.56	JX	44.24	AH	43.00	XZ	41.42
1995	BJ	81.33	SH	72.40	TJ	69.18	NA	51.76	GZ	51.11	XZ	51.11
2000	BJ	82.95	SH	75.96	TJ	70.74	GX	55.57	HA	53.94	HN	53.72
2005	BJ	83.86	SH	74.80	TJ	69.22	XJ	58.05	HN	56.09	HA	54.08
2008	BJ	85.47	SH	75.90	XZ	70.99	JX	59.09	HN	57.37	HA	55.90
LI (high ratio is better)												
	Highest 3						Lowest 3					
1985	BJ	60.98	SH	54.94	TJ	53.25	XZ	16.74	GX	15.69	YN	15.37
1990	BJ	63.08	SH	59.28	TJ	55.39	XZ	17.37	GZ	16.64	YN	15.21
1995	BJ	69.38	SH	65.04	TJ	58.88	GZ	21.32	XZ	20.28	YN	19.28
2000	BJ	72.12	SH	65.51	TJ	59.61	HN	27.17	XZ	23.32	YN	21.54
2005	BJ	80.94	SH	73.51	TJ	60.84	XZ	33.95	HN	33.51	YN	25.58
2008	BJ	83.45	SH	74.84	TJ	64.22	HN	37.81	GX	34.80	YN	31.23
SD (low ratio is better)												
	Lowest 3						Highest 3					
1985	JL	8.34	BE	11.54	BJ	11.84	SA	30.49	GS	32.07	GX	35.42
1990	TJ	11.21	JL	13.15	LN	14.45	GZ	33.43	SA	35.43	YN	36.19
1995	SH	7.43	TJ	10.37	LN	14.31	NX	35.44	GZ	35.69	YN	42.20
2000	SH	10.59	BJ	11.06	TJ	13.41	QH	38.42	XZ	41.81	YN	44.41
2005	BJ	5.10	SH	8.70	TJ	15.37	GS	36.84	XZ	36.99	YN	43.88
2008	BJ	4.85	SH	6.67	ZJ	11.38	GS	35.95	NM	37.78	YN	40.80
ID (low ratio is better)												
	Lowest 3						Highest 3					
1985	JL	6.68	HL	8.35	JS	9.92	SA	28.10	GD	28.34	GX	34.65
1990	TJ	11.18	HL	11.53	JL	12.29	YN	30.20	GX	31.19	SA	33.12
1995	SH	7.36	TJ	10.29	HL	10.66	XZ	30.82	NX	31.29	YN	33.83
2000	SH	10.45	BJ	10.83	TJ	11.13	NX	31.02	YN	35.48	XZ	40.76
2005	SH	1.29	BJ	2.92	TJ	8.39	GS	26.42	XZ	34.28	YN	34.51
2008	SH	1.06	BJ	2.02	TJ	4.38	GX	25.99	YN	29.87	XZ	31.87

(Note) BJ: Beijing; TJ: Tianjin, HB: Hebei; SX: Shanxi; NM: Inner Mongolia; LN: Liaoning; JL: Jilin; HL: Heilongjiang; SH: Shanghai; JS: Jiangsu; ZJ: Zhejiang; AH: Anhui; FJ: Fujian; JX: Jiangxi; SD: Shandong; HN: Henan; BE: Hubei; NA: Hunan; GD: Guangdong; GX: Guangxi; HA: Hainan; CQ: Chongqing; SC: Sichuan; GZ: Guizhou; YN: Yunnan; XZ: Tibet; SA: Shaanxi; GS: Gansu; QH: Qinghai; NX: Ningxia; XJ: Xinjiang.

Table 2 Results of *SDG* and *IDG* (base year is 2008)

	SDG					*IDG*				
	85–08	90–08	95–08	00–08	05–08	85–08	90–08	95–08	00–08	05–08
China	21.17	17.28	8.78	5.05	1.79	14.26	10.28	6.72	3.71	1.32
Beijing	17.71	9.60	5.27	3.54	2.69	13.03	7.91	4.13	2.52	1.61
Tianjin	4.93	7.39	7.54	7.99	2.72	3.42	2.04	−0.58	−2.14	−0.62
Hebei	29.36	20.67	10.99	6.04	2.40	23.54	15.17	7.10	4.12	1.90
Shanxi	16.85	16.43	12.12	7.53	2.41	7.57	4.39	1.55	0.42	0.01
Mongolia	24.86	25.34	19.68	16.76	6.04	12.88	10.57	5.01	2.58	0.90
Liaoning	9.69	10.39	8.26	7.25	4.84	9.23	4.03	1.05	−0.06	−0.59
Jilin	19.87	17.88	10.96	7.13	3.94	17.73	13.98	8.33	4.33	2.78
Heilong	12.71	9.38	6.42	3.16	1.43	12.37	7.62	5.22	1.66	1.36
Shanghai	7.28	4.14	4.53	1.84	1.86	6.55	4.06	3.50	-0.06	1.10
Jiangsu	28.92	19.28	9.73	6.30	1.68	24.74	13.85	6.60	3.32	1.33
Zhejiang	25.52	18.90	7.96	4.46	1.47	16.21	12.60	5.86	3.81	1.46
Anhui	34.50	27.47	14.70	10.47	4.64	25.30	19.15	9.94	5.36	0.79
Fujian	30.07	25.43	13.78	9.00	3.39	14.90	10.45	6.84	3.58	1.48
Jiangxi	34.20	30.82	17.94	14.84	4.71	20.76	14.85	6.34	1.11	0.65
Shandong	30.85	22.28	12.76	7.91	2.08	17.47	12.90	6.50	3.07	1.45
Henan	28.76	24.59	12.72	10.27	4.16	17.07	10.95	5.44	3.66	1.29
Hubei	30.80	24.92	14.92	7.65	3.07	25.84	18.40	10.66	5.19	2.18
Hunan	29.42	23.57	15.23	8.82	3.89	23.10	16.94	10.89	5.71	2.16
Guangdong	27.31	22.74	10.83	7.62	2.37	11.57	5.71	1.65	0.31	0.09
Guangxi	24.29	22.39	12.51	10.47	5.03	10.45	11.04	6.95	5.22	1.71
Hainan	18.09	14.25	6.09	7.19	3.45	14.77	10.57	0.77	1.95	1.82
Chongqing	29.69	25.97	15.31	10.36	4.56	24.63	20.58	10.24	3.60	1.31
Sichuan	30.99	26.11	17.25	12.61	5.28	20.66	14.66	8.36	4.57	1.70
Guizhou	27.27	21.06	14.95	8.76	3.07	24.53	17.87	12.39	7.51	3.03
Yunnan	25.43	18.67	9.21	5.54	2.85	22.00	15.68	7.99	4.08	1.01
Tibet	34.62	33.34	21.50	11.63	3.30	31.73	29.58	19.89	6.92	2.76
Shaanxi	19.58	17.77	11.73	8.02	2.97	10.43	4.06	2.75	0.87	0.52
Gansu	20.60	15.81	10.75	5.33	2.25	19.89	13.47	8.86	3.21	1.34
Qinghai	22.55	20.21	15.25	10.89	3.78	13.02	12.36	5.95	1.20	0.37
Ningxia	18.97	15.07	10.94	9.73	3.84	12.57	7.11	1.71	0.31	−0.42
Xinjiang	17.09	14.53	8.40	6.06	2.19	15.78	11.22	6.28	4.19	1.80
Average	23.64	19.56	11.94	8.23	3.30	16.89	12.06	6.39	2.97	1.23

Table 3 Results of *SDL* and *IDL* (base year is 2008)

	SDL					*IDL*				
	85–08	90–08	95–08	00–08	05–08	85–08	90-08	95-08	00–08	05-08
China	20.42	18.33	11.14	9.05	4.60	19.64	17.61	10.51	8.06	3.54
Beijing	29.68	28.52	21.17	14.56	3.46	22.47	20.37	14.07	11.33	2.51
Tianjin	13.71	11.70	8.66	4.63	3.38	10.97	8.83	5.33	4.61	3.38
Hebei	19.04	18.06	9.27	7.69	3.74	16.52	15.98	7.28	4.34	3.05
Shanxi	11.06	9.77	5.58	5.52	2.77	10.77	9.42	4.69	5.38	2.76
Mongolia	12.15	8.84	6.29	3.82	2.96	11.76	7.75	4.48	3.80	2.75
Liaoning	17.01	15.93	11.53	4.89	3.07	10.37	8.54	4.07	4.84	3.07
Jilin	11.20	10.94	6.87	5.17	2.57	6.10	7.95	3.49	5.13	2.18
Heilong	12.72	12.66	12.10	3.42	2.21	2.03	0.46	−2.81	3.37	2.19
Shanghai	25.35	23.28	14.36	9.81	1.43	19.90	15.56	9.79	9.32	1.33
Jiangsu	28.37	24.47	17.98	18.88	6.41	26.49	22.71	15.46	13.97	3.92
Zhejiang	32.01	30.31	21.44	17.95	5.80	29.35	26.67	17.01	11.82	4.19
Anhui	23.94	21.30	13.90	13.64	5.86	21.61	18.93	11.45	9.54	3.80
Fujian	26.34	23.61	16.83	13.98	5.71	22.33	19.70	13.31	10.20	4.25
Jiangxi	23.30	22.33	12.93	12.21	5.32	22.45	21.46	10.12	4.74	2.55
Shandong	27.30	23.36	14.85	13.58	2.49	25.37	22.08	13.73	11.69	2.30
Henan	21.00	17.79	9.83	13.32	5.91	18.28	15.35	7.72	10.63	4.29
Hubei	25.13	24.09	14.65	10.99	6.27	25.00	23.86	14.48	9.56	4.47
Hunan	20.35	18.22	10.48	9.70	3.53	20.16	18.09	9.99	8.52	2.78
Guangdong	28.13	22.18	7.91	11.12	4.00	26.49	21.52	6.74	9.19	3.22
Guangxi	21.45	18.49	10.06	8.79	8.39	19.11	16.23	7.14	2.10	-3.43
Hainan	18.81	15.32	7.21	6.82	2.92	18.72	15.24	7.20	6.66	2.85
Chongqing	31.66	29.55	19.68	16.92	7.18	30.20	28.31	18.29	13.83	5.69
Sichuan	27.19	25.26	15.70	12.65	4.93	26.10	24.16	15.55	10.89	3.86
Guizhou	25.26	25.30	20.64	14.02	4.58	25.16	25.28	20.61	13.90	4.49
Yunnan	15.95	16.18	12.12	10.05	5.99	15.85	16.02	11.95	9.69	5.65
Tibet	22.94	22.50	19.51	16.31	5.27	22.38	21.76	18.84	15.81	5.17
Shaanxi	17.88	16.59	12.08	7.76	3.49	17.88	16.53	12.01	6.84	2.91
Gansu	19.72	16.77	7.63	6.62	4.03	19.71	16.77	7.10	6.61	4.00
Qinghai	16.29	14.36	14.03	14.16	4.32	16.26	14.20	13.76	12.38	2.65
Ningxia	17.94	15.17	12.25	11.20	3.25	16.84	13.96	11.11	9.44	2.16
Xinjiang	13.79	11.95	8.98	6.12	1.51	13.67	11.51	7.83	6.12	1.47
Average	21.18	19.19	12.79	10.53	4.28	19.04	16.94	10.38	8.59	3.11

Table 4 Results of *SDG* and *IDG* (base region is Beijing)

	SDG						*IDG*					
	1985	1990	1995	2000	2005	2008	1985	1990	1995	2000	2005	2008
China	23.06	22.60	25.02	25.19	25.45	27.88	21.46	22.60	22.82	21.42	19.94	20.23
Beijing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tianjin	13.86	18.43	20.55	21.06	26.89	32.14	7.25	11.00	12.16	12.21	14.64	16.87
Hebei	35.48	31.84	29.61	30.57	31.38	33.53	34.88	31.64	27.34	25.97	24.66	24.37
Shanxi	14.45	17.63	21.38	25.19	29.60	34.22	14.43	16.37	17.31	17.79	18.29	19.89
Mongolia	24.96	25.94	23.34	22.72	25.84	31.49	22.31	25.13	23.34	22.52	21.76	22.46
Liaoning	20.20	20.10	22.61	24.02	26.09	32.55	17.95	17.87	18.67	19.17	19.56	21.75
Jilin	26.75	27.88	26.88	25.30	26.08	27.81	26.49	27.87	25.99	23.60	22.98	21.80
Heilong	27.18	26.53	29.77	29.31	31.47	33.44	22.82	23.20	24.57	22.63	23.24	23.49
Shanghai	9.02	13.90	19.12	14.72	18.95	19.76	3.08	5.72	8.93	6.98	9.06	9.57
Jiangsu	32.11	27.48	28.08	28.37	30.95	33.59	32.11	26.35	22.88	21.21	20.13	20.41
Zhejiang	22.24	22.29	23.87	26.07	26.89	28.83	20.49	22.01	19.04	18.61	17.17	17.32
Anhui	40.07	35.50	29.27	26.73	24.75	28.87	35.58	34.56	29.12	26.15	22.51	23.32
Fujian	28.15	24.63	24.78	24.86	26.86	30.46	23.02	23.69	23.86	22.22	21.03	21.16
Jiangxi	38.07	34.85	28.67	25.46	29.75	34.52	34.11	33.32	28.59	24.97	25.43	26.38
Shandong	29.35	28.64	29.08	29.96	33.52	36.35	27.76	28.32	25.69	23.88	23.17	23.33
Henan	33.48	31.19	31.38	32.26	34.00	38.10	32.13	31.14	29.40	29.23	27.77	28.09
Hubei	36.48	32.50	28.07	25.40	24.99	26.84	34.24	31.92	27.96	24.10	22.01	21.43
Hunan	36.47	32.70	29.58	26.53	25.06	27.01	32.88	31.85	29.57	26.01	23.37	22.82
Guangdong	20.85	15.59	17.16	19.67	24.14	28.62	15.65	14.92	14.63	14.90	15.60	17.11
Guangxi	30.09	30.06	27.49	27.44	25.65	28.13	22.09	27.81	27.49	27.37	24.78	24.68
Hainan	37.99	35.18	27.52	30.22	30.07	29.59	31.31	32.24	26.20	29.00	29.78	29.57
Chongqing	33.57	32.77	25.93	21.28	21.89	25.77	31.35	32.42	25.86	20.83	19.46	19.76
Sichuan	36.64	32.73	28.83	26.85	26.82	30.26	32.21	31.34	28.82	26.64	24.69	24.59
Guizhou	35.09	32.10	30.27	27.69	25.72	25.69	33.46	31.93	30.22	26.95	23.39	21.97
Yunnan	34.72	32.15	29.13	27.39	25.89	28.65	33.34	32.14	28.22	25.92	23.78	24.37
Tibet	41.82	41.53	32.18	22.08	16.04	14.48	33.17	36.14	30.23	18.87	15.63	14.48
Shaanxi	20.10	18.12	22.26	23.95	27.62	31.92	19.36	18.11	20.58	20.31	20.87	21.96
Gansu	28.62	27.39	27.29	24.26	24.63	27.00	28.59	27.29	26.46	22.42	21.47	21.73
Qinghai	22.84	25.96	23.90	22.20	26.24	31.18	21.47	25.94	23.30	20.15	20.24	21.48
Ningxia	21.25	20.28	19.69	20.58	23.99	29.45	20.52	20.19	18.56	18.77	18.96	20.98
Xinjiang	28.43	28.99	28.84	28.98	29.01	30.55	28.36	28.92	27.76	27.28	25.81	25.62
Average	27.75	26.61	25.37	24.55	25.83	28.74	24.92	25.21	23.31	21.50	20.68	21.06

Table 5 Results of *SDL* and *IDL* (base region is Beijing)

	SDL						*IDL*					
	1985	1990	1995	2000	2005	2008	1985	1990	1995	2000	2005	2008
China	39.43	39.53	36.25	34.45	37.67	36.93	33.81	33.88	33.08	33.37	37.67	36.64
Beijing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tianjin	9.21	8.62	12.72	14.56	24.42	25.13	7.74	7.70	10.50	12.51	20.10	19.23
Hebei	39.71	40.85	35.90	34.13	41.41	41.66	34.63	36.19	33.80	33.58	41.12	40.58
Shanxi	28.63	29.54	29.24	31.94	37.51	37.43	25.53	26.28	27.85	31.27	37.48	37.22
Mongolia	37.77	35.84	36.34	37.45	43.29	42.56	31.63	29.73	32.76	34.81	42.59	42.35
Liaoning	17.58	17.96	19.56	23.57	30.04	29.63	17.37	17.64	19.47	22.97	30.03	29.47
Jilin	24.66	29.31	29.85	33.90	38.15	38.13	21.72	25.68	27.52	31.88	37.77	38.09
Heilong	21.27	21.95	23.85	33.61	39.97	40.17	19.72	20.25	23.28	32.19	39.84	40.16
Shanghai	12.92	13.03	10.72	11.19	14.30	17.40	6.04	3.81	4.34	6.60	7.43	8.61
Jiangsu	32.18	30.45	28.48	29.29	30.45	32.95	30.58	28.90	27.94	29.20	27.97	26.56
Zhejiang	33.56	33.80	28.83	25.39	30.47	32.76	31.75	31.18	27.82	25.36	26.56	24.87
Anhui	47.93	47.46	43.48	42.36	42.98	41.87	40.77	40.19	39.00	39.84	42.92	41.63
Fujian	38.75	38.09	34.68	31.99	34.59	34.49	32.24	31.72	31.63	31.25	34.12	32.38
Jiangxi	43.15	44.37	38.86	34.90	37.92	38.12	37.80	38.91	33.87	31.23	37.86	37.82
Shandong	44.79	42.86	38.57	37.77	36.79	37.60	39.54	38.36	36.30	37.00	36.43	36.64
Henan	48.64	47.53	43.06	46.75	47.48	45.84	41.45	40.63	39.29	44.94	47.43	45.64
Hubei	38.89	40.45	35.18	31.76	33.35	31.18	33.63	34.59	31.51	29.32	33.06	31.10
Hunan	47.15	47.16	44.07	43.07	43.75	43.07	40.73	40.77	38.97	40.23	43.31	43.04
Guangdong	37.59	33.39	23.39	26.90	29.70	30.22	32.53	29.66	21.18	26.36	29.22	28.51
Guangxi	54.73	53.91	48.38	43.88	44.27	48.68	45.29	44.52	41.73	39.42	42.72	48.65
Hainan	49.55	48.64	43.59	42.99	44.87	43.82	39.11	37.74	35.99	38.18	43.21	42.86
Chongqing	48.40	48.34	42.53	39.22	37.11	34.08	41.56	41.78	38.05	36.32	37.01	33.83
Sichuan	50.76	51.07	44.64	41.93	41.10	39.39	43.02	43.19	40.87	38.94	40.74	39.39
Guizhou	51.42	55.30	54.70	48.44	45.23	42.51	44.22	46.44	48.06	44.09	43.50	41.52
Yunnan	54.27	56.80	56.51	54.44	56.80	52.88	45.61	47.87	50.10	50.58	55.36	52.22
Tibet	55.99	57.93	57.94	53.96	48.84	45.42	44.24	45.72	49.10	48.80	46.99	44.33
Shaanxi	41.30	42.98	42.56	38.63	41.32	40.60	36.00	36.75	38.53	36.09	40.99	40.58
Gansu	48.35	47.83	41.42	41.97	45.95	43.97	40.73	39.88	36.52	38.76	44.97	43.48
Qinghai	38.60	39.56	42.80	42.98	39.29	38.65	32.44	32.48	38.33	39.69	38.79	38.65
Ningxia	41.95	41.47	42.03	40.88	40.55	40.95	35.22	34.45	37.89	38.96	40.50	40.85
Xinjiang	41.24	40.74	40.16	40.08	42.02	42.49	33.10	33.05	35.66	36.69	40.87	41.90
Average	38.09	38.30	35.94	35.48	37.55	37.21	32.45	32.45	32.19	33.13	36.48	35.88

Table 6 Results of *SDG* and *IDG* (base region is China)

	SDG						*IDG*					
	1985	1990	1995	2000	2005	2008	1985	1990	1995	2000	2005	2008
China	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beijing	23.06	22.60	25.02	25.19	25.45	27.88	21.46	22.60	22.82	21.42	19.94	20.23
Tianjin	24.75	18.93	12.38	10.00	8.58	8.84	14.21	11.60	10.66	9.21	5.30	3.36
Hebei	13.57	9.77	4.65	5.38	5.93	5.66	13.43	9.04	4.52	4.56	4.72	4.14
Shanxi	11.61	9.16	5.96	5.82	7.64	8.67	7.03	6.23	5.51	3.62	1.65	0.34
Mongolia	2.87	6.75	10.51	10.32	2.61	3.65	0.85	2.53	0.52	1.10	1.82	2.23
Liaoning	18.07	10.48	4.84	2.55	1.50	5.26	3.51	4.73	4.15	2.25	0.38	1.52
Jilin	6.93	5.34	4.65	4.70	4.62	2.47	5.04	5.27	3.17	2.19	3.04	1.57
Heilong	23.25	13.06	6.77	5.50	6.33	5.66	1.36	0.60	1.76	1.21	3.30	3.26
Shanghai	24.98	21.20	15.39	14.44	10.91	10.83	18.38	16.88	13.89	14.44	10.88	10.66
Jiangsu	13.43	8.81	6.00	5.58	7.70	7.50	10.66	3.75	0.06	0.21	0.19	0.18
Zhejiang	0.99	3.72	5.60	5.73	5.62	4.85	0.97	0.59	3.78	2.81	2.77	2.91
Anhui	17.29	14.36	9.67	9.06	6.08	3.76	14.13	11.97	6.30	4.73	2.56	3.09
Fujian	7.91	6.66	3.74	2.25	1.41	2.88	1.56	1.10	1.04	0.80	1.09	0.93
Jiangxi	15.21	14.69	9.91	9.02	5.50	6.88	12.65	10.72	5.77	3.55	5.48	6.15
Shandong	6.40	7.23	4.42	5.42	9.01	9.23	6.30	5.72	2.87	2.46	3.23	3.10
Henan	10.71	8.68	6.62	7.82	8.71	10.24	10.67	8.54	6.58	7.81	7.83	7.86
Hubei	13.44	11.06	9.35	5.87	4.48	3.25	12.78	9.33	5.14	2.68	2.07	1.20
Hunan	13.56	11.74	11.85	9.25	7.58	5.39	11.42	9.25	6.75	4.59	3.43	2.59
Guangdong	7.89	8.84	8.30	6.53	5.07	4.89	5.81	7.68	8.19	6.52	4.34	3.12
Guangxi	11.98	12.41	11.44	12.81	10.39	7.21	0.64	5.21	4.67	5.95	4.84	4.45
Hainan	16.36	16.94	18.97	23.05	22.28	20.52	9.85	9.64	3.39	7.59	9.84	9.34
Chongqing	10.51	10.84	8.90	8.93	5.80	2.67	9.89	9.83	3.04	0.58	0.48	0.47
Sichuan	14.03	12.73	12.52	11.17	7.13	4.63	10.76	8.74	6.00	5.22	4.74	4.36
Guizhou	12.19	9.83	11.33	8.88	6.17	6.10	12.00	9.33	7.40	5.54	3.45	1.74
Yunnan	11.95	9.55	6.21	6.33	6.76	5.84	11.88	9.54	5.40	4.51	3.84	4.14
Tibet	20.65	24.39	22.56	24.86	19.87	19.66	11.72	13.54	7.41	2.55	4.31	5.75
Shaanxi	3.71	4.52	2.86	1.24	2.46	4.34	2.10	4.49	2.24	1.11	0.93	1.73
Gansu	10.07	5.30	5.11	4.12	4.05	3.49	7.13	4.69	3.64	1.00	1.53	1.50
Qinghai	0.67	3.59	4.98	4.16	0.93	3.65	0.01	3.34	0.48	1.26	0.30	1.25
Ningxia	3.07	3.19	5.63	5.49	1.49	1.66	0.94	2.41	4.26	2.65	0.99	0.75
Xinjiang	9.52	6.67	5.51	6.82	6.40	5.95	6.90	6.32	4.94	5.86	5.87	5.39
Average	12.28	10.74	9.09	8.65	7.37	7.21	8.26	7.59	5.37	4.52	4.04	3.85

Table 7 Results of *SDL* and *IDL* (base region is China)

	SDL						*IDL*					
	1985	1990	1995	2000	2005	2008	1985	1990	1995	2000	2005	2008
China	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beijing	39.43	39.53	36.25	34.45	37.67	36.93	33.81	33.88	33.08	33.37	37.67	36.64
Tianjin	36.32	35.68	31.53	26.31	22.78	20.86	26.08	26.19	22.58	20.86	17.56	17.41
Hebei	1.19	2.70	2.79	2.52	6.52	6.18	0.82	2.30	0.71	0.22	3.45	3.94
Shanxi	11.05	10.25	7.90	2.96	1.98	0.97	8.29	7.60	5.23	2.10	0.19	0.59
Mongolia	2.21	4.17	0.95	5.42	8.65	10.64	2.18	4.15	0.32	1.45	4.92	5.71
Liaoning	24.03	23.50	18.79	10.91	7.77	7.33	16.44	16.24	13.62	10.39	7.64	7.17
Jilin	14.84	10.30	6.44	3.28	4.76	6.51	12.09	8.20	5.57	1.48	0.10	1.46
Heilong	18.72	18.10	13.75	1.60	3.36	6.79	14.09	13.63	9.80	1.18	2.17	3.52
Shanghai	42.14	44.52	37.84	32.04	32.86	29.91	27.77	30.08	28.74	26.76	30.23	28.02
Jiangsu	10.75	11.87	10.65	7.51	15.98	17.94	3.23	4.98	5.14	4.17	9.70	10.08
Zhejiang	9.65	7.80	8.98	10.80	19.13	20.38	2.06	2.70	5.26	8.01	11.11	11.76
Anhui	8.52	7.98	7.38	8.70	5.52	4.99	6.96	6.30	5.92	6.47	5.25	4.99
Fujian	1.98	2.28	1.57	2.75	7.26	8.37	1.57	2.16	1.46	2.12	3.55	4.25
Jiangxi	4.02	5.12	4.30	7.32	1.59	1.19	3.99	5.03	0.79	2.14	0.19	1.18
Shandong	5.78	4.64	3.69	3.76	5.89	3.77	5.73	4.47	3.22	3.63	1.24	0.00
Henan	9.22	8.01	6.81	12.35	9.88	9.02	7.64	6.75	6.21	11.58	9.76	9.01
Hubei	0.77	0.94	1.78	5.42	5.95	6.00	0.18	0.70	1.58	4.05	4.61	5.54
Hunan	7.75	7.66	8.24	9.65	7.89	8.97	6.92	6.89	5.89	6.86	5.65	6.41
Guangdong	1.94	6.57	12.87	7.71	10.32	9.74	1.28	4.22	11.90	7.01	8.44	8.13
Guangxi	15.53	14.63	12.97	12.28	12.08	13.55	11.48	10.64	8.65	6.05	5.05	12.02
Hainan	11.44	11.02	10.18	12.17	12.73	15.14	5.30	3.85	2.91	4.82	5.54	6.23
Chongqing	8.97	8.84	6.49	6.87	2.11	2.86	7.75	7.89	4.97	2.96	0.66	2.81
Sichuan	11.37	11.59	8.39	8.91	5.65	5.37	9.21	9.31	7.79	5.58	3.07	2.76
Guizhou	12.00	15.85	18.76	15.70	13.09	14.61	10.41	12.56	14.98	10.73	5.84	4.89
Yunnan	14.91	17.32	20.45	20.73	21.40	20.29	11.80	13.99	17.02	17.21	17.70	15.59
Tibet	17.48	19.28	22.60	21.14	15.73	16.46	10.43	11.83	16.02	15.43	9.32	7.69
Shaanxi	2.19	3.46	6.34	5.87	5.70	6.89	2.19	2.87	5.44	2.72	3.32	3.95
Gansu	9.02	8.52	5.85	9.25	11.42	13.14	6.92	6.00	3.43	5.39	7.31	6.85
Qinghai	1.51	2.62	6.73	10.13	5.72	5.52	1.37	1.40	5.25	6.32	1.12	2.01
Ningxia	2.88	2.79	5.87	6.76	3.15	4.62	1.41	0.56	4.81	5.59	2.84	4.22
Xinjiang	4.37	3.57	4.47	8.24	9.67	12.86	0.71	0.83	2.58	3.32	3.20	5.27
Average	11.68	11.97	11.34	10.76	10.78	11.22	8.39	8.65	8.42	7.74	7.37	7.74

Table 8 Correlation and statistical test

	GDP-GI		GDP-LI		GDP-SD		GDP-ID	
	Correlation	T-value	Correlation	T-value	Correlation	T-value	Correlation	T-value
1985	0.8261	7.89	0.8704	9.52	−0.4098	−2.42	−0.3672	−2.13
1986	0.8333	8.12	0.8776	9.86	−0.3878	−2.27	−0.3878	−2.27
1987	0.8247	7.85	0.8816	10.06	−0.4113	−2.43	−0.4241	−2.52
1988	0.8265	7.91	0.8815	10.05	−0.4604	−2.79	−0.4946	−3.06
1989	0.8401	8.34	0.8854	10.26	−0.5429	−3.48	−0.5927	−3.96
1990	0.8591	9.04	0.8885	10.42	−0.4664	−2.84	−0.5273	−3.34
1991	0.8576	8.98	0.8865	10.32	−0.5344	−3.40	−0.5980	−4.02
1992	0.8589	9.03	0.8848	10.23	−0.5953	−3.99	−0.6355	−4.43
1993	0.8733	9.65	0.8621	9.16	−0.5626	−3.66	−0.5933	−3.97
1994	0.8749	9.73	0.8837	10.17	−0.6789	−4.98	−0.6577	−4.70
1995	0.8724	9.61	0.8800	9.98	−0.6684	−4.84	−0.6388	−4.47
1996	0.8883	10.42	0.8843	10.20	−0.6716	−4.88	−0.6120	−4.17
1997	0.8718	9.58	0.8517	8.75	−0.6006	−4.05	−0.5258	−3.33
1998	0.8751	9.74	0.8974	10.95	−0.7525	−6.15	−0.6430	−4.52
1999	0.8572	8.96	0.8875	10.37	−0.7583	−6.26	−0.6448	−4.54
2000	0.8458	8.54	0.8923	10.64	−0.7786	−6.68	−0.6587	−4.71
2001	0.7768	6.64	0.8862	10.30	−0.8028	−7.25	−0.7050	−5.35
2002	0.8100	7.44	0.9162	12.32	−0.8362	−8.21	−0.7456	−6.03
2003	0.8052	7.31	0.9248	13.09	−0.8481	−8.62	−0.7881	−6.89
2004	0.7930	7.01	0.9253	13.14	−0.8448	−8.50	−0.8040	−7.28
2005	0.7851	6.83	0.9286	13.48	−0.8430	−8.44	−0.8222	−7.78
2006	0.7706	6.51	0.9150	12.21	−0.8024	−7.24	−0.7861	−6.85
2007	0.7602	6.30	0.9075	11.63	−0.8218	−7.77	−0.8096	−7.43
2008	0.7388	5.90	0.9081	11.67	−0.8091	−7.42	−0.8282	−7.96
1985–2008	0.7164	27.97	0.8082	37.39	−0.3919	−11.60	−0.5790	−19.34

(Note) statistical test was carried out using the following formula:

$$t = r\sqrt{n-2}\Big/\sqrt{1-r^2}$$

in which r is correlation, n is number of samples (31 for each year and 744 for the period 1985–2008).