



## An Empirical Study on Spatial Disparity of Regional Economy since Reform and Opening In China: Counting for Grouping Income in Provinces

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### Abstract

This paper takes the way that divides all thirty one provinces into five groups under the standard of accounting for twenty percentages of all regions during 1978-2004. Then it examines the share of every provincial gross domestic product per capita versus the sum of all provinces and ranks the order. And last the Lorenz Curves are drawn at the interval of two years. All computed outcomes are shown in graphs and tables, explicitly exploring the change of disparity of all China's provincial region, what serves as scientific and objective bases for analyzing the reasons of regional economy's disparity changes, evaluating its influences, and predicting the future development trend.

**Keywords:** Grouping income, Spatial disparity, Lorenz Curves, Regional economy

### 1. Introduction

Although some scholars have already made researches on the disparity changes of China's regional economy after the reform and opening, not any acceptable conclusion has been drawn. Some conclusions are even far different from each other. Kaizhong Yang (1994) takes the growth rates of national income per capita in different regions from 1952 to 1990 as samples, adopts the variation coefficient method and the weighted variation coefficient method, and counts the economic disparity of different provinces and regions in China. He concludes that the economic disparity changes of different provinces and regions takes the year 1978 as a turning point and changes in a U shape: the disparity is reducing from 1952 to 1978, and rising from 1978 to 1990. Houkai Wei (1997) uses data of per capita GDP, per capita national income, and per capita income, adopts the  $\beta$  convergence coefficient method used to evaluate regional economic growth, and make studies on the regional disparity from 1952 to 1995. He concludes that the regional disparity is reducing from 1952, rising from 1965 to 1978, and reducing from 1978 to 1995. Chenglin Qin (2002) uses the weighted coefficient method to count the regional per capital GDP from 1978 to 2000 and concludes that the regional disparity is reducing from 1978 to 2000 but slightly rising from 1993 to 1995. Yifu Lin (2003) uses the per capital GDP in 31 provinces and regions in China and adopts the coefficient of variation method and the Gini Coefficient method to count the sample data from 1978 to 1999 and concludes that the regional disparity becomes significant after 1990. All these researches adopt different methods and select different time periods, what lead to different results. Based on former researches, the author selects the late reform and opening as the time period sample, partially takes references from Chenglin Qin's research methods (1997), and carefully counts the proportion of provincial or regional per capital GDP to national per capital GDP and the rank of every province or region. Based on these calculations, the author draws a Lorenz Curve. Then the author takes the way that divides all thirty one provinces into five groups under the standard of accounting for twenty percentages of all provinces and regions. The author respectively calculates the changes of provincial and regional per capita GDP in five groups and their differences with the average value, namely the national per capital GDP, and their proportions to the average. Use tables to display the provincial income disparity in China. All these calculations and tables serve as scientific and objective bases for analyzing reasons for changes of regional economic disparity, evaluating the effects, and predicting the trend.

### 2. Data sources and data processes

The statistical data in this paper chiefly include the provincial and regional GDP and population. The GDP is valued by current prices in the year. All data are from the History Statistical Materials Compilation for Provinces, Autonomous

Regions, and Municipalities and China Statistical Yearbook (from 1949 to 1989) published by China Statistical Publishing House. Besides, before the foundation of Hainan province, Hainan's yearly GDP data are separated from Guangdong's. For the sake of a uniform measure, all provincial yearly per capita GDP data are based on original data of provincial yearly GDP and population. And the data of national GDP and population are based on relevant provincial and regional data.

This paper adopts a spatial statistical method to measure the regional economic disparity and makes these researches as follow. Firstly, calculate the proportion of provincial or regional per capita GDP to the national GDP from 1978 to 2004. Take the way that divides all provinces and regions into five groups from I to V according to provincial or regional yearly per capita GDP under the standard of accounting for twenty percentages of all provinces and regions. Respectively calculate the proportion of every group sample's yearly per capita GDP to the national GDP. Secondly, calculate the provincial and regional per capita GDP and their differences with the average value, namely the national per capita GDP, and their proportions to the average. Rank the provincial and regional per capita GDP from the big to the small and draw every two years' Lorenz Curve. All calculated results are shown in tables, which serve as bases for studying provincial and regional economic disparity in China from 1978 to 2004.

### **3. The empirical analysis on the provincial and regional grouping income disparity in China after the reform and opening**

This section is to analyze the spatial characteristics of provincial and regional economic disparity changes in China from 1978 to 2004 by taking single province or region as a unit, from an aspect of groups at different income levels.

#### *3.1 The analysis on the contribution of groups at different income levels to the regional economic disparity changes*

In order to calculate the regional disparity changes in China, we classify all 31 provinces and regions into five groups according to the income level from 1978 to 2004. Each group includes six provinces or regions (in grouping, for the sake of same number of provinces and regions in one group and the smoothness of data, data of Chongqing city are taken by Sichuan province). The provinces or regions in one group change in different statistical year (see table 1). According to Lorenz Curve the number of provinces or regions in each group accounts for 20% of the total number in China. If the economy of all provinces and regions is in a balance state, the per capita GDP in every group should account for 20% of the sum of all provincial and regional per capita GDP. However, regional economy develops differently in fact. Therefore, to analyze the contribution of regional groups at different income levels to the regional economic disparity changes in China is a primary task.

According to the table 2, the per capita GDP in different group accounts for a different percentage of the national one from 1978 to 2004. In Group I, the percentage changes quite obvious, reducing from 1978 to 1990 by 8.4%, rising from 1991 to 1993 by 2.99%, and then rising slowly. In general, Group I keeps a great distance from other groups. It accounts for more than 38%. In Group II, the percentage is basically rising from 16.3% to 22.4% from 1978 to 1994, and reducing from 1995 to 2004 by 1.7%. Group III, Group IV, and Group V respectively accounts for a relatively stable percentage with a slight rise. And from 1991, their percentages tend to reducing. Apparently, the percentage of Group I changes in a relatively larger range, then Group II. Percentages of other groups do not change a lot. During the "Sixth Five-Year Plan" period, Group I reduces in a largest range, and Group III and Group IV rise in a largest range. During the "Seventh Five-Year Plan" period, changes are similar to that in last period but in a small range. Group V rises in a largest range in early 90s, then in the "Eighth Five-Year Plan" period. Entering 90s, Group I begins to rise. Group II rises in a largest range in early 90s and then begins to reduce, and other Groups also tend to reduce.

According to the change of the proportion of per capita GDP in groups with lower income to that in groups with higher income (E/A in the table), the ratio keeps rising from 1978 to 1990 by 0.08, and is reducing from 1990 to 2004 by 0.08.

Therefore, the regional economic relative disparity changes are chiefly caused by the economic development changes in Group I and Group II, and are seldom affected by other groups.

#### *3.2 The analysis on the contribution of different provinces and regions to the regional economic disparity changes*

We merely generally discuss the contribution of different groups with different incomes to China's regional economic disparity changes above. However, according to the table 1, in a different year the groups include different provinces and regions. Therefore, it is necessary to discuss the contribution of provinces and regions to the regional economic disparity changes further.

##### **3.2.1 The analysis on the contribution of different provinces and regions to the absolute regional economic disparity**

According to the difference with the average between provincial or regional per capita GDP and national per capita GDP, and the changes of ranks of provincial or regional per capita GDP in China, analyze the contribution of provinces and regions to absolute regional economic disparity from 1978 to 2004. Four characteristics can be concluded from table 3 and figure 1.

Firstly, the per capita GDP in six provinces and cities, Shanghai, Beijing, Tianjin, Liaoning, Jiangsu, and Heilongjiang, is higher than the national average. Besides, except for Heilongjiang and Liaoning, the per capita GDP of other

provinces or cities keeps rising and the rise becomes fast after 90s. The per capita GDP in Heilongjiang and Liaoning grows slowly.

Secondly, the per capita GDP in fifteen provinces and regions, including Neimenggu, Anhui, Jiangxi, Henan, Hubei, Hunan, Hebei, Guangxi, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Qinghai, is always lower than the average. Except for Neimenggu, Hebei, and Henan, the per capita GDP in other provinces and regions tends to be lower than the average all the time. Thereof, Guizhou, Gansu, Guangxi, Shaanxi, Anhui, Sichuan, Jiangxi, Ningxia, Hunan, and Yunnan decrease fast. Entering 90s, the difference with the average reduces more quickly.

Thirdly, the per capita GDP in Zhejiang, Guangdong, Shandong, and Fujian rises fast, from being lower than the average to being higher. Besides, the increase is more energetic entering 90s.

Fourthly, the per capita GDP in Shanxi is higher than the average before 1986 (except 1980) and then becomes lower than the average. It tends to decrease fast. The per capita GDP in Jilin fluctuates around the average before 90s and then strays away from the average. The per capita GDP in Xinjiang begins to surpass the average since 1991. The per capita GDP in Hainan is always lower than the average except for a period from 1993 to 1995 when it is higher than the average.

Fifthly, except Liaoning and Heilongjiang, the difference with the average in eight provinces and regions, including Shanghai, Beijing, Tianjin, Jiangsu, Zhejiang, Guangdong, Shandong, and Fujian, is in a positive speeded rise, and other provinces and regions in a negative speeded rise.

All these characteristics prove that the absolute provincial and regional economic disparity is enlarging in China from 1978 to 2004. Especially entering 90s, the absolute disparity is extending greatly. In specific, the absolute economic disparity between provinces and cities with better economic bases, such as Shanghai, Beijing, Tianjin, Liaoning, and Heilongjiang, and that with fast-developing economy, such as Jiangsu, Guangdong, Zhejiang, Shandong, and Fujian, and other provinces and regions, especially Guizhou, Yunnan, Sichuan, Gansu, Ningxia, Shaanxi, Anhui, Henan, Jiangxi, and Hunan, keeps in rising. Thereof, the absolute disparity of economic development between Jiangsu, Zhejiang, Guangdong, Shandong, Fujian and Shanghai, Beijing, Tianjin keeps in reducing. However, the absolute disparity with other provinces and regions is rising constantly. The disparity between Hebei and the ten provinces and cities mentioned above is decreasing. So does Neimenggu after 21st century. The absolute economic disparity between Shanxi, Jilin, Hainan, Tibet, Xinjiang and the ten provinces and cities becomes smaller in mid 80s but rises later.

### 3.2.2 The analysis on the contribution of different provinces and regions to the relative regional economic disparity changes

According to changing ratio of provincial and regional per capita GDP to national per capita GDP and the growth rate of national per capita GDP, analyze the contribution of provinces and regions to the relative regional economic disparity changes in China. Four points can be concluded from data in table 4.

Firstly, for Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, and Jiangsu, the ratio of provincial and regional per capita GDP to the national average is higher than 100% from 1978 to 2004. From late 70s to mid 80s, ratios in these provinces and regions keep in decreasing. Entering 90s, the ratio in Shanghai, Beijing, and Tianjin shows a rising tendency, and that in Liaoning and Heilongjiang is relatively stable. During the “Tenth Five-Year Plan” period, the ratio in these six provinces and regions rise slowly.

Secondly, for Neimenggu, Anhui, Jiangxi, Henan, Hubei, Hunan, Guangxi, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, and Ningxia, the ratio of provincial and regional per capita GDP to the national average is lower than 100% from 1978 to 2004. Thereof, the provinces whose ratio is always lower than 80% are Guizhou, Guangxi, Yunnan, Henan, Anhui, Shaanxi, and Ningxia. Especially, the ratio in Guizhou is always under 55% and Guangxi under 75%. From late 70s to late 90s, the ratio changes in these provinces and regions mentioned above include following types: the ratio in four provinces, namely Anhui, Henan, Guizhou, and Shaanxi keeps in rising; the ratio in seven provinces and regions, including Jiangxi, Hunan, Hubei, Guangxi, and Yunnan, shows an obvious rise respectively in mid and late 80s, and decreases quickly; the ratio in three provinces and regions, namely Gansu, Qinghai, and Ningxia shows a decrease once in late 80s and keeps in rising later; the ratio in Tibet changes irregularly; entering 90s, except Neimenggu and Henan, the ratio in other provinces and regions is decreasing.

Thirdly, for Zhejiang, Shandong, Guangdong, Fujian, and Hebei, the ratio of provincial and regional per capita GDP to the national average is firstly lower than 100% and then higher than 100%. The ratio in Zhejiang, Guangdong, and Shandong surpasses 100% since early 80s, and Fujian late 80s.

### 3.2.3 Analyze the provincial and regional economic disparity changes from Lorenz Curve

Finally, we draw an every-two-year Lorenz Curve for provincial and regional per capita GDP in China. From the changes of curves displayed in figure 2 to figure 5, we can directly find out the characteristics of Lorenz Curve changes for provincial and regional per capita GDP in China from 1978 to 2004.

Firstly, from 1980 to 1990, the Lorenz Curve becomes closer to the equality line (the 45-degree diagonal line). Thereof, during the “Seventh Five-Year Plan” period, the curve moves a largest range. It indicates that the relative provincial and regional economic disparity in China from 1978 to 1990 keeps in reducing. Especially in late 80s, the reduced range reaches the largest.

Secondly, the Lorenz Curve in 2000 is farer from the equality line comparing with the Lorenz in 1990, which indicates that entering 90s, the relative provincial and regional economic disparity is enlarging in China. In 2000, the enlarging range is larger than that in 1995.

Thirdly, according to the moves of Lorenz Curve’s subsections, its lower section moves in a smallest range, which indicates that the relative economic disparity changes between Guizhou, Guangxi, Yunnan, Sichuan, Gansu, Shaanxi, Anhui and other provinces and regions are small. The middle and upper sections of Lorenz Curve move in a largest range close to the equality line from 1978 to 1990, and move in a smallest range far to the equality line from 1991 to 2004, which indicates that the economic development in Jiangsu, Zhejiang, Guangdong, Shandong, and Fujian contributes a lot to the reduce of relative regional economic disparity in China. The middle section of Lorenz Curve moves a smaller range close to the equality line than the upper section from 1978 to 1990, but moves a largest range far to the equality line after 1990, which indicates that Xinjiang, Hubei, Jilin, Hainan, Hebei, and Shanxi affect significantly the relative regional economic disparity changes in China.

#### 4. Conclusions and suggestions

Based on the empirical analysis on the provincial and regional groups with different incomes and the economic disparity, we can draw these conclusions as follow:

Firstly, China’s regional economic disparity changes are chiefly affected by the economic development changes in Group I and Group II, and seldom by Group III, Group IV, and Group V. The relative economic disparity between Group I and other groups is reducing from 1978 to 1990, and rising from 1991. And it always keeps a relative large disparity range. From 2001 to 2004, the disparity changes slowly. The relative disparity between Group II and Group I is reducing from 1978 to 1990. The disparity between Group II, III, IV and other groups reduces in a smaller range from 1978 to 1990. It tends to rise from 1991. Considering the change range of relative disparity between them, during the “Sixth Five-Year Plan” period, the relative disparity between Group I and Group II, III, IV reduces in a largest range. In specific, the percentage of Group I is relatively decreasing and that of other groups rising. During the “Seventh Five-Year Plan” period, changes are similar to that in last period but in a smaller range. In late 80s, the relative disparity between Group V and other groups reduces in a largest range. During the “Sixth Five-Year Plan” period, the reducing range is smaller. During the “Eighth Five-Year Plan” period and the “Ninth Five-Year Plan” period, the relative disparity between Group I and other groups is enlarged further.

Secondly, in a spatial aspect, China’s absolute regional economic disparity is enlarging from 1978 to 1990. Entering 90s, the disparity enlarges at a greater speed. In specific, the absolute disparity between provinces and cities with better economic bases, such as Shanghai, Beijing, Tianjin, Liaoning, and Heilongjiang, and that with fast-developing economy, such as Jiangsu, Guangdong, Zhejiang, Shandong, and Fujian, and other provinces and regions, especially Guizhou, Yunnan, Sichuan, Gansu, Ningxia, Shaanxi, Anhui, Henan, Jiangxi, and Hunan, keeps in rising. Thereof, the absolute disparity of economic development between Zhejiang, Guangdong, Shandong, Fujian and Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu keeps in reducing. However, the absolute disparity with other provinces and regions is rising constantly. The disparity between Shanxi, Jilin, Hubei, Tibet, Xinjiang and the ten provinces and cities mentioned above is decreasing in 80s but rises later.

In a spatial aspect, China’s relative regional economic disparity changes are: the relative disparity between Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu and other provinces and regions in China tends to reduce before 90s and rises at a fast speed after 90s (except Heilongjiang). The economic development in Zhejiang, Guangdong, Shandong, and Fujian contributes a lot to the decrease of relative regional economic disparity in China. The economic development in Shanxi, Jilin, Xinjiang, Hainan, Hubei, and Hebei affects both the increase and decrease of relative regional economic disparity in China. The relative economic disparity between Guizhou, Guangxi, Yunnan, Sichuan, Henan, Shaanxi, Anhui and other provinces and regions in China reduces a smaller range.

In general, from the reform and opening to late 80s, the regional economic disparity between groups tends to reduce but rises fast after 90s. After 21st century, due to the macro policies, the rising tendency is weakened, what is caused by the relatively higher proportion of agriculture to the national economy in China at the beginning of the reform and opening, and before 1983 the city economic reform does not begin. Therefore, during that period, the rural reform in the undeveloped regions generates a vital effect on the decrease of regional economic disparity. After 90s in 20th century, the reform and opening reaches a climax. Centered in five special economic zones and fourteen port-opening cities, the seaside regions attract amounts of foreign investments by favorable treatments. In contrast, due to the disadvantages in locations, geographic and cultural conditions, and policies, the inland areas lag behind in a foreign-fund-driven

economic development.

The efficiency-and-equity paradox is always there. The strategy of giving the eastern area a priority in development that has been advanced earlier is chiefly to solve the efficiency issue. However, the equity issue has become the main social problem at present. As a large country, regions in China are far different in geographic locations, infrastructures, and economic environment. If the regional economic disparity keeps enlarging for a long time, it will hurt China's sustainable development and makes it impossible to construct a harmony society, causing a series of social problems, such as social opposition, rising crime rate, and decreasing work enthusiasm of middle and lower classes. Too much emphasis on the seaside regions is unfair for undeveloped areas. By an empirical analysis, this paper reveals the graveness of equity issue, which serves as a scientific and objective base for policy-makers.

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Table 1. The grouping result based on regional per capita GDP in China.

Year	Group I	Group II	Group III	Group IV	Group V
1978	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Qinghai, Jilin, Tibet, Ningxia, Guangdong, Shanxi	Hebei, Gansu, Hubei, Zhejiang, Neimenggu, Shandong	Hainan, Xinjiang, Shaanxi, Hunan, Jiangxi, Fujian	Sichuan, Anhui, Henan, Yunnan, Guangxi, Guizhou
1979	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Shanxi, Jilin, Zhejiang, Qinghai, Hubei, Guangdong	Tibet, Hebei, Ningxia, Gansu, Xinjiang, Shandong	Neimenggu, Hunan, Shaanxi, Hainan, Jiangxi, Fujian	Sichuan, Anhui, Henan, Yunnan, Guangxi, Guizhou
1980	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Guangdong, Qinghai, Tibet, Zhejiang, Jilin, Shanxi	Ningxia, Hubei, Hebei, Xinjiang, Shandong, Gansu	Hunan, Neimenggu, Hainan, Fujian, Jiangxi, Shaanxi	Sichuan, Henan, Anhui, Guangxi, Yunnan, Guizhou
1981	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Tibet, Guangdong, Zhejiang, Jilin, Shanxi, Shandong	Hubei, Ningxia, Qinghai, Xinjiang, Hebei, Fujian	Neimenggu, Hainan, Hunan, Jiangxi, Gansu, Shaanxi	Anhui, Henan, Sichuan, Guangxi, Yunnan, Guizhou
1982	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Guangdong, Zhejiang, Xinjiang, Shanxi, Tibet, Jilin	Shandong, Qinghai, Hainan, Hubei, Neimenggu, Hebei	Ningxia, Fujian, Hunan, Jiangxi, Gansu, Shaanxi	Sichuan, Anhui, Guangxi, Henan, Yunnan, Guizhou
1983	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Guangdong, Jilin, Zhejiang, Shandong, Shanxi, Xijiang	Qinghai, Hubei, Hainan, Tibet, Neimenggu, Hebei	Ningxia, Fujian, Hunan, Gansu, Henan, Anhui	Jiangxi, Sichuan, Shaanxi, Guangxi, Yunnan, Guizhou
1984	Shanghai, Beijing, Tianjin, Liaoning, Heilongjiang, Jiangsu	Guangdong, Zhejiang, Shandong, Jilin, Shanxi, Tibet	Hubei, Qinghai, Xinjiang, Neimenggu, Hainan, Ningxia	Hebei, Fujian, Anhui, Hunan, Gansu, Shaanxi	Jiangxi, Sichuan, Henan, Yunnan, Guangxi, Guizhou
1985	Shanghai, Beijing, Tianjin, Liaoning, Zhejiang, Heilongjiang	Jiangsu, Guangdong, Tibet, Shandong, Jilin, Shanxi	Xinjiang, Neimenggu, Hubei, Qinghai, Fujian, Ningxia	Hainan, Hebei, Anhui, Hunan, Gansu, Shaanxi	Jiangxi, Henan, Sichuan, Yunnan, Guangxi, Guizhou
1986	Shanghai, Beijing, Tianjin, Liaoning, Zhejiang, Jiangsu	Heilongjiang, Guangdong, Jilin, Shandong, Xinjiang, Qinghai	Hubei, Shanxi, Neimenggu, Tibet, Ningxia, Fujian	Hainan, Hebei, Anhui, Hunan, Shaanxi, Gansu	Jiangxi, Henan, Sichuan, Yunnan, Guangxi, Guizhou
1987	Shanghai, Beijing, Tianjin, Liaoning, Zhejiang, Jiangsu	Guangdong, Heilongjiang, Jilin, Shandong, Xinjiang, Hubei	Neimenggu, Qinghai, Fujian, Shanxi, Hainan, Ningxia	Hebei, Tibet, Anhui, Hunan, Shaanxi, Gansu	Henan, Jiangxi, Sichuan, Yunnan, Guangxi, Guizhou
1988	Shanghai, Beijing, Tianjin, Liaoning, Guangdong, Jiangsu	Zhejiang, Heilongjiang, Jilin, Shandong, Fujian, Xijiang	Neimenggu, Qinghai, Hainan, Hubei, Hebei, Shanxi	Ningxia, Anhui, Shaanxi, Hunan, Tibet, Henan	Gansu, Jiangxi, Sichuan, Yunnan, Guangxi, Guizhou
1989	Shanghai, Beijing, Tianjin, Liaoning, Guangdong, Jiangsu	Zhejiang, Heilongjiang, Jilin, Shandong, Fujian, Xijiang	Hainan, Hebei, Hubei, Neimenggu, Shanxi, Qinghai	Ningxia, Anhui, Shaanxi, Hunan, Tibet, Jiangxi	Henan, Gansu, Yunnan, Sichuan, Guangxi, Guizhou
1990	Shanghai, Beijing, Tianjin, Liaoning,	Jiangsu, Heilongjiang,	Hainan, Qinghai, Hubei, Shanxi,	Ningxia, Hunan, Tibet, Shaanxi,	Jiangxi, Sichuan, Gansu, Henan,

	Guangdong Zhejiang	Shandong, Xinjiang, Fujian, Jilin	Neimenggu, Hebei	Yunan, Anhui	Guangxi, Guizhou
1991	Shanghai, Beijing, Tianjin, Guangdong, Liaoning, Zhejiang	Jiangsu, Heilongjiang, Xinjiang, Fujian, Shandong, Jilin	Hainan, Qinghai, Hubei, Hebei, Shanxi, Neimenggu	Ningxia, Tibet, Shaanxi, Hunan, Jiangxi, Sichuan	Yunnan, Henan, Gansu, Guangxi, Anhui, Guizhou
1992	Shanghai, Beijing, Tianjin, Guangdong, Liaoning, Jiangsu	Zhejiang, Fujian, Xinjiang, Heilongjiang, Shandong, Hainan	Jilin, Hebei, Hubei, Qinghai, Shanxi, Neimenggu	Ningxia, Hunan, Tibet, Shaanxi, Jiangxi, Henan	Sichuan, Yunnan, Guangxi, Gansu, Anhui, Guizhou
1993	Shanghai, Beijing, Tianjin, Liaoning, Guangdong, Zhejiang	Jiangsu, Hainan, Fujian, Heilongjiang, Shandong, Xijiang	Jilin, Hebei, Hubei, Neimenggu, Shanxi, Qinghai	Ningxia, Hunan, Guangxi, Yunnan, Sichuan, Henan	Jiangxi, Anhui, Tibet, Gansu, Shaanxi, Guizhou
1994	Shanghai, Beijing, Tianjin, Guangdong, Zhejiang, Liaoning	Jiangsu, Fujian, Hainan, Shandong, Heilongjiang, Xinjiang	Jilin, Hebei, Hubei, Neimenggu, Qinghai, Shanxi	Guangxi, Hunan, Ningxia, Anhui, Sichuan, Yunnan	Henan, Jiangxi, Shaanxi, Tibet, Gansu, Guizhou
1995	Shanghai, Beijing, Tianjin, Guangdong, Zhejiang, Jiangsu	Liaoning, Fujian, Shandong, Heilongjiang, Hainan, Xinjiang	Hebei, Jilin, Hubei, Neimenggu, Shanxi, Hunan	Qinghai, Anhui, Ningxia, Henan, Guangxi, Jiangxi	Sichuan, Yunnan, Shaanxi, Tibet, Gansu, Guizhou
1996	Shanghai, Beijing, Tianjin, Guangdong, Zhejiang, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hainan, Hebei	Xinjiang, Jilin, Hubei, Neimenggu, Shanxi, Hunan	Guangxi, Henan, Anhui, Qinghai, Ningxia, Jiangxi	Yunnan, Sichuan, Shaanxi, Gansu, Tibet, Guizhou
1997	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hebei, Xinjiang	Hubei, Hainan, Jilin, Shanxi, Neimenggu, Hunan	Henan, Anhui, Guangxi, Jiangxi, Sichuan, Qinghai	Yunnan, Ningxia, Shaanxi, Tibet, Gansu, Guizhou
1998	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Fujian	Jiangsu, Liaoning, Shandong, Heilongjiang, Hebei, Hubei	Xinjiang, Hainan, Jilin, Neimenggu, Shanxi, Hunan	Henan, Anhui, Jiangxi, Qinghai, Yunnan, Sichuan	Ningxia, Guangxi, Shaanxi, Tibet, Gansu, Guizhou
1999	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Fujian	Jiangsu, Liaoning, Shandong, Heilongjiang, Hebei, Hubei	Xinjiang, Hainan, Jilin, Neimenggu, Hunan, Henan	Shanxi, Anhui, Qinghai, Jiangxi, Ningxia, Sichuan	Yunnan, Tibet, Guangxi, Shaanxi, Gansu, Guizhou
2000	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hebei, Xinjiang	Hubei, Hainan, Jilin, Neimenggu, Hunan, Henan	Shanxi, Qinghai, Anhui, Jiangxi, Ningxia, Sichuan	Yunnan, Tibet, Shaanxi, Guangxi, Gansu, Guizhou
2001	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hebei, Xinjiang	Hubei, Jilin, Hainan, Neimenggu, Hunan, Henan	Qinghai, Shanxi, Ningxia, Tibet, Sichuan, Anhui	Jiangxi, Shaanxi, Yunnan, Guangxi, Gansu, Guizhou
2002	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hebei, Xinjiang	Jilin, Hubei, Hainan, Neimenggu, Hunan, Henan	Qinghai, Shanxi, Tibet, Jiangxi, Anhui, Sichuan	Ningxia, Shaanxi, Yunnan, Guangxi, Gansu, Guizhou

2003	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu	Fujian, Liaoning, Shandong, Heilongjiang, Hebei, Xinjiang	Jilin, Hubei, Neimenggu, Hainan, Henan, Hunan	Shanxi, Qinghai, Tibet, Ningxia, Jiangxi, Sichuan	Shaanxi, Anhui, Guangxi, Yunnan, Gansu, Guizhou
2004	Shanghai, Beijing, Tianjin, Zhejiang, Jiangsu, Guangdong	Fujian, Shandong, Liaoning, Heilongjiang, Hebei, Neimenggu	Xinjiang, Jilin, Hubei, Henan, Hainan, Shanxi	Hunan, Qinghai, Jiangxi, Ningxia, Sichuan, Tibet	Anhui, Shaanxi, Guangxi, Yunnan, Gansu, Guizhou

Table 2. Changes of percentage of per capita GDP of different group

Year	A(%)	B(%)	C(%)	D(%)	E(%)	E/A
1978	47.18	16.30	14.31	12.49	9.72	0.21
1979	46.05	16.31	14.82	12.88	9.93	0.22
1980	46.12	16.53	14.79	12.50	10.06	0.22
1981	44.35	17.33	14.99	12.83	10.50	0.24
1982	43.01	17.74	15.51	13.05	10.69	0.25
1983	42.83	17.79	15.34	13.21	10.84	0.25
1984	41.99	18.57	15.65	13.12	10.67	0.25
1985	41.48	18.78	15.92	13.27	10.54	0.25
1986	41.29	18.85	15.82	13.51	10.53	0.26
1987	40.82	19.44	15.69	13.38	10.68	0.26
1988	40.27	19.75	16.09	13.13	10.76	0.27
1989	39.68	19.83	16.33	13.09	11.08	0.28
1990	38.78	20.05	16.34	13.55	11.28	0.29
1991	40.77	19.66	15.64	13.13	10.80	0.26
1992	41.58	20.12	15.35	12.38	10.57	0.25
1993	41.77	21.55	15.16	12.40	9.12	0.22
1994	40.64	22.43	14.90	12.20	9.84	0.24
1995	41.34	21.81	14.80	12.37	9.68	0.23
1996	41.25	21.44	15.03	12.42	9.86	0.24
1997	41.59	21.43	14.98	12.24	9.76	0.23
1998	42.12	21.37	14.84	11.98	9.69	0.23
1999	42.68	21.31	14.57	11.68	9.75	0.23
2000	43.31	21.47	14.50	11.32	9.40	0.22
2001	43.63	21.22	14.39	11.34	9.42	0.22
2002	43.92	20.98	14.25	11.52	9.33	0.21
2003	44.35	20.78	14.12	11.53	9.23	0.21
2004	44.14	20.76	14.23	11.57	9.29	0.21

Notice: The five columns: A, B, C, D, E respectively means the percentage of per capita GDP in the five groups: I, II, III, IV, V.



Table 3. The difference with the average between the provincial and regional per capita GDP and the national average (For the sake of the paper length, only data in typical years are listed. If necessary, all data during sample period can be listed.)

Year	1978	1980	1985	1990	1995	2000	2004
Beijing	925	1133	1870	3222	8294	14749	24444
Tianjin	795	941	1366	1965	5517	10282	18936
Hebei	-1	-24	-113	-191	-347	-48	304
Shanxi	0	-9	6	-128	-1222	-2574	-3464
Neimenggu	-48	-90	-23	-178	-1152	-1839	-1309
Liaoning	315	360	581	1042	2089	3515	3683
Jilin	16	-6	36	90	-377	-864	-1682
Heilongjiang	199	243	230	372	674	851	1283
Shanghai	2133	2287	3023	4254	14152	26836	42693
Jiangsu	65	90	221	447	2508	4062	8091
Zhejiang	-34	19	231	466	3283	5750	11328
Anhui	-121	-160	-186	-474	-1434	-2844	-4846
Fujian	-92	-103	-95	107	1996	3890	4604
Jiangxi	-89	-109	-235	-522	-1708	-2860	-4425
Shandong	-49	-49	55	159	967	1844	4311
Henan	-133	-134	-252	-565	-1478	-2267	-3144
Hubei	-33	-23	-24	-100	-629	-523	-2114
Hunan	-79	-86	-206	-368	-1321	-2072	-3497
Guangdong	4	29	193	881	3704	5174	7093
Guangxi	-140	-173	-361	-590	-1487	-3392	-5418
Hainan	-51	-97	-103	-67	434	-817	-3164
Sichuan	-103	-130	-262	-522	-1710	-2923	-4830
Guizhou	-190	-232	-412	-846	-2938	-5049	-8399
Yunnan	-139	-184	-346	-432	-1747	-3074	-5881
Tibet	10	20	62	-380	-2399	-3152	-4835
Shaanxi	-74	-117	-228	-415	-1948	-3162	-4857
Gansu	-17	-63	-224	-557	-2503	-3873	-6644
Qinghai	63	22	-24	-98	-1361	-2624	-4008
Ningxia	5	-18	-95	-263	-1463	-2872	-4734
Xinjiang	-52	-41	-12	143	28	-241	-1415

Table 4. The ratio of provincial and regional per capita GDP to the national average (%) (For the sake of the paper length, only data in typical years are listed.)

Year	1978	1980	1985	1990	1995	2000	2004
Beijing	353	352	325	295	273	291	294
Tianjin	318	309	264	219	215	233	250
Hebei	100	95	86	88	93	99	102
Shanxi	100	98	101	92	74	67	73
Neimenggu	87	80	97	89	76	76	90
Liaoning	186	180	170	163	144	146	129
Jilin	104	99	104	105	92	89	87
Heilongjiang	154	154	128	122	114	111	110
Shanghai	684	608	464	357	395	448	438
Jiangsu	118	120	127	127	152	153	164
Zhejiang	91	104	128	128	169	175	190
Anhui	67	65	78	71	70	63	62
Fujian	75	77	89	106	142	150	137
Jiangxi	76	76	72	68	64	63	65
Shandong	87	89	107	110	120	124	134
Henan	64	70	70	66	69	71	75
Hubei	91	95	97	94	87	93	83
Hunan	78	81	75	78	72	73	72
Guangdong	101	107	123	153	177	167	156
Guangxi	62	62	57	64	69	56	57
Hainan	86	79	88	96	109	89	75
Sichuan	72	71	69	68	64	62	62
Guizhou	48	49	51	49	39	35	33
Yunnan	62	59	58	74	64	60	53
Tibet	103	105	108	77	50	59	62
Shaanxi	80	74	73	75	59	59	61
Gansu	95	86	73	66	48	50	47
Qinghai	117	105	97	94	72	66	68
Ningxia	101	96	89	84	69	63	62
Xinjiang	86	91	99	109	101	97	89

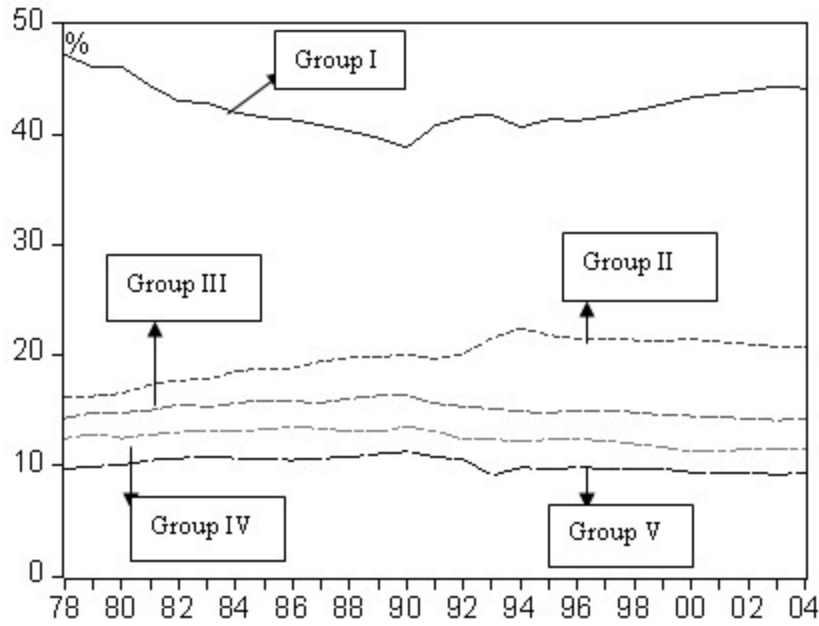


Figure 1. The Percentage Change Curve of per capita GDP in Different Group.

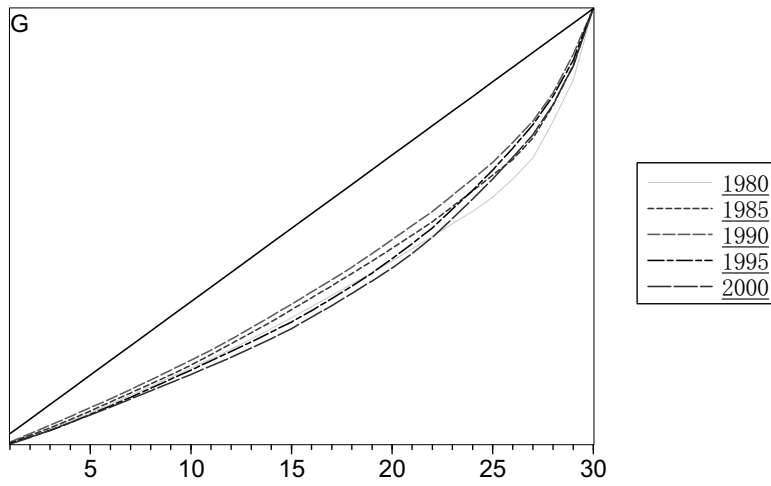


Figure 2. The Lorenz Curve of Provincial and Regional per capita GDP in 1980, 1985, 1990, 1995, and 2000 in China

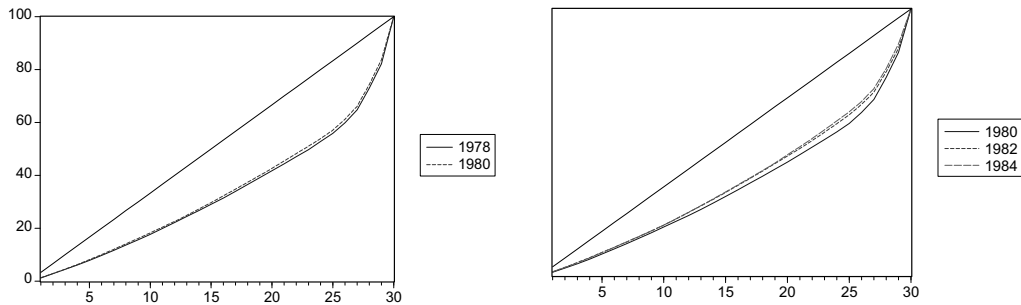


Figure 3. The Lorenz Curve of Provincial and Regional per capita GDP in 1978, 1980, 1982, and 1984 in China

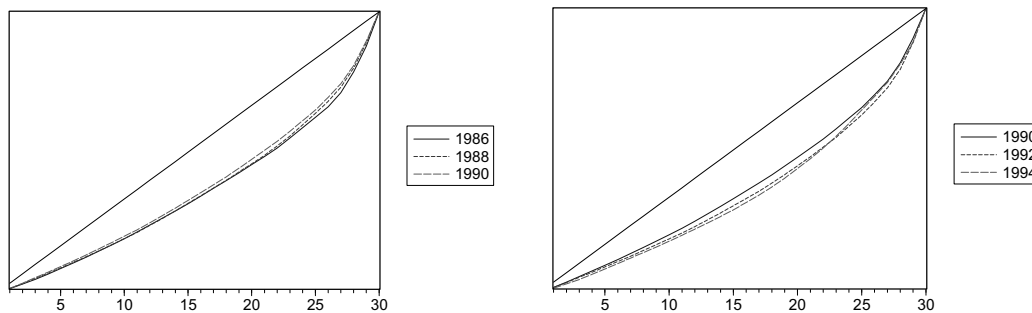


Figure 4. The Lorenz Curve of Provincial and Regional per capita GDP in 1986, 1988, 1990, 1992, and 1994 in China

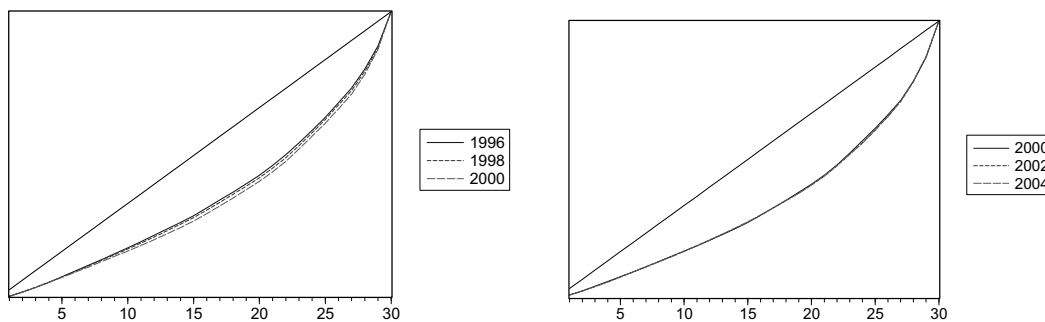


Figure 5. The Lorenz Curve of Provincial and Regional per capita GDP in 1996, 1998, 2000, 2002, and 2004 in China