

# New Approach to Estimate the Chinese Gini Coefficients from 1978 to 2003

Jiandong Chen, Southwest University of Finance and Economics

Email: [cjd9754@yahoo.com](mailto:cjd9754@yahoo.com)

Wenxuan Hou, Bradford University School of Management

Email: [whou@dom01.ac.uk](mailto:whou@dom01.ac.uk)

**Abstract:** The Gini coefficient is usually seen as the most important index to evaluate income disparity. It is also a key criterion for the government to make relevant decisions on income distribution. However, there are many arguments over the estimations of the Chinese Gini coefficient. On the basis of critical analysis of relevant literature and adopting a new approach, the authors present a series of Chinese Gini ratios from 1978 to 2003 and decompose them. To the authors' best knowledge, such a long period series of decomposed Chinese Gini coefficients cannot be found in current literature. In line with calculation, the authors argue that the contribution of the intra-rural Gini ratio to the national Gini coefficient has declined since 1983, while the intra-urban Gini ratio plays a more and more important role in the whole-country's income inequality. However, the current dominant factor in the Chinese Gini coefficient is the Gini coefficient between rural and urban areas, which shares a similar changing tendency with the nation-wide Gini coefficient. Thus, studies on Chinese income disparity should pay more attention to probing urban and rural income inequality. Accordingly, the improvement of Chinese income disparity should focus on narrowing the rural and urban income gap.

**Keywords:** The Chinese Gini Coefficient, Decomposition of the Gini Coefficient, Urban-rural Income Disparity.

## **1. Background of Study**

China has experienced a long-term high-speed economic growth since 1978. Over the two decades since 1978, the average Chinese per capita real income has increased by a factor of nine (see table 2). China's economy achieved historically unprecedented growth of income and rapid integration with the global economy. There was an explosive increase in exports and China captured a very large share of foreign direct investment in developing countries. However, the above extraordinary achievements were accompanied with a sharp increase in inequality between town and country, and between the coastal areas and inland China (World Bank, 2002). Based on the relevant data of *Chinese Statistical Yearbooks*, income gaps are enlarging quickly among different regions and different industries as well as different professions since 1980s. By 1995, income inequality in China had become greater than that of most other developing countries in the region (Khan and Riskin, 2001).

Two of the most widely used methods for measuring income inequality are the Lorenz curve and the Gini coefficient (Sloman, 1999). The Gini coefficient is the most important index for evaluating the degree of income inequality (Sen, 1984; Champernowne, 1998). Due to the different calculation methods and data sources, the research results in the areas of Chinese Gini coefficient show a big difference. Wang and Hu (1999) pointed out that the Gini coefficient of Chinese inhabitants is at the intolerant stage. However, Lin (2000) holds that the current Gini coefficient is reasonable. Similarly, Chinese pre-premier Zhu once said the Chinese Gini ratio was 0.39 in 2000 at a press conference, and thought it was within the safety range. Therefore, how to estimate the precise Gini coefficient is an important issue in the studies on Chinese income disparity.

## **2. Different Estimations of the Chinese Gini Coefficients**

Current studies on the Chinese Gini ratio produce somewhat contradictory results in their estimations. For example, different scholars and organizations present conflicting results on the Chinese Gini coefficient for the same year-1995. Chen (1997) believes the Chinese

Gini coefficient in 1995 is 0.365. In 2002, he and Zhou used two different methods to calculate and gave two different the Gini coefficients of 0.38392 and 0.41914 for 1995, whereas Xiang's figure (1998) is 0.3515, and the result of Zhao, Li and Riskin (1999) is 0.445. The lowest figure, which Lin (2000) estimated, is 0.2354; Kanbur and Zhang (2001) give a similar estimation (0.271). The highest figure, which Khan and Riskin (2001) estimated, is 0.452 and it is 9% higher than the estimate reported by the World Bank (1995) for the same year (0.415). The highest figure is almost twice the lowest figure. There are still no widely accepted estimations of the Chinese Gini coefficient. As the fundament to evaluate income disparity, lacking of authentic estimations of the Chinese Gini ratios, to great extent, restrains the research of national income inequality. If further investigating the internal reasons, we find that such a huge gap in the estimations basically comes from the following three aspects: ( I ) different data sources, ( II ) varied methods (III) other reasons.

#### ( I ) Different data sources

The Chinese Statistical Yearbooks are used as the major secondary data sources to evaluate Chinese income distribution. For example, Chen (1997), Chen and Zhou (2002), Xiang (1998) and Lin's (2000) studies mainly rely on these yearbooks. There are many arguments about the Chinese Statistic Yearbooks. Khan and Riskin (2001) point out that the data were reported in too highly aggregated a form to permit a careful analysis of income distribution and poverty. Fang, Zhang and Fan, (2002) also hold that the grouped distribution data are less accurate. Thus, the Gini ratio will be underestimated if it is based on the data in the Chinese Statistic Yearbooks (see table 4), which ignore the uneven income within each decomposed income group.

It is not commonly recognized that methods of collecting the household survey data used to measure inequality differ widely between China and other countries. For an instance, each member of a sampled household is required to keep a diary of all expenditures for each day for 12 months in the urban survey in China. In practice, it is impossible to have confidence in the precise daily records of selected households, although each sampled

household can receive around 20 yuan per month for filling in the complex income and expenditure form. In contrast to China's detailed, year-long data collection, surveys in many other countries observe households for a week, a fortnight, or a month, and estimates of income and consumption from these periods are annualised by multiplying by 52, 26, or 12 (Gibson, Huang and Rozelle, 2001). In China, sampled households report their incomes every month for a full 12-month period. No other country in the world has such a comprehensive data collection method for their household income and expenditure survey. In comparison to a household's monthly income, its annual income is likely to have less variability because peaks occurring in a particular month are often offset by peaks in the opposite direction in some other month of the year (Deaton, 1995). Hence, part of the difference in reported income inequality between China and other countries may just reflect the difference in the length of the survey period over which income is measured in the various countries.

Another difficult problem in calculating the national Gini coefficient is that the Chinese Statistical Yearbook provides two samples: urban and rural inhabitants' decomposed income distribution separately rather than one sample for all Chinese inhabitants' decomposed income distribution. If the two samples are directly combined, it implies that the urban population is the same as the rural population. For instance, the ratio of urban over rural population was about 36:64 in 2000. Hence, the sample of national inhabitants' income distribution cannot directly be drawn simply from a combination of the rural and urban samples. Clearly, simply combining two samples directly cannot estimate the Gini ratio precisely. Despite its limitations, this is the only data source that is available to researchers and consistently compiled for the period of economic reforms. (Fang, Zhang and Fan, 2002). Owing to the limitations of data sources, some scholars narrow their research scope and only focus on rural or urban areas. In fact, rural and urban areas are closely linked by capital and merchandise circulation as well as rural to urban migrants. Isolated studies on rural or urban income distribution cannot grasp the internal changing trend and the integrated picture. For example, rural labour movement influences the income gap between rural and urban inhabitants; the urban and rural income gap further affects rural to urban migrants.

Using a sub-sample of the national household survey in 1988 and 1995 with some adjustments to overcome the above shortcomings, Khan and Riskin (2001) observed an increase in inequality in China, and their results are cited extensively. Nevertheless, the two sub-samples are not consistent; the survey in 1988 covers 28 provinces, whereas the later survey just covers 19 provinces. Hence, the limitations in their data are obvious. The World Bank (1995), jointly with the National Bureau of Statistics (NBS), also offered an estimation of the Gini ratio in 1995. Due to limited information in their samples, the quality of samples cannot be assessed. However, similar to Khan and Riskin, the World Bank's estimation which were drawn from only two years lacked a clear trend, varying from period to period. Owing to the amount of work and costs, individual research or a single organization cannot present the time serial primary data necessary to analyze the Chinese Gini ratio at the current stage.

## ( II ) Varied methods

As mentioned above, when calculating the Chinese Gini coefficient, people will encounter two separate samples and cannot combine them directly. In order to overcome this obstacle, Chen and Zhou (2001) present a statistical means to compute the national Gini ratio. Based on the actual urban and rural populations, they give different weights to the urban and rural samples first, and then integrate the two samples together. The method itself is unquestionable. But when they reproduce two samples to reduce the negative influence of highly aggregated data, they only adopt some territories' data to represent the whole nation's rich and poor group. Thus, the reproduced samples cannot precisely represent the reality of Chinese income distribution. Xiang (1998) tried to find another way to reckon the national Gini ratio; he simply gave a formula to calculate the whole country's Gini ratio. This formula is:

$$G = P_u^2(Y_u/Y)G_u + P_r^2(Y_r/Y)G_r + P_u P_r(Y_u - Y_r)/Y$$

$$Y = P_u Y_u + P_r Y_r$$

Symbol	Meaning
<b>G</b>	The nation-wide Gini coefficient
<b>Gu (Gr)</b>	The intra-urban Gini coefficient (the intera-rural Gini coefficient)
<b>Pu (Pr)</b>	The ratio of urban (rural) population to whole nation population
<b>Yu (Yr)</b>	Per capita urban (rural) inhabitant's income
<b>Y</b>	$PuYu+PrYr$

However, he did not explain how the formula was deduced. Regrettably, Xiang's equation will be disproved in the following analysis.

### (III) Other reasons

Many studies (the research office of Chinese State Council, 1997, the research group of Nankai University, 1990, Huang, 1999, and Liu and Lu, 1991) on the Chinese Gini ratio present only their final results and omit their data sources and methods. To some extent, these estimations cannot be proved or disproved. Here, the authors attempt to give some empirical judgment. As statistical data has shown, from 1984 to 1985, the Chinese rural urban income gap was the lowest since 1978, correspondingly, the national Gini ratio decreased from 1978 to 1984 (see table 1). Huang's estimation (1999) spans 1978 to 1995. But, Huang held that the Gini ratio increased from 1978 to 1984. Additionally, due to inability to access data sources at the household level, some research is based on the provincial level per capita GDP (Zhang, Liu and Yao, 2001) or per capita NI (Lin, 2000) to estimate the Chinese Gini ratio. Obviously, their Gini ratios cannot be compared with the Gini coefficients on the basis of per capita income directly, although per capita GDP or NI strongly relates to per capita income. Kanbur and Zhang (2001) construct a time series of inequality by building up information on real per capita consumption at the provincial level; they admit "our measures do provide a lower bound on inequality over this entire period."

Most researchers agree that Chinese income disparity has been growing since reform and open door policies were adopted. However, few studies provide a comprehensive time series of the national Gini coefficient from 1978 that is able to show the changing

tendency of income inequality. As a basic tool for appraising the Chinese income distribution, the Chinese Gini coefficient ought to be precisely calculated. Although the estimations of the intra-rural and intra-urban Gini ratio, provided by the Chinese Rural Household Survey Team and Urban House Survey Team respectively, are cited extensively, as mentioned above, there is no credible estimations of a series Chinese Gini coefficient which is widely accepted.

### 3. The New Approach and Relevant Data Sources

In order to estimate the Chinese Gini coefficient accurately, the authors decomposed the Chinese Gini ratio (G) into three parts: the intra-rural Gini ratio (Gr), the intra-urban Gini ratio (Gu) and the Gini coefficient between urban-rural (Gur). In fact, the studies of the decomposition of the Gini coefficients are not new in econometrics. Pyatt (1976) employs game theory to derive the Gini ratio which can be decomposed into different class components. Later Cowell (1980) and Shorrocks (1984) also provide some new analytical tools in this field. On the basis of matrix algebra or covariance, these studies offer cumbersome and complicated ways to derive the decomposed equation and calculate the relevant Gini coefficients. Yao's (1997) work has further improved previous methods. In this paper, the authors present a very simple mathematical method to derive the decomposed Gini ratios.

Supposing the  $i$ th group income to total income is  $I_i$  and  $i$ th group population to total population is  $P_i$  ( $i=1, 2, 3, \dots, m, \dots, n$ ); the average income of  $i$ th group is  $Y_i$ , and  $Y_1 \leq Y_2 \leq \dots \leq Y_m \leq Y_{n-1} \leq Y_n$

Obviously,

$$I_1 + I_2 + I_3 + \dots + I_m + \dots + I_n = 1$$

$$P_1 + P_2 + P_3 + \dots + P_m + \dots + P_n = 1$$

Additionally, making:

Symbol	Meaning
$I_r$	$I_1+I_2+I_3+\dots+I_{m-1}+I_m$
$I_u$	$I_{m+1}+\dots+I_{n-1}+I_n$
$P_r$	$P_1+P_2+\dots+P_{m-1}+P_m$
$P_u$	$P_{m+1}+\dots+P_{n-1}+P_n$
$\delta$	$I_u P_u$
$\beta$	$I_r P_r$

The detailed deduction is as following:

$$\begin{aligned}
G &= 2\{0.5 - [0.5I_1P_1 + I_1P_2 + 0.5I_2P_2 + \dots + 0.5I_nP_n + P_n(I_1 + I_2 + \dots + I_{n-1})]\} \\
&= (I_1 + I_2 + \dots + I_n)(P_1 + P_2 + \dots + P_n) - [I_1P_1 + 2I_1P_2 + I_2P_2 + \dots + I_nP_n + 2P_n(I_1 + I_2 + \dots + I_{n-1})] \\
&= \sum_{i=2}^n [I_i(\sum_{k=1}^i P_k - P_k)] - \sum_{i=2}^n [P_i(\sum_{k=1}^i I_k - I_k)] \\
&= \{ \sum_{i=2}^m [I_i(\sum_{k=1}^i P_k - P_k)] + \sum_{i=m+2}^n [P_i(\sum_{k=m+1}^i I_k - I_k)] + I_u P_r \} - \{ \sum_{i=2}^m [P_i(\sum_{k=1}^i I_k - I_k)] + \sum_{i=m+2}^n [P_i(\sum_{k=m+1}^i I_k - I_k)] + I_r P_u \}
\end{aligned}$$

$$\begin{aligned}
G_{ur} &= 2[0.5 - (0.5I_rP_r + I_rP_u + 0.5I_uP_u)] \\
&= 1 - (I_rP_r + 2I_rP_u + I_uP_u) \\
&= (I_r + I_u)(P_r + P_u) - (I_rP_r + 2I_rP_u + I_uP_u) \\
&= I_uP_r - I_rP_u
\end{aligned}$$

$$\begin{aligned}
G_r &= 2\{0.5 - [0.5I_1P_1/I_rP_r + I_1P_2/I_rP_r + 0.5I_2P_2/I_rP_r + \dots + 0.5I_mP_m/I_rP_r + P_m(I_1 + I_2 + \dots + I_{m-1})/I_rP_r]\} \\
I_rP_rG_r &= I_rP_r - [I_1P + 2I_1P_2 + I_2P_2 + \dots + I_mP_m + 2P_m(I_1 + I_2 + \dots + I_{m-1})] \\
&= (P_1 + P_2 + \dots + P_m)(I_1 + I_2 + \dots + I_m) - [I_1P + 2I_1P_2 + I_2P_2 + \dots + I_mP_m + 2P_m(I_1 + I_2 + \dots + I_{m-1})] \\
&= \sum_{i=2}^m [I_i(\sum_{k=1}^i P_k - P_k)] - \sum_{i=2}^m [P_i(\sum_{k=1}^i I_k - I_k)]
\end{aligned}$$

$$\text{By the same way, } I_uP_uG_u = \sum_{i=m+2}^n [I_i(\sum_{k=m+1}^i P_k - P_k)] - \sum_{i=m+2}^n [P_i(\sum_{k=m+1}^i I_k - I_k)]$$

Therefore,  $G = G_{ur} + \delta G_u + \beta G_r$

Supposing the urban average income is higher than the rural average income. As statistical data has indicated, the average income of some decomposed rural groups is higher than that of some decomposed urban groups. For instance, average income of one urban group is  $Y_f$  and  $Y_e$  represents average income of one rural group, but  $Y_f < Y_e$ . Under this circumstance,  $G$  will become  $G'$ .

$$G' = G_{ur} + \delta G_u + \beta G_r \text{ and } G - G' = G_0$$

$$\text{Finally, } G = G_{ur} + \delta G_u + \beta G_r + G_0$$

$G_0$  arises from the re-ranked income groups. When we calculate  $G_r$  ( $G_u$ ), the necessary condition is  $Y_1 \leq Y_2 \leq \dots \leq Y_e \leq \dots \leq Y_m$  ( $Y_{m+1} \leq Y_{m+2} \leq \dots \leq Y_f \leq \dots \leq Y_n$ ). If rural and urban data are integrated directly (according to the order  $Y_1, Y_2, \dots, Y_e, \dots, Y_m, Y_{m+1}, \dots, Y_f, \dots, Y_{n-1}, Y_n$ ), we cannot confirm  $Y_1 \leq Y_2 \leq \dots \leq Y_m \leq Y_{m+1} \leq Y_{m+2} \leq \dots \leq Y_n$ . When  $Y_e \geq Y_f$ ,  $G_0 > 0$ . Here is a simple example:

**The different rank and relevant the Gini ratios**

	(1)		(2)	
	$Y_i$	$P_i$	$Y_i$	$P_i$
Rural groups	50	0.2	50	0.2
	100	0.2	100	0.2
	<b>200</b>	0.2	<b>250</b>	0.2
Urban groups	<b>250</b>	0.2	<b>200</b>	0.2
	400	0.2	400	0.2
Gur	0.25		0.2	
Gr	2/7		1/3	
Gu	3/26		1/6	
G	0.34		0.34	
G'	0.34		0.32	
$G_0$	0		0.02	

As the above table shows, with only two groups were exchanged in the column (2), the relevant Gini ratios were totally changed and  $G_0$  was 0.02. According to actual urban and rural population, we endow different weights to urban and rural samples and integrate two samples to calculate the national Gini ratios.  $G_0 = 0.0014$  in 2001,  $G_0 = 0.002$  in 2002. It only accounts for a very small share of the Chinese Gini ratio and can be omitted. Thus, if  $G_r$ ,  $G_u$ , and  $G_{ur}$  are known, the Chinese Gini ratio can be approximately calculated.

When utilizing the decomposed formula to test the income gap among different groups or regions, the following precondition should be met: high-income gap among groups or regions. Otherwise,  $G_0$  will be large and the Gini ratio will be underestimated accordingly.

The coefficient  $\delta$  ( $\beta$ ) represent the ratio of urban (rural) population times the ratio of urban (rural) income, i.e.,  $\delta$  ( $\beta$ ) =  $I_u P_u$  ( $I_r P_r$ ). The decomposed Chinese Gini ratio consists of three parts: the intra-urban Gini ratio, the intra-rural Gini ratio and the Gini ratio between rural and urban areas, so the corresponding coefficient for each part will be  $\delta$ ,  $\beta$  and 1 rather than as Xiang postulated. This formula can be utilized to calculate the national Gini ratio, even if the rural and urban samples are separated. Moreover, it is also possible to evaluate how much each part contributes to the national Gini coefficient. The  $G_u$  and  $G_r$  estimated by the Chinese Rural Household Survey Team (RHS) and the Urban Household Survey Team (UHS) will be employed directly in this paper. In order to keep the data concordance, the data of  $I_u$ ,  $P_u$ ,  $I_r$  and  $P_r$  also come from UHS and RHS.

As the table 2 and 3 have shown, an obvious income gap has existed between urban and rural since 1978.  $G_0$  only accounts for less than 1% of the nation's Gini ratio. Hence,  $G_0$  can be ignored. Based on  $G_u$ ,  $G_r$  and  $G_{ur}$ , the national Gini ratio can be obtained (see table1). Additionally, In light of the formula of decomposed Gini coefficient, assuming the Khan and Riskin estimations (2001) of both rural and urban Gini coefficient were correct, the national Gini ratio, adopting the decomposed formula, would be 0.426 and 0.341 in 1995 and 1988 respectively rather than 0.452 and 0.382. The possible reasons for these differences might be because (a) the ratio of urban to rural population in their sample is doubtful; (b) their sample cannot represent the reality of the whole national income distribution.

Although using decomposed formulae to estimate the national Gini ratio cannot deal with the problems of original samples and the precondition of a big income gap between rural and urban inhabitants still need to be met, this approach has more advantages than others when calculating the Chinese Gini coefficient.

Firstly, it can overcome the problem caused by separate urban and rural samples. If the intra-urban Gini ratio and the intra-rural Gini ratio as well as the Gini ratio between rural and urban are estimated, the whole country's Gini ratio will be obtained directly. Some scholars suggest to employ different provinces' household data to reproduce the national household income data, such work needs 30 provinces' yearbooks as well as the rural to urban population ratio in each province. All 30 provinces' data need to be re-ranked according to income level. It is a tremendous task. Also, many provinces' historical data cannot be obtained especially from the early period of economic reform. Thus, it is impossible to calculate the nation-wide Gini ratio during the whole era of Chinese economic reform.

Secondly, the estimation of the Chinese Gini coefficient based on the rural and urban household survey data is more precise than the estimation on the basis of the Chinese Statistical Yearbook. Highly aggregated household income data in the Chinese Statistical Yearbooks ignore the income disparity within each decomposed income group, the result is Chinese Gini coefficient is around 4% underestimated based on the Chinese Statistical Yearbook (see table 4). The decomposed method in the Chinese Statistical Yearbook is also questionable, for instance, it puts the rural top income group (average income over 3000 yuan) at over 20% of the total rural population in 1996. In order to precisely calculate rural income disparity, this group has to be further decomposed. When the decomposed formula for national Gini ratio is used, from the intra-rural and the intra-urban Gini ratios which have been calculated by the Chinese Rural Household Survey Team and Urban Household Survey Team, it is necessary to estimate the Gini ratio between rural and urban inhabitants. Then we can obtain a time series national Gini coefficient.

Finally, the new approach will be employed to analyze the trends in the national Gini ratio. The decomposed nation-wide Gini coefficient consists of the intra-urban Gini ratio, the intra-rural Gini ratio and the Gini ratio between rural and urban areas. Thus, how much each part contributes to national Gini ratio can be calculated separately. Due to the different coefficient of each part, the whole-country's Gini ratio does not mainly rely on

the intra-urban Gini ratio and intra-rural Gini ratio. From the decomposed formula, the general changing trend and internal structure of the national Gini coefficient will be revealed. The detailed analysis will be in the following part.

#### **4. Chinese Income Disparity: the Main Change Tendencies since 1978**

On the basis of the decomposed formula of the national Gini ratio, the Chinese Gini coefficients from 1978 to 2003 are calculated. Table 1 illustrates that the income inequality in 2003 is about 1.75 times as much as that in 1985. From 1978 to 2003, Gu, Gr and Gur increased by 213%, 173% and 157% respectively. Although the Gu and Gr rose quickly, the influence of Gu and Gr on the nation-wide Gini ratio is limited. The influence of the intra-rural Gini ratio on the national Gini ratio decreased from 49.83% in 1983 to 15.34% in 2003, while the influence of the intra-urban Gini ratio on the national Gini ratio increased from 3.41% in 1978 to 21.27% in 2003. According to this trend, the influence of the intra-urban Gini ratio on national disparity will rise as the urban population maintains a sustained growth.

Whereas, the dominant factor on the national Gini ratios, as table 1 shown, is Gur, Gur has contributed over 50% to the national Gini ratio since 1985. In 2003, it accounted for 63.39% of the national Gini ratio. In 2004, the total urban inhabitants' real income had grown by 17.46 times when compared to 1978. On the other hand, the total rural inhabitants' real income only increased 4.86 times during the same period (see table 2). The urban residents who accounted for 41.8% of the nation's population made up 69.74% of the total nation's income in 2004. Table 3 presents a clear picture of the income gap between rural and urban inhabitants evaluated by both real income and nominal income from 1978 to 2004. In addition, the intra-rural and the intra-urban Gini coefficients did not have any significant relationship to the country's Gini ratio as they rose or fell during 1978 to 2003. Figure 1 further illustrates the close relationship between Gur and the national Gini coefficient ( $R^2=0.975$ ) from 1978 to 2003. It means that Gur and the national Gini ratio shared a similar trend. It goes without saying that Gur holds a dominant position in the whole country's Gini coefficient. Therefore, more attention to

the study of Chinese income inequality should be shifted to analyse urban-rural income disparity.

As the decomposed national Gini coefficient has shown, the intra-urban Gini ratio and the intra-rural Gini ratio contributing to the whole country's Gini ratio not only depend on how big they are but also depend on their income and population size. The increasing rate of urban inhabitants' income growth is much faster than that of rural inhabitants' income, total urban income is around two times as total rural income, and the urban population is about 72% of the rural population in 2004. Although the urban population is lower than the rural population, the influence of the intra-urban Gini ratio to the national Gini ratio is bigger than that of the intra-rural Gini ratio.

Moreover, table 1 states the nation-wide Gini ratio can be grouped into four stages: (1) From 1978 to 1985 the national Gini ratio decreased. The household responsibility system introduced in 1978 provided farmers with greater control over assets and greater incentives for production. Agricultural trade conditions were also improved during 1978 to 1984. As a result of these measures, the income gap between urban and rural was narrowed. Accordingly, national Gini ratio declined. (2) From 1985 to 1994 Gini coefficient increased; in the post rural reform period after 1984, when China decentralized, opened up and experienced an explosion of trade and foreign direct investment, inequality rose steadily. The increase in rural average income lagged behind urban average income. With government policies focused on more market oriented economic growth, income inequality increased and the rate of poverty reduction slowed in rural area. The central government cut the marginal procurement price for grain in 1985. Meanwhile, input prices increased much faster than the government's output procurement prices. The result was an end to the rapid output growth of the previous five years. The income gap between rural and urban inhabitants rose then the national Gini coefficient went up. (3) From 1994 to 1997 Gur went down. In 1994, the national Gini ratio reached 0.4, and Gur climbed to 0.2483 constituting 62.94% of the national Gini ratio. In order to improve the income disparity between rural and urban inhabitants, the government raised the prices of agriculture products, this measure directly reduced the

urban-rural income gap; (4) Since 1997 up till now, the increase rate of urban average income growth is higher than that of rural average income, and the Gur has risen again. In 2004, the government further raised prices of agriculture products and reduced some unreasonable burdens that had been upon peasants, so the income gap between rural and urban inhabitants narrowed again. Unfortunately, due to entry into the WTO, room for further increases in the price of agriculture products is limited. In line with the agreement on farming of WTO, the Chinese government has pledged to reduce average import duty to 15.6 per cent by 2005 from the average of 21.3 per cent in 2001. Domestic prices for wheat, soybean, corn, cotton, edible oil and oil crops and sugar and sugar crops are 10 to 70 per cent higher than in the international market. Thus, it is impossible in future to add to rural income by employing the leverage of the prices of agricultural products (Chinadaily, 2002).

In the light of the above analysis, the general trend of the national Gini ratio is very clear. The table 1 reveals significant information: Gur shares the same changing tendency as the whole country's Gini coefficient. Now that the Gur is a dominator fact in the national income inequality, the studies of Chinese income inequality should concentrate on the income gap between rural and urban areas, and narrowing the urban and rural income gap will directly improve the national income disparity.

## **5. Suggestions**

Reduction urban and rural income gap relies on two issues: population structure and per capita income. Urban total income occupies the major share of total national income, if the ratio of urban population continuously increases, the Gini ratio between rural and urban inhabitants will fall. Another possibility is that the increasing ratio of rural per capita income is faster than that of urban per capita income. The ratio of urban to rural per capita income would fall and nation-wide disparity would be reduced. From these points of view, government policies should concentrate on encouraging the urbanization process and raising rural inhabitants' income. However, how to raise peasants' income is a difficult problem. Owing to entry into the WTO, the room to further heighten the price

of agricultural products is limited. Reducing the farmers' burden can only achieve a temporary effect, because all agricultural taxes and fees will be removed completely by end of 2005. Township and village enterprises (TVEs) also face fierce competition from both foreign and domestic rivals. They cannot play a key role in absorbing rural surplus labour. The rest methods to increase rural residents' income will be investment in rural infrastructures. But it cannot directly contribute to heightening peasants' income in the short-term. However, if we shift our concentration from directly raising peasants' income to encouraging and organizing impoverished peasants into towns or small and middle size cities, we will find this an effective approach to cope with Chinese income disparity.

First, it will increase rural per capita income. Due to the reduction of poor, the average rural income will rise. Then, the ratio of rural to urban per capita income will rise and the Gini ratio will decline. Moreover, this method will benefit rural poverty alleviation directly. The speed of rural poverty reduction slows down since end of 1990s, although the investment in poverty alleviation is continuously rising. Now, as rural poor incidences are mainly concentrated in the remote west territory with a bad environment, governments have taken different means to improve their condition. However, the results are not optimistic, in such unfavorable geographic surroundings, the poor cannot easily access education, health care, employment and other social opportunities to enhance their capabilities to subsist. Thus, migration should be a practicable option. Furthermore, government guiding, training and organizing rural labour moves to small and middle sized cities will relieve the pressure of rural migrants flowing to big cities and reduce so called "blind flowing". However, nothing is perfect, rural labour movement to cities will make the situation of urban unemployment worse and urban poor rise. From the point of view of the whole country, the ultimate approach to solve Chinese income inequality and poverty should pay great attention to creating more new jobs to absorb the huge rural surplus labour and reduce urban unemployment. Obviously, creating new employment opportunities mainly depends on economic development. Although economic development cannot automatically solve Chinese income disparity, Chinese income inequality cannot be settled without economic development.

## **6. Conclusions**

On the basis of critical analysis of different estimations of the Chinese Gini coefficient, this paper employed a new approach to calculating the Chinese Gini ratios from 1978 to 2003. This long period time series Gini ratios, covering the years of China's economic reform, cannot be found in relevant research areas. Meanwhile, the authors further calculate how much each part (the intra-rural and the intra-urban Gini ratio and the Gini ratio between rural and urban areas) contributes to the national Gini coefficient.

In light of the results, the influence of the intra-urban Gini ratio to the national Gini ratio has decreased from 49.83% in 1983 to 15.34% in 2003, while the influence of the intra-urban Gini ratio to the national Gini ratio has increased from 3.41% in 1978 to 21.27% in 2003. According to this trend, the influence of the intra-urban Gini ratio to national disparity will rise. However, the crucial factor in the whole country's Gini ratio comes from Gini ratio between rural and urban areas. It has contributed over 50% to national Gini ratio since 1985 and shared the same tendency as the national Gini coefficient.

Therefore, the concentration on studying Chinese income disparity can shift from the national level to exploring the income gap between rural and urban areas. Accordingly, the improvement of national income inequality should focus on narrowing the rural and urban income gap. The authors suggest that organizing impoverished rural poor into towns or small and middle size cities will narrow urban/rural income gap then further improve national income disparity. From the long run, the ultimate approach to coping with rural and urban income disparity will mainly rely on economic development.

## References

Champernowne, D. (1998) *Economic Inequality and Income Distribution*, Cambridge University Press: Cambridge.

Chen, Z and Zhou, Y.(2001) *Re-discussion Development and Income Distribution: whether income polarisation exists or not*. Economic Science Press: Beijing.

(陈宗胜, 周云波 (2002) 在论改革与发展中的收入分配, 中国发生两极分化了吗? 经济科学出版社: 北京)

Chen. Z. (1997) *Reform, Development and Income Distribution*. Fudan University Press: Shanghai.

(陈宗胜.(1997) 改革、发展与收入分配复旦大学出版社: 上海.)

Chinadaily (2002) *Make WTO entry farmers' gain*. Chinadaily 02/23/2002

Cowell, F (1980) *On the Structure of Additive Inequality Measures*. Review of Economics Studies. Vol, 47.

Deaton, A.(1995) *Data and Econometric Tools for Development Analysis*. In Behrman, J., Srinivasin, T.N., (eds.) Handbook of Development Economics, Volume3, Elsevier Press: Amsterdam.

Fang, C, Zhang, X and Fan, S. (2002) *Emergence of urban poverty and inequality in China: evidence from household survey*. Elsevier Science Inc.

Gibson, Huang and Rozelle (2001) *Why is Income Inequality So Low in China Compared to Other Countries? The Effect of Household Survey Methods*. JEL: D31, O15

Huang, D (1999) *On the theory of Marginal Propensity to Consume*. Journal of Quantitative Economics and Economic Study vol 5.

(黄丹(1999) 边际消费倾向递减论\_数量经济技术经济研究 1999 年第 5 期)

Kanbur and Zhang (2001) *Fifty Years of Regional Inequality in China: A Journey Through Revolution, Reform and Openness*. JEL Classification: D63, O18, P27.

Khan, A and Riskin, C (2001) *Inequality and Poverty in China in the Age of Globalisation*. Oxford University Press: Oxford.

Liu, D and Lu, Q (1991) *The Positive Analysis on Chinese Income Equality*. Academic Journal of Beijing University, vol 6.

(刘晓东, 卢青(1991) 中国收入平等程度的实证研究. 北京大学学报 1991 年第 6 期)

Lin, Y (2000) *The Positive Studies on the Chines Regional National Income Gap*. Beijing University Press: Beijing.

(林燕平(2000) 中国地区国民收入差距实证研究. 北京大学出版社: 北京.)

National Bureau of Statistical (1987-2004) *Chinese Statistical Yearbook 1987 to 2003*. Chinese Statistics Press: Beijing.

(国家统计局(1987 至 2004) *中国统计年鉴*, 中国统计出版社:北京.)

National Bureau of Statistical (2004) *China Statistical Abstract*. Chinese Statistics Press: Beijing.

(国家统计局(2004) *中国统计摘要*, 中国统计出版社:北京.)

National Bureau of Statistical (1978-2004) *China National Economy and Social Development Statistical Bulletin\_1978 to2004*.

(国家统计局(1978 至 2004), 中国经济与社会发展统计公报 <http://www.stats.gov.cn/tjgb/>)

Pyatt, G. (1976) *On the Interpretation and Disaggregation of Gini Coefficients*. Economic Journal 86.

Rural Social and Economic Survey Term of National Bureau of Statistical (2002-2004) *Chinese Rural household Survey Yearbook*, Chinese Statistics Press: Beijing.

(国家统计局农村社会经济调查总队(2002-2004) *中国农村住户调查年鉴*, 中国统计出版社:北京.)

Sen, A (1984) *Resources, Values and Development*. Basil Blackwell: Oxford.

Shorrocks, F (1984) *Inequality Decomposition by Population Subgroups*. Econometrica Vol, 50.

Sloman, J. (1999) *Economics*, Prentice Hall Europe: London.

The research group of income distribution of Nankai University (1990) *The Current Situation, Reasons and Countermeasures of Chinese Income Disparity*. Academic Journal of Nankai University vol, 2.

(南开大学收入分配课题组(1990) *我国收入分配不公的现状, 根源和对策*. 南开学报 1990 年第 2 期.)

The Study Group of The State Council Research Institute. (1997) *The Analysis of the Urban Inhabitants' Income Gap and Recommendable Countermeasures* .Journal of economic study vol 8

(国务院研究室课题组.(1997). *关于城镇居民收入差别的分析和建议*. 经济研究杂志 1997 年第 8 期.)

Urban Social and Economic Survey Term of National Bureau of Statistical (2002-2004) *Chinese Price and Urban household Survey Yearbook*\_Chinese Statistics Press: Beijing.

(国家统计局城市社会经济调查总队(2002 至 2004) *中国价格及城市居民家庭收支调查统计年鉴*, 中国统计出版社:北京.)

Wang, S and Hu, A. (1999) *The Political Economy of Uneven Development :The Case of China* Chinese Plan Press: Beijing.

(王绍光, 胡鞍钢(1999) *中国: 不平衡发展的政治经济学*. 中国计划出版社:北京.)

World Bank. (2002) *Globalization, Growth and Poverty: Building an Inclusive World Economy*. World Bank report.

World Bank. (1995) *Poverty Reduction and the World Bank: Progress and Challenges in the 1990s*. World Bank report.

Xiang J (1998) *Estimation of the Chinese Inhabitants' Gini Coefficient and Regress Analysis*. *Journal of Financial Practice and Theories*. Vol1.  
(向书坚(1998) 全国居民收入分配基尼系数的测算与回归分析, 财经理论与实践 1998 年第 1 期)

Yao, S (1997) *Decomposition of Gini coefficients by income factor: a new approach and application*. *Journal of Applied Economics Letters*, 4.

Zhang, Z, Liu, A and Yao, S (2001) *Convergence of China's Regional Incomes: 1952-97*, *China Economic Review*.

Zhao, R, Li, S. and Riskin.C (1999) *Re-study on Chinese Income Distribution*. Chinese Financial Press: Beijing.  
(赵人伟, 李实, 卡尔. 李思勤.(1999). 中国居民收入分配再研究. 中国财政经济出版社: 北京.)

**Table 1. The Chinese Gini coefficient from 1978 to 2003**

Year	(1)Gur	(2)Gr	(3)Gu	(4)Gini	(5)Gur/Gini	(6)Gu/Gini	(7)Gr/Gini
1978	0.1803	0.2124	0.16	0.3022	0.5964	0.0341	0.3695
1979	0.1802	0.2245	0.16	0.3069	0.5872	0.0355	0.3773
1980	0.1813	0.2407	0.16	0.3142	0.5771	0.0371	0.3859
1981	0.1597	0.2406	0.15	0.2933	0.5444	0.0372	0.4184
1982	0.1355	0.2317	0.15	0.2659	0.5097	0.0413	0.449
1983	0.1183	0.2461	0.15	0.2575	0.4595	0.0421	0.4984
1984	0.1241	0.2439	0.16	0.2584	0.4803	0.0505	0.4692
1985	0.1291	0.2267	0.19	0.2552	0.5058	0.0646	0.4296
1986	0.1629	0.3042	0.19	0.3178	0.5126	0.0598	0.4276
1987	0.17	0.2889	0.2	0.3159	0.5382	0.0678	0.3939
1988	0.1717	0.3053	0.23	0.3264	0.5262	0.0782	0.3957
1989	0.1864	0.3185	0.23	0.343	0.5434	0.0788	0.3778
1990	0.1772	0.3099	0.23	0.3314	0.5347	0.0809	0.3844
1991	0.1984	0.3072	0.24	0.3494	0.568	0.0837	0.3482
1992	0.2205	0.3134	0.25	0.3689	0.5976	0.093	0.3094
1993	0.2412	0.3292	0.27	0.3938	0.6124	0.1008	0.2868
1994	0.2483	0.321	0.3	0.4008	0.6194	0.1145	0.2661
1995	0.2358	0.3415	0.28	0.3934	0.5994	0.1088	0.2918
1996	0.2172	0.3229	0.284	0.3714	0.5849	0.1148	0.3003
1997	0.214	0.3285	0.292	0.3709	0.5769	0.1209	0.3022
1998	0.2189	0.3369	0.3	0.3785	0.5784	0.126	0.2956
1999	0.2377	0.3361	0.295	0.3886	0.6116	0.1546	0.2338
2000	0.2506	0.3536	0.319	0.4088	0.6132	0.1732	0.2136
2001	0.26	0.3603	0.323	0.419	0.6204	0.1848	0.1948
2002	0.2754	0.3646	0.32	0.4328	0.6362	0.1926	0.1711
2003	0.2824	0.368	0.34	0.4455	0.6339	0.2127	0.1534

Note:

1. Column (1) Gur comes from author's calculation based on the data from the *Chinese Statistical Yearbooks* and *China National Economy and Social Development Statistical Bulletin* from 1978 to 2004.
2. Column (2) and (3) Gr and Gu come from the *Chinese Yearbook Rural household Survey* and *Chinese Yearbook Chinese Price and Urban household Survey* from 2000 to 2004.
3. Column (4) the Gini coefficients comes from author's calculation based on the formula  $G = Gur + \delta Gu + \beta Gr + G_0$
4. Column (5), (6) and (7) each component occupying the national Gini coefficients come from author's calculation based on the formula  $G = Gur + \delta Gu + \beta Gr + G_0$

**Table 2. The main urban and rural income indexes in 1978 and 2004**

Year	Urban nominal per capita income (yuan)	Rural nominal per capita income (yuan)	Urban inhabitants total nominal income (trillion yuan)	Rural inhabitants total nominal income (trillion yuan)	Chinese inhabitants total nominal income (trillion yuan)	Urban real per capita income (yuan)	Rural real per capita income (yuan)	Urban inhabitants total real income (trillion yuan)	Rural inhabitants total real income (trillion yuan)	Chinese inhabitants total real income (trillion yuan)
1978	343.4	133.6	0.0592	0.1056	0.1648	343.4	133.6	0.0592	0.1056	0.1648
2004	9422	2936	5.1194	2.2212	7.3406	1902.7	678.1	1.0338	0.5130	1.5468
The ratio of 2004/1978	27.44	21.98	86.43	21.04	44.54	5.54	5.08	17.46	4.86	9.39

Data source: re-calculating the data from the *China National Economy and Social Development Statistical Bulletin* 1978 and 2004

**Table 3. The basic information of China population and inhabitants' income from 1978 to 2004**

Year	(1) Urban per capita nominal income (yuan)	(2) Rural per capita nominal income (yuan)	(3) Urban per capita real income (yuan)	(4) Rural per capita real income (yuan)	(5) Urban population (%)	(6) Rural population (%)	(7) Urban/rural per capita nominal income (yuan)	(8) Urban/rural per capita nominal income (yuan)	(9) Per capita nominal income (yuan)	(10) Per capita real income (yuan)	(11) Gini	(12) Gur
1978	343.4	133.6	343.4	133.6	17.92	82.08	2.5704	2.5704	171.2	171.2	0.3022	0.1803
1979	405	160.2	397.4	157.2	18.61	81.39	2.5281	2.5281	205.76	201.9	0.3069	0.1802
1980	477.6	191.3	436.2	174.7	19.39	80.61	2.4966	2.4966	246.81	225.4	0.3142	0.1813
1981	500.4	223.4	446.0	199.1	20.16	79.84	2.2399	2.2399	279.24	248.9	0.2933	0.1597
1982	535.3	270.1	467.9	236.1	21.13	78.87	1.9819	1.9819	326.14	285.1	0.2659	0.1355
1983	564.6	309.8	483.8	265.5	21.62	78.38	1.8225	1.8225	364.89	312.7	0.2575	0.1183
1984	652.1	355.3	543.9	296.3	23.01	76.99	1.8354	1.8354	423.59	353.3	0.2584	0.1241
1985	739.1	397.6	550.7	308.2	23.71	76.29	1.8589	1.7870	478.57	365.2	0.2552	0.1291
1986	900	424	626.7	309.8	24.52	75.48	2.1226	2.0233	540.72	387.4	0.3178	0.1629
1987	1002	463	641.5	318.5	25.32	74.68	2.1641	2.0141	599.47	400.3	0.3159	0.17
1988	1181	545	626.5	319.1	25.81	74.19	2.167	1.9636	709.15	398.6	0.3264	0.1717
1989	1376	601	627.7	294.9	26.21	73.79	2.2895	2.1284	804.13	383.0	0.343	0.1864
1990	1510	686	680.2	322.2	26.41	73.59	2.2012	2.1114	903.62	417.5	0.3314	0.1772
1991	1701	709	729.1	325.5	26.94	73.06	2.3992	2.2402	970.59	433.7	0.3494	0.1984
1992	2027	784	799.9	343.7	27.46	72.54	2.5855	2.3271	1127.44	473.5	0.3689	0.2205
1993	2577	922	875.9	355.5	27.99	72.01	2.795	2.4637	1387.72	508.1	0.3938	0.2412
1994	3496	1221	950.5	381.6	28.51	71.49	2.8632	2.4912	1872.11	552.3	0.4008	0.2483
1995	4283	1578	997.0	419.7	29.04	70.96	2.7142	2.3756	2363.53	595.5	0.3934	0.2358
1996	4839	1926	1035.3	474.7	30.48	69.52	2.5125	2.1809	2781.55	647.1	0.3714	0.2172
1997	5160	2090	1070.8	502.6	31.91	68.09	2.4689	2.1306	3008.54	680.8	0.3709	0.214
1998	5425	2162	1132.6	525.1	33.35	66.65	2.5093	2.1567	3153.95	719.5	0.3785	0.2189
1999	5854	2210	1238.2	545.0	34.78	65.22	2.6489	2.2720	3477.38	804.5	0.3886	0.2377
2000	6280	2253	1317.7	556.1	36.22	63.78	2.7874	2.3693	3711.58	855.3	0.4088	0.2506
2001	6860	2366	1429.5	579.4	37.66	62.34	2.8994	2.4672	4058.44	928.7	0.419	0.26
2002	7703	2476	1621.3	608.8	39.1	60.9	3.1111	2.6633	4519.76	1042.6	0.4328	0.2754
2003	8472	2622	1767.2	634.5	40.53	59.47	3.2311	2.7852	4993.01	1138.1	0.4455	0.2824
2004	9422	2936	1902.7	678.1	41.8	58.2	3.2091	2.8060	5647.15	1239.0		0.2794

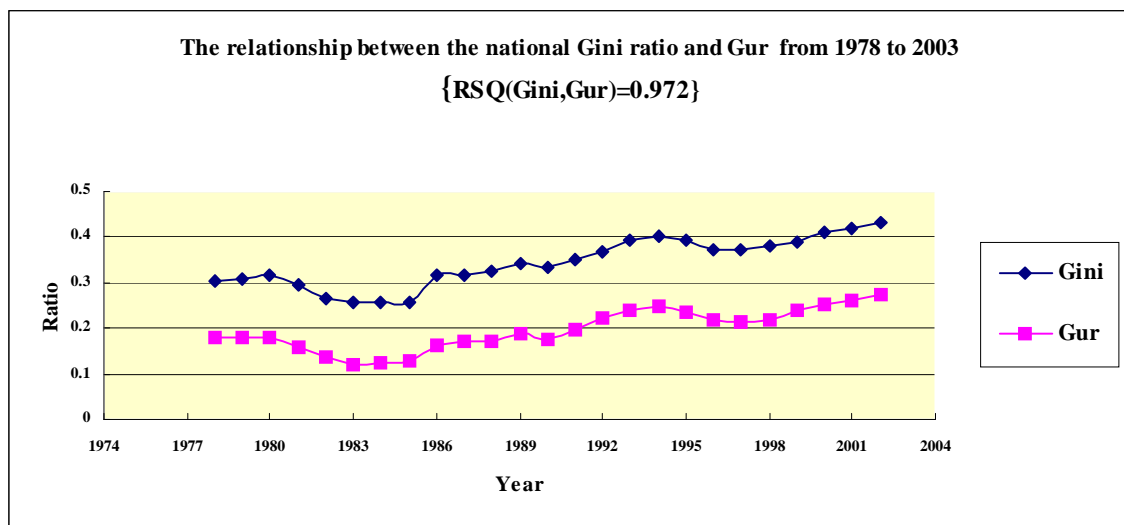
Note:

1. The data of column 1 and 2 are from the *China's Employment Situation and Policies* (Information Office of State Council of the PRC, 2004) and *China National Economy and Social Development Statistical Bulletin* from 2002 to 2004.
2. The data of column 3 and 4 comes from author's calculation based on the *China Yearbook of Rural Household Survey 2004* and *China National Economy and Social Development Statistical Bulletin* 2004.
3. The data of column 5 and 6 are from the *Chinese Statistical Yearbook 2002* and *China National Economy and Social Development Statistical Bulletin* from 2002 to 2004.
4. The data of column 7, 8, 9, 10, 11 and 12 comes from author's calculation.

**Table 4. Different estimations of the Gini ratio based on different data sources**

Year	The Gini ratio based on the Chinese Statistical Yearbooks (1)	The Gini ratio based on the Yearbooks of Household Survey (2)	(1)/(2)
1997	0.3605	0.3709	0.972
1998	0.3643	0.3785	0.962
1999	0.3744	0.3886	0.963
2000	0.3886	0.4088	0.951
2001	0.3986	0.4190	0.951
2002	0.4192	0.4328	0.969
2003	0.4298	0.4455	0.965

**Figure1. The relationship between the national Gini ratio and Gur**



Data source: data from table 1