The Kyoto Economic Review 76(2): 155–163 (December 2007)

Forming Kuznets Curve among Chinese Provinces

Hiroshi Ohnishi[1]

[1] *Graduate School of Economics, Kyoto University. E-mail: ohnishi@econ.kyoto-u.ac.jp*

As coastal areas in China achieved economic growth, income disparities between the rural and urban areas have become prominent, and this trend can be measured using Gini coefficients and Theil indices. However, as Williamson (1991) mentioned, there is a possibility that the catching-up process of the poor areas is sometimes measured as a process of widening regional income disparity, for example, from distribution 1 : 1 : 1 : 2 to distribution 1 : 1 : 2 : 2. Moreover, as the rich areas in China are expanding from a few cities to many of its coastal areas as part of this process, the trend of these regional disparities can be regarded as the case suggested by Williamson. Furthermore, in recent years, some of the inner provinces achieved very high growth rates, while growth rates of the richest cities have become relatively lower. In this sense, we can conclude that China's regional income disparity has shifted from the divergence stage to the convergence stage, as aimed by Deng Xiaoping's "get rich first" policy. In other words, China can now be regarded as progressing from an economic growth stage that only focused on the rich to an economic growth stage that focuses on the poor.

Keywords: regional disparity, convergence, catch-up, Kuznets curve, Theil index
JEL Classification Numbers: C14, C21, R11

1. Introduction

As the coastal areas in China achieved prominent economic growth, income disparities between the rural and urban areas had begun to stand out clearly. This trend is shown in Figure 1, which measures the Gini coefficients of the provincial per capita income from 1978 to 2005 in China. Although this disparity decreased due to the rapid increase in farmers' income soon after 1978, the trend began to change from the middle of the 1980s and particularly during the 1990s. In this sense, we cannot deny the present trend of increasing regional income disparities.

However, Williamson (1991) mentioned that there is a possibility that the catching-up process of the poor areas is sometimes measured as a process of

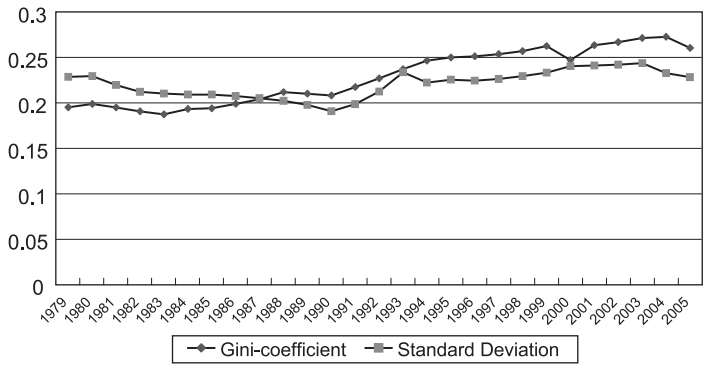

Figure 1 Gini coefficient and standard deviation of regional income: 1979–2005.

widening regional income disparity, for example, from distribution 1 : 1 : 1 : 2 to distribution 1 : 1 : 2 : 2[1]. Distribution 1 : 1 : 2 : 2 is better than distribution 1 : 1 : 1 : 2 because one-fourth of the population has caught up with the rich, but the Gini-coefficient has increased in this process, that is, the regional disparity increases. In this sense, bad impressions are sometimes conversely just the surfaces of good realities. Moreover, what is the current situation in China now?

In my opinion, the present trend in China is completely similar to the case suggested by Williamson; moreover, the recent trend of σ-convergence may be somewhat of a corroboration of what was revealed by McErlean and Wu (2003) and Sakamoto (2005). Erlean and Wu's data does not pertain to regional incomes but regional agricultural labor productivity. However, it was very important to predict the new tendency. On the other hand, Sakamoto (2005) has revealed this new tendency from 2002 onward by using data on the logarithm of regional income, while non-logarithmic original data on the regional income could reveal it only from 2004 onward (See Fig. 1). In this sense, Sakamoto (2005) could predict this new tendency a little earlier by converting the original data into logarithms.

In reality, during these years, the fastest economic growth in China was realized in the Inner Mongolian Autonomous Region. On the other hand, economic growth rates in Shanghai and Beijing were ranked the fourth lowest in 2005 and the eighth and the seventh lowest respectively in 2006[2]. This new tendency had not been observed until a few years ago. Thus, there is a possibility that the areas with the highest growth in China are now going to be the inland areas instead of the coastal areas.

---

[1] Williamson (1991) merely mentioned this possibility by citing Robinson (1976). However, we are actually observing this tendency, and in this sense, this mention was significant.

[2] There is a debate on the reliability of these statistics. This is because all the reported growth rates of the gross provincial products exceed the GDP growth rates. However, there are some evidences that the GDP growth rates were underestimated due to the limitation of coverage. Therefore, we neglected the problem of statistical bias, and used the data in *China's Statistical Yearbook*.

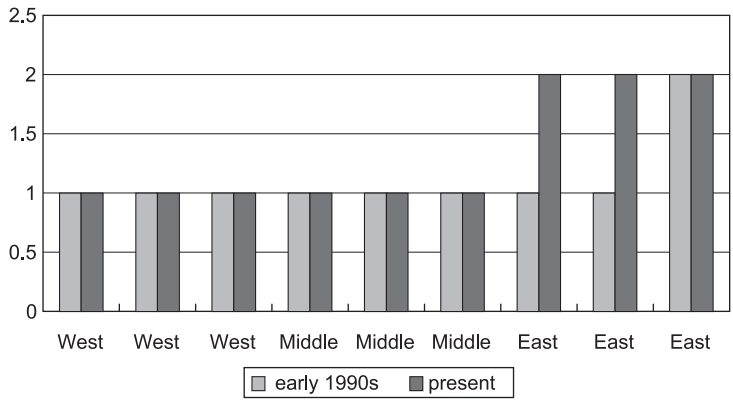

Figure 2 Image of regional disparity in the early 1990s and the present.

However, as I mentioned earlier, we could observe such a new tendency for this period of five years at most, while a far more basic trend has been observed from the early 1990s, when there was no σ-convergence. This basic trend involved the formation of two or three geoeconomic "clubs," as identified by Jian et al. (1996), Chen and Fleisher (1996), Raiser (1998), Kawabata and Meng (2000), Yao and Zhang (2001), Zhang et al. (2001), Pedroni and Yao (2006), and Mao (2003). In their research, these clubs are typically classified into three, because these three geometrically located areas—"eastern (coastal)," "middle," and "western"—are also going to have similar income levels of their own. In other words, their income levels are going to converge within their own "clubs," and the most important characteristic here is that the eastern area's converging income level is significantly higher than that of the other areas. In my opinion, this is the actual reason that China's regional disparity is now increasing as a whole, because convergence within the eastern areas implies that the ratio of higher incomes has increased to one-third from one-ninth when only Shanghai, Beijing, and Shenzhen were rich in the early 1990s, as shown schematically in Figure 2. What is most important in this schema is that this progress from one-ninth to one-third is a process of increasing regional income disparity. If the income of eight-ninth is 1 and one-ninth is 2, the Gini coefficient is 0.1, whereas if that of six-ninth is 1 and three-ninth is 2, the Gini coefficient is 0.18. This is the transition that Williamson suggested.

We confirm this tendency clearly by extending the data period in Mao (2003).

2. Interregional Disparity among the Clubs and Intraregional Disparities within Each Club after 1990

The reason we employ the same method as Mao (2003) is that he used the Theil index, and this index is the best to decompose the factors of the disparities, that is, to detect the percentage of the total disparity that is composed of interregional and

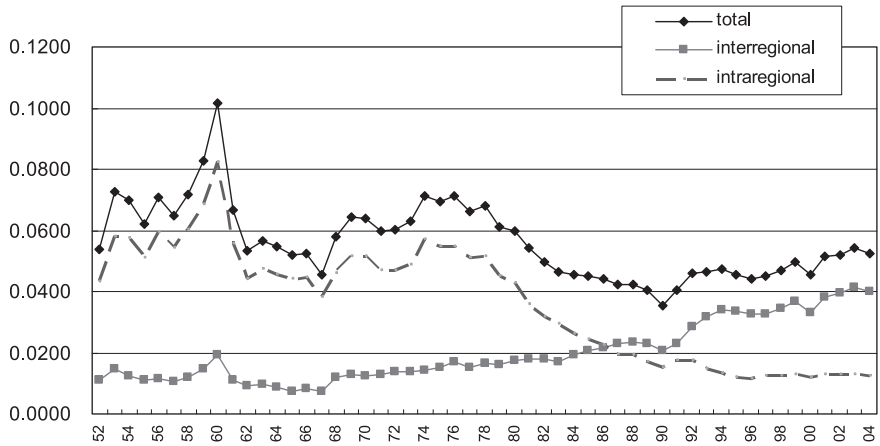

Figure 3 Decomposition of China's regional disparity by Theil index.

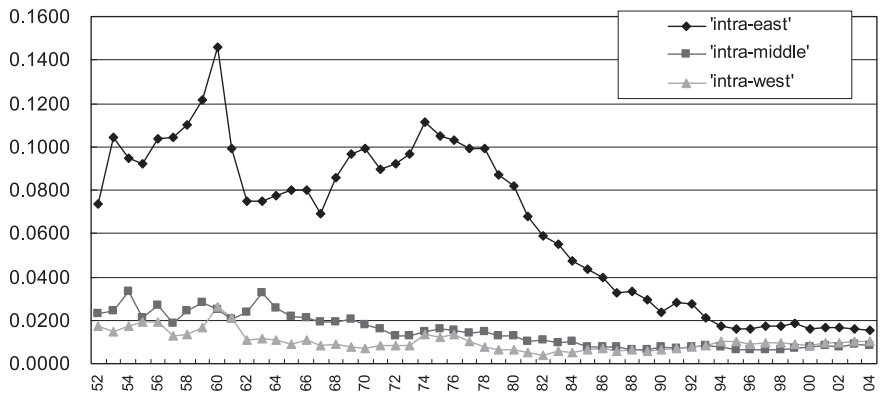

Figure 4 Intraregional disparity among the east, middle and west.

intraregional disparities within these three clubs[3]. While Mao (2003) originally used the data until 1997, we extended the data until 2004, as shown in Figures 3[4] and 4.

---

[3] Here, the definitions of the three clubs are slightly different from the ordinary sense because they are not only defined on a geographical basis but also by their economic stage. That is, the "east" refers to Liaoning, Beijing, Tianjin, Shandong, Jiangsu, Shainghai, Zhejiang, Fujian, Guangdong, and Hainan; the "middle" refers to Inner Mongolia, Heilongjian, Jilin, Hebei, Shanxi, Henan, Anhui, Hubei, and Jiangxi; and the "west" refers to Shaanxi, Ningxia, Gansu, Qinghai, Xinjiang, Tibet, Sichuan, Guizhou, Yunnan, and Guangxi. Such types of reclassifications are sometimes conducted by researchers. See Sakamoto (2005).

Both these figures confirm the same tendency that Mao (2003) detected. That is, Figure 3 confirms that interregional disparity continues to increase; however, on the other hand, intraregional disparity continues to be stable or decrease slightly. Furthermore, Figure 4 also confirms the slightly decreasing tendency of intra-regional disparities as having continued only in the eastern areas, and it implies that the relatively poorer areas in the east have caught up with the richest cities/provinces. The catch-up provinces in the eastern areas are Guangdong, Shangdong, Liaoning, Jiangsu, Zhejiang, and Fujian. Moreover, through this process, these provinces are actually forming one homogeneous club. The present development stage should be understood in this manner.

However, if this assessment is accepted by us, we can predict the next stage. In this case, some of the middle area's provinces will soon rush to catch up with the costal provinces. Moreover, some of the descriptive information reports rapid changes in some cities located in the middle areas, for example, Wuhan, Zhengzhou, and Changsha. This is the new stage, because the middle areas will loose their homogeneity during this stage, and in this sense, we will not be able to assess the middle area as a homogeneous club. Therefore, the club categories that were introduced by Yao and Zhang (2001) and Zhang et al. (2001) should be replaced with a new understanding, and this should be Deng Xiaoping's "get rich first" policy. A few become rich first, and the others follow later. We could understand this as the process whose possibility was suggested by Williamson (1991).

3. Forming Kuznets Curve in Recent Years

Although Williamson suggested that the abovementioned possibility could occur in the process of industrialization, mainstream economics has not paid attention to this possibility and has merely discussed regional disparity as a problem of convergence or divergence as a whole. This traditional view was encouraged by Barro and Sala-i-Martin (1992, 1995). For example, in the field of studies on China's regional disparity, Tsui (1991), Sakamoto (2001), and Cai et al. (2002) have all discussed only β-convergence and/or σ-convergence as a whole and have not conducted club analysis. In this manner, therefore, they could not grasp the catching-up process of the backward regions in terms of provinces. That is, they could not grasp the reality of the case suggested by Williamson.

One more problem regarding these studies is that when they tested the β-convergence hypothesis they did so based on the data of long periods and not yearly data. For example, Jian et al. (1996) tested the period from 1978 to 1985, 1985 to 1993, and 1990 to 1993. However, as we observed earlier, this tendency has changed after the early 1990s, and is now once again progressing to the next stage where the middle areas begin to diverge. Therefore, we have to analyze two

---

[4] The same or similar graphs as Figure 3 can also be found in Dai (1997) and Cai et al. (2002). However, Dai's graph pertains only to 1992, and it could not predict the basic trend after 1990. Moreover, the graph found in Cai et al. (2002) only depicts the ratios of the contributing factors.

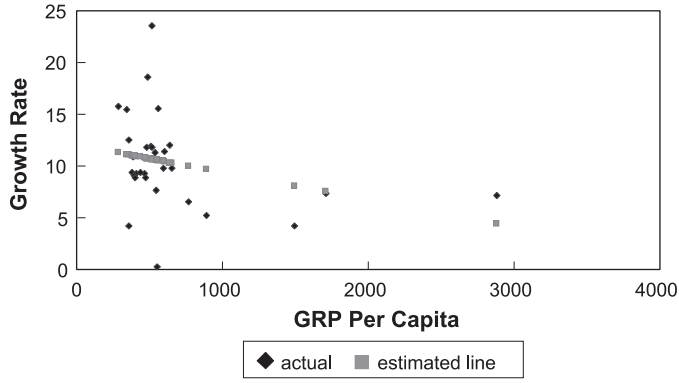

Figure 5 Convergence in 1982.

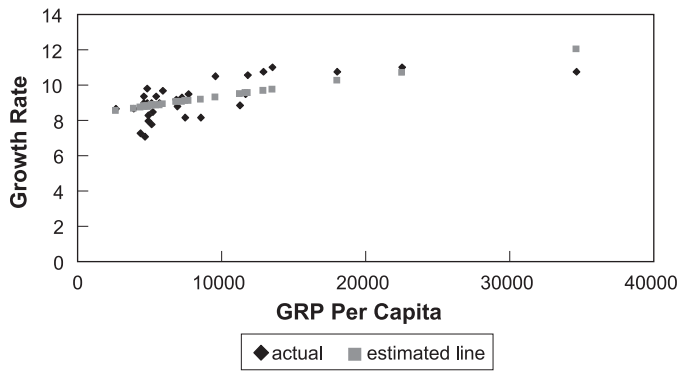

Figure 6 Divergence in 2000.

different tendencies—convergence and divergence—simultaneously. Moreover, the tendencies should be divergence in the lower income stage and convergence in the higher income stage, because the most fundamental hypothesis of disparity is the inverse U-shaped Kuznets curve. As research based on Williamson's suggestion, we return to this original hypothesis because the Williamson hypothesis is an example in which the Kuznets hypothesis was applied in the field of regional disparity.

For this purpose, first, we reflect on the history of the changes in the pattern of regional disparity in China by using yearly data, that is, by drawing graphs with two axes: the GRP (Gross Regional Product) per capita and the GRP growth rate in each year in the Chinese provinces. First, see Figure 5, which shows the convergence trend caused by the rapid growth in farmers' income that was fostered by agricultural reform. However, after enjoying this benefit of agricultural reform,

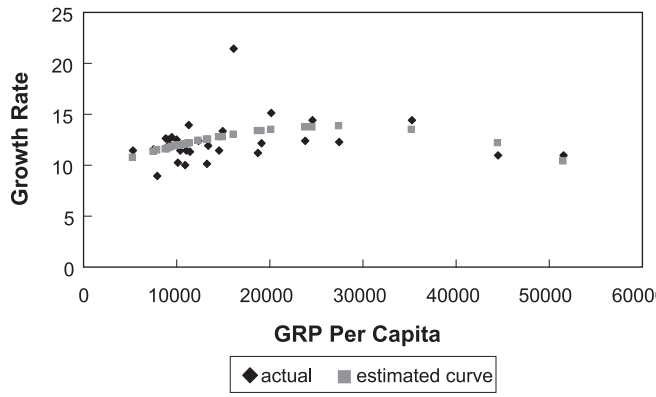

Figure 7 Forming Kuznets curve in 2005.

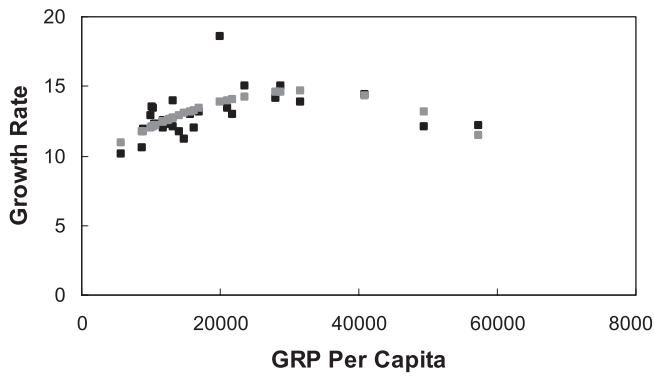

Figure 8 Clearer Kuznets curve in 2006.

China progressed to the next stage of reform involving the industrial sector. In this stage, it experienced divergence because the industrial sector developed faster than the agricultural sector. This is depicted in Figure 6.

However, as shown in Figure 7, in 2005, we can identify two different stages—the divergence and convergence stages—simultaneously, and this refers to the Kuznets curve as a whole. Furthermore, Figure 8 more clearly shows the Kuznets curve that supports our original hypothesis of the poor areas catching up with the rich ones, and implies future convergence on the whole.

Therefore, in order to identify the present stage, we need to propose some measurements of the degree of the estimated Kuznets curve. The first such measurement is the p-value of the estimated parameters of the squared GRP per capita of the provinces, because smaller p-values indicate a clearer curve. If it is significantly small, we can reject the null hypothesis that assumes that there is no curve.

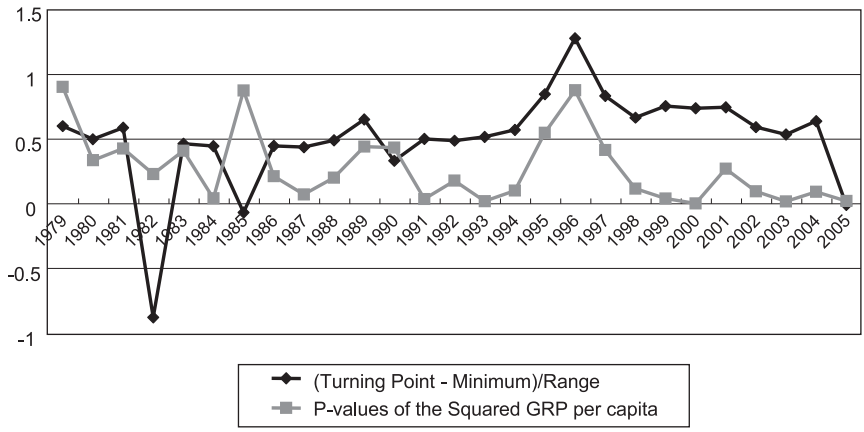

Figure 9 Shift of the 'Turning Point'.

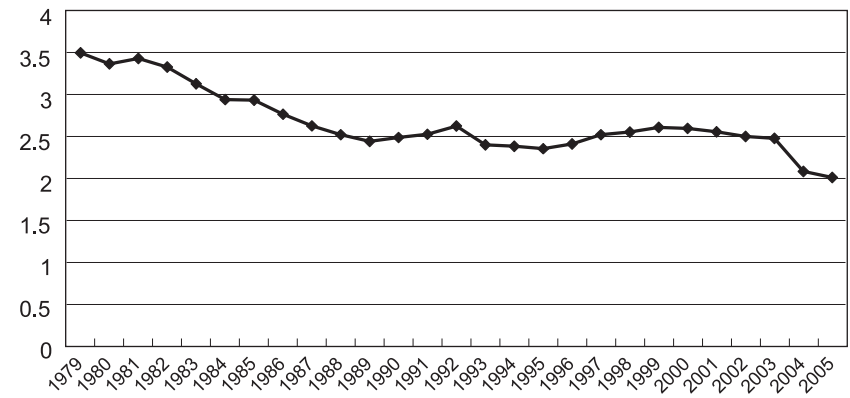

Figure 10 Correcting the skewed distribution of GRP per capita.

The second measurement indicates where the turning point between the divergence and convergence stages is located. It can be measured by using a fraction of the range between the turning point and the province with the lowest GRP per capita, divided by the range between the highest and the lowest. If this is smaller and near to zero, there is a wide phase of convergence. These two sequences are shown in Figure 9.

The third measurement shown in Figure 10 is the skewness of distribution, and its decreasing trend also indicates that the density of the low income provinces is decreasing and that the number of relatively higher income provinces is increasing.

Therefore, all these sequences show that the Kuznets curve for these years is becoming increasingly clearer. In summary, our original question about whether

provincial income disparity is in divergence or in convergence changes into another question about the ratio of provinces that are in the convergence process. The latter question alone can reveal the reality of regional disparity in each year, and the only abovementioned method can identify the present stage of the Chinese regional disparity.

References

Barro, R. J. and X. Sala-i-Martin (1992) "Convergence", *Journal of Political Economy* 10(2): 00–00.

Barro, R. J. and X. Sala-i-Martin (1995) *Economic growth*. McGraw-Hill. New York.

Cai, F., D. Wang and Y. Du (2002) "Regional disparity and economic growth in China: the impact of labor market distortions", *China Economic Review* 13: 197–212.

Chen, J. and B. M. Fleisher (1996) "Regional income inequality and economic growth in China", *Journal of Comparative Economics* 22(2): 141–164.

Dai, E. B. (1997), "The regional income inequality in China, 1952–1992", *The Research and Study* 12: 27–42 (in Japanese).

Jian, T., J. D. Sachs and A. M. Warner (1996) "Trends in regional inequality in China", *China Economic Review* 7(1): 1–21.

Kawabata, K. and J. Meng (2000) "Convergence of regional economies in China: statistical tests by cross-section and time-series", *Ajia Keizai* 16(6): 20–33 (in Japanese).

Mao, S. (2003) "Trend of regional disparity and regional policies", in H. Ohnishi and G. Yano (eds.) *Quantitative analysis of China's economy*. Sekaishisousha. Kyoto. (in Japanese).

McErlean, S. and Z. Wu (2003) "Regional agricultural labour productivity convergence in China", *Fool Policy* 28: 237–252.

Ohnishi, H. (2005) *What does China think about now?* Ohtsuki Shoten (in Japanese).

Pedroni, P. and J. Y. Yao (2006) "Regional income divergence in China", *Journal of Asian Economics* 17: 294–315.

Raiser, M. (1998) "Subsidising inequality: economic reforms, fiscal transfers and convergence across Chinese provinces", *Journal of Development Studies* 34(3): 1–26.

Robinson, S. (1976) "A note on the U hypothesis relating income inequality and economic development", *American Economic Review* 66(3): 437–440.

Sakamoto, H. (2001) "Regional economic inequality and its convergence in China", *Osaka University Economic Journal* 51(1): 89–110. (in Japanese).

Sakamoto, H. (2005) "Present trend of provincial income disparity in China", *A Viewpoint to East Asia* June 2005: 10–17. (in Japanese).

Tsui, K. Y. (1991) "China's regional inequality, 1952–1985", *Journal of Comparative Economics* 15: 1–21.

Williamson, J. G. (1991) *Inequality, poverty and history*. Basil Blackwell. Oxford.

Yao, S. and Z. Zhang (2001) "On regional inequality and diverging clubs: a case study of contemporary China", *Journal of Comparative Economics* 29(3): 466–484.