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Abstract

Using the Atkinson inequality measure of income distribution, we analyze the impact of China as a single country and examine the effect of its domestic income inequality on total income inequality among East Asian countries. First, we find that China's domestic income inequality exacerbated income inequality among East Asian countries from the 1980s, and this effect became even more pronounced from 1990. Second, the growth of China's per capita GDP had an equalizing effect on income distribution in a framework of ASEAN + China, but this effect was reversed around 1997. However, relative to higher income countries such as Japan and South Korea, China's per capita GDP remains low, and although China has contributed to income inequality in the area, it has recently had a more equalizing effect.

Keywords: *East Asia, China, income inequality, free trade agreement, harmonious society*
JEL classification: O15, D31, F43

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1. Introduction

At the National People's Congress of 2007, Chinese Premier Wen Jiabao emphasized the construction of a 'balanced society', signaling that China had abandoned its 'Get Rich First' policy, in the words of Deng Xiaoping in 1978. This policy change was made to deal with dissatisfaction about domestic policy; that is, the policy of 'Get Rich First', which made economic growth its highest priority, caused domestic income inequality. There are many empirical studies of recent trends in China's domestic income inequality. For example, Tsui (1993), Chen and Fleisher (1996), Akita (2003) and Kanbur and Zhang (2005) conducted a decomposition analysis of income inequality. Yao and Zhang (2001), Zhang, Liu and Yao (2001) and Maasoumi and Wang (2008) investigated regional income convergence. Liu (2006), Wan (2004) and Zhang and Wan (2006) measured China's inequality in rural areas. Wang, Shi and Zheng (2002) measured urban inequality. Dong (2005), Gustafsson and Shi (2002) and Sicular, Ximing, Gustafsson and Shi (2007) investigated differences in economic growth rates in urban and rural areas. In addition, Kanbur and Zhang (1999) examined differences between inland and coastal areas. Further, Meng, Gregory and Wang (2005) and Meng, Gregory and Wan (2007) studied poverty problems brought about by increased inequality. In attempting to determine the causes of rising inequality, Fujita and Hu (2001) and Wan, Lu and Chen (2006, 2007) analyzed the relationship between globalization and economic growth, and Ma (2006) studied the role of foreign direct investment. It is difficult to survey all the early work on China's income inequality because there are so many empirical studies. However, most studies focus only on the trend and growth rate of inequality; we cannot find studies of its international effect or of its effect on China's neighbors.

In terms of population and size, China's provinces (including five big cities) are similar in scale to individual ASEAN countries. In this paper, we regard Chinese provinces as one country, and compare China with ASEAN countries. For example, the per capita GDP of Shanghai is higher than that of Malaysia, which has the second highest per capita GDP among the ASEAN countries and a larger population. The per capita GDP levels of the Chinese cities of Tianjin and Beijing exceed that of Thailand, which has the ASEAN region's third highest per capita GDP. China's per capita GDP exceeds Indonesia's and, while falling short of the levels of Singapore, Malaysia and Thailand, exceeds

the ASEAN average. Hence, were there to be an economic union or a free trade agreement (FTA) between China and ASEAN, China would be expected to be the leader because of its economies of scale and presence in terms of both population and income. Regarding income inequality, although inequality among Chinese provinces has exhibited a recent upward trend, it remains low by ASEAN standards. In other words, in forming an economic union or FTA in this area, ASEAN countries would face a greater income inequality challenge than would Chinese provinces. The existing studies of income inequality in the ASEAN region by Mizoguchi and Yoshida (1998) and Datt and Walker (2004), who analyzed inequality in 1985 and 1997, respectively, are somewhat dated. The problem of inequality became more apparent in 2004, which is the final year covered by our study.

In this paper, using the Atkinson inequality measure of income distribution, we investigate the impact of China's inequality in two ways. First, we investigate the impact of China's domestic inequality when calculating inequality measures with and without considering Chinese provinces as a country. Second, we measure the impact of China as one country when comparing income inequality among East Asian countries including and excluding China.

A summary of the results follows. Since 1980, the inequality of China's domestic income distribution has exacerbated income inequality in East Asia, and this effect has been even more pronounced since 1990. On the other hand, this result depends on how income inequality is measured: within a framework of ASEAN + China, the growth of China's per capita GDP has had an equalizing effect on income distribution in the area. However, this effect has weakened since 1997. These outcomes were a consequence of the economic stagnation of some ASEAN countries following the East Asian financial crisis and the rapid growth of China's economy. When higher per capita GDP countries such as Japan and South Korea are included, per capita GDP in China is relatively low, and although China has contributed to income inequality in the area, it has recently had a more equalizing effect.

This paper is organized as follows. In Section 2, we explain the inequality measure used in this study and propose indices to measure the effects of China as one country and its domestic inequality. In Section 3, we define specific geographical areas for considering regional economic inequality and investigate recent trends in per capita GDP and income inequality. In Section 4, we investigate the

impact of China's economic growth and its domestic income inequality on East Asian countries, using

the indices developed in Section 2. In Section 5, we summarize our results and discuss remaining issues.

2. The Inequality Measure and its Application

In this paper, we measure inequality in the income distribution by using the measure proposed

by Atkinson (1970). To analyze inequality, this measure uses a social welfare function that is based on

the evaluation of individual utility, which is defined as follows:

$$u(x) = a + b \frac{x^{1-\varepsilon}}{1-\varepsilon} \text{ for } \varepsilon \neq 1, \text{ and } \varepsilon = 0,$$

$$u(x) = \ln x \text{ for } \varepsilon = 1.$$

Then, the Atkinson measure is defined as:

$$A = 1 - \left[\frac{1}{n} \sum_{i=1}^{n} \left(\frac{x_i}{\mu} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}, \text{ for } \varepsilon \neq 1, \text{ and } \varepsilon = 0,$$

$$A = 1 - \exp\left(\frac{1}{n} \sum_{i=1}^{n} \log\left(\frac{x_i}{\mu} \right) \right), \text{ for } \varepsilon = 1,$$

where n is the total number of individuals, x_i is the income of the i-th individual, and μ is average

income. The parameter ε represents the degree of inequality aversion. Treating the social welfare

function in such a way is an advantage of the Atkinson measure.

We propose two methods for capturing the impact of China as one country and the impact of

its domestic income inequality using the Atkinson inequality measure. First, to measure the impact of

China as one country on income inequality in East Asia, we propose using two versions of the Atkinson

measure: one including and one excluding China. Second, to measure the contribution of China's domestic income inequality, we propose two versions of the Atkinson inequality measure: one based on considering China as one country and one based on considering Chinese provinces as individual countries.

To measure income inequality among East Asian countries including China, with a population weight for each country (w_i, $i = 1,2,...,M$), the Atkinson measure is calculated as:

$$A = 1 - \left[\frac{1}{N} \sum_{i=1}^{M} w_i \left(\frac{x_i}{\mu} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}, \text{ for } \varepsilon \neq 1, \text{ and } \varepsilon = 0,$$

$$A = 1 - \exp\left(\frac{1}{N} \sum_{i=1}^{M} w_i \log\left(\frac{x_i}{\mu} \right) \right), \text{ for } \varepsilon = 1,$$

in which N is the total population of the area under study. Defining A^C as the Atkinson measure that excludes China from the area under study, we propose the following index for measuring the impact of China as one country:

$$DC = A - A^C.$$

To clarify the use of this index, consider the following simple numerical example. Suppose there is an economy comprising five people ($j = 1,2,...,5$), whose incomes are 10, 20, 30, 40 and 50. Table 1 compares the Atkinson measure for all five people with that when one is excluded. Table 1 shows that when the maximum and minimum incomes are excluded, the Atkinson measure is low, but when average incomes are excluded, the Atkinson measure goes up. Hence, this index measures the contributory effect on income inequality of a specific country. For our analysis, when China is

classified as a low income country in the area, DC is positive, and changes from positive to negative according to China's economic growth. Further, DC is minimized when China's income is the average for the area, and its value can only increase from that point. One would expect DC to become positive if China's income grows sufficiently. It is clear from Table 1 that positive and negative changes in DC are asymmetric; that is, DC falls rapidly but rises slowly. The changes are not symmetric around the average.

To measure the contribution of China's domestic income inequality in the area under study, we calculate the Atkinson measure considering China as one country (A), and considering the Chinese provinces as countries (A^D). The difference between these two measures represents an index of the contribution of China's domestic inequality, as follows:

$$DD = A - A^D.$$

Clearly, DD is zero if all the average incomes of the Chinese provinces are equal; otherwise, this index takes a negative value. This index measures the decreasing effect of the domestic inequality of a specific country on overall income inequality. Using the Atkinson measure, Das and Parikh (1982) and Lasso de la Vega and Urrutia (2003) developed a decomposition method. However, instead of using a decomposition method, because we focus on the contribution of China's domestic income inequality, we construct an index from the difference in Atkinson measures. Thus, we investigate the impact of China as one country and the impact of its domestic income inequality by using the DC and DD indices described above.

3. China's Regional Income Inequality versus ASEAN's Income Inequality

To analyze the inequality of China's income distribution from the viewpoint of East Asia, we consider the following specific groups of East Asian countries: the ASEAN countries; ASEAN + China; ASEAN + 3 (namely China, Japan and South Korea); and all East Asian countries. The first three

groups relate to countries bound by FTAs or involved in negotiations. Table 2 shows the member

countries. Before calculating the DC and DD indices, we investigate the relative position of China's

economy and trends in per capita GDP and levels of inequality within the country groups. The data used

are population and GDP figures denominated in US dollars from 1980 to 2004. We obtained Chinese

data from the China Compendium of Statistics 1949–2004, compiled by the Department of

Comprehensive Statistics of the National Bureau of Statistics (2005). China's GDP figures are

converted from Chinese yuan into US dollars by using annual exchange rates from the World Economic

Outlook Database of the International Monetary Fund (IMF). All other data are from the World

Economic Outlook Database of the IMF. In this paper, the (eight) ASEAN countries are Indonesia,

Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam; because the World

Economic Outlook Database of the IMF lacks the necessary data, we omit Brunei Darussalam and

Cambodia.

In 2004, because China's share of East Asia's total population was 62.9% and ASEAN's

(including Brunei Darussalam and Cambodia) was 27.1%, China and the ASEAN 10 accounted for 90%

of East Asia's population in that year. The percentages of East Asia's population accounted for by other

countries were: Japan, 6.3%; South Korea, 2.4%; Taiwan, 1.1%; and Hong Kong, 0.3%. Figures 1 and 2

compare levels of per capita GDP and economic growth rates for groups of countries with those of

China. To smooth out annual fluctuations, we used three-year moving averages for economic growth

rates. These figures confirm that China's recent economic growth rate exceeded the average growth rate

of the ASEAN countries, and China's level of GDP has almost reached that of ASEAN. Figure 3, which

shows each country's share of regional GDP, indicates that Japan accounted for more than 50% of East

Asia's GDP in 2004. However, the combined share of China and ASEAN is about 30%. Moreover,

Figure 3, which also shows GDP shares for 1980, 1990, 2000 and 2004, indicates that East Asia's GDP

for 2004 was almost five times its 1980 level.

In Figure 4, we compare the GDP per capita levels of the ASEAN countries with those of the

top five Chinese provinces (in terms of GDP per head), which are Shanghai, Tianjin, Beijing, Zhejiang

and Jiangsu. In 1980, the per capita GDP levels of these top five Chinese provinces were similar to

those of the ASEAN countries. In 2004, Shanghai's per capita GDP grew more rapidly than did that of

Malaysia, and China's fifth largest city, Jiangsu, matched Thailand's per capita GDP. These high

growth rates in coastal China probably result from China's 'Get Rich First' policy.

4. China and Income Inequality in East Asia

In Figure 5, we compare the Atkinson income inequality measures, with $\varepsilon = 1$, for ASEAN +

China, ASEAN + 3, the Chinese provinces and the ASEAN 8. Figure 5 shows that the Atkinson

measure for China has risen recently, but remains low, which means that China's inequality is relatively

low among ASEAN countries. For example, whereas China's Atkinson measure, with $\varepsilon = 1$, is 0.11 for

2004, the corresponding figure for ASEAN is 0.30. This result is consistent with the findings of

Milanovic and Yitzhaki (2002), who "find that Asia is the most heterogeneous continent;

between-country inequality is much more important than inequality in incomes within countries."

Figures 6 and 7 illustrate the DC and DD indices corresponding to the Atkinson measures with

$\varepsilon = 0.5$ and $\varepsilon = 2$, respectively. In both figures, the DD lines for ASEAN + 3 and East Asia are so similar

that it is difficult to distinguish between them.

The DC index with $\varepsilon = 0.5$ within a framework of ASEAN + China implies reduced inequality

after 1988 and then a resurgence from the trough reached in 1998. This result means that, within an

ASEAN + China framework, around 1998 China's impact changed from reducing inequality to

increasing it. Moreover, China's entry into the higher income group of ASEAN countries around 1998

because of its rapid economic growth transformed China's effect on inequality. Further, in a framework

of ASEAN + 3 or an East Asian framework, China only began reducing income inequality around 2001.

This means that China's economic growth is expected to reduce income inequality within the ASEAN +

3 and East Asia. On the other hand, the DD index shows that the effect of domestic income inequality in

China increases income inequality in ASEAN + China, ASEAN + 3 and East Asia. However, the

contributions implied by DD are small relative to those implied by DC. In a framework of ASEAN +

China, DD indicates that China's domestic income inequality increased overall income inequality, but

that after 1988 (and with $\varepsilon = 0.5$), this effect was dwarfed by China's contribution to reducing its own income inequality, as shown by the DC index. In ASEAN + 3, with $\varepsilon = 0.5$, this phenomenon occurred after 2002.

With $\varepsilon = 2.0$, because the DC and DD indices have relatively high weights on higher income classes, DC exhibits its income-inequality-reducing effect continuously from 1980 for ASEAN + China, ASEAN + 3 and East Asia. This effect also became more pronounced around 1998 for ASEAN + China, with $\varepsilon = 0.5$. Further, a comparison of the DC and DD effects for ASEAN + China reveals that, from 1989, China's favorable impact (reducing inequality through DC) exceeded its contribution to increased inequality (from domestic sources through DD).

For an overall summary of the results, in a framework of ASEAN + China, the income-inequality-reducing effects of China's economic growth (DC) weakened after about ten years; that is, from 1988, when the effects of DC outstripped those of DD, to 1997, when the DC effects bottomed out. Hence, in another ten years, the effects of DC are expected to be outstripped by the effects of DD, some years after which the DC effects will become positive. This means that China will increase income inequality through its rapid growth. In other words, China will become a high income country in the region at the end of the 2000s (China changed policy around 2007). In an ASEAN + China framework, China's economic growth will have less of an impact in reducing income inequality than China's domestic inequality will have in increasing income inequality. By contrast, the DD contribution to income inequality is smaller in ASEAN + 3 and East Asia overall than in ASEAN + China. The DC impact suggests that China's economic growth will reduce income inequality in the future. In other words, our results suggest that China's economic growth is required for the convergence of incomes in East Asia.

5. Conclusion

Studies of global income inequality include those of Berry, Bourguignon and Morrison (1983), Milanovic and Yitzhaki (2002) and Dowrick and Akmal (2005). However, there are no studies that

focus on a specific country and analyze the impact of that country's economic growth and its domestic income inequality on the income inequality of the region to which it belongs. By developing the indices for measuring the impact of China as one country (DC) and for measuring the contribution of China's domestic inequality (DD), our paper represents the first attempt to evaluate these effects quantitatively.

According to the results of our analysis, first, China's domestic income inequality increased income inequality among East Asian countries, particularly from about 1990. China's per capita GDP lowered income inequality in the ASEAN nations (including China), until about 1997, after which the effect weakened. In comparison with high income countries such as Japan and South Korea, China's per capita GDP remains low, and China's own income inequality contributed to that of the region until recently. However, when the degree of risk aversion is relatively low (with $\varepsilon = 0.5$), China's recent economic growth has reduced income inequality in East Asia, thus overturning the effect.

On the effects of China's economic growth and domestic income inequality within the ASEAN region (including China), China has already entered the groups of higher income countries, and its GDP level has risen to soften the effect of increased domestic income inequality, despite China's successful pursuit of external economic growth. Thus, from the ASEAN + China point of view, China's policy change made to reconcile economic growth and domestic income inequality is appropriate. However, China's per capita GDP is not sufficiently high to justify the economic integration of the ASEAN + 3 group of countries, and China needs to raise its per capita GDP for the convergence of per capita incomes in East Asia. If China considers the economic benefits of free trade agreements or economic integration to be important for the formation of foreign policy, our results imply that China should prioritize free trade agreements within ASEAN + China over agreements within the ASEAN + 3 group.

Finally, we discuss a limitation of our analysis. Although empirical research suggests income inequality between urban and rural areas in China, we have ignored this aspect to focus on the effects of Chinese provinces in comparison to East Asian countries. It is appropriate to compare income

inequality in Chinese provinces with domestic income inequality among ASEAN countries. We should try to analyze this problem in the future when suitable data are available.

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Table 1. Numerical Examples for Atkinson Measures

	Atkinson Measure (Total)	Deleted Number of Persons	Atkinson Measure (Subtotal)	DC
ε = 0.5		1	0.02681	0.03635
		2	0.06626	−0.00310
	0.06315	3	0.07862	−0.01547
		4	0.07422	−0.01107
		5	0.05559	0.00757
ε = 1.0		1	0.05436	0.07725
		2	0.14364	−0.01203
	0.13161	3	0.16171	−0.03010
		4	0.14896	−0.01735
		5	0.11465	0.01696
ε = 2.0		1	0.10946	0.16061
		2	0.30985	−0.03978
	0.27007	3	0.31624	−0.04617
		4	0.28465	−0.01458
		5	0.23200	0.03807

Note: Incomes are {10, 20, 30, 40 and 50}.

Table 2. Country Groups

	Targeted FTA Area	Countries	Number of Countries
1	ASEAN + China	ASEAN (Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam), China	9
2	ASEAN + 3	ASEAN, China, Japan, and South Korea	11
3	East Asia	ASEAN, China, Japan, South Korea, Hong Kong and Taiwan	13
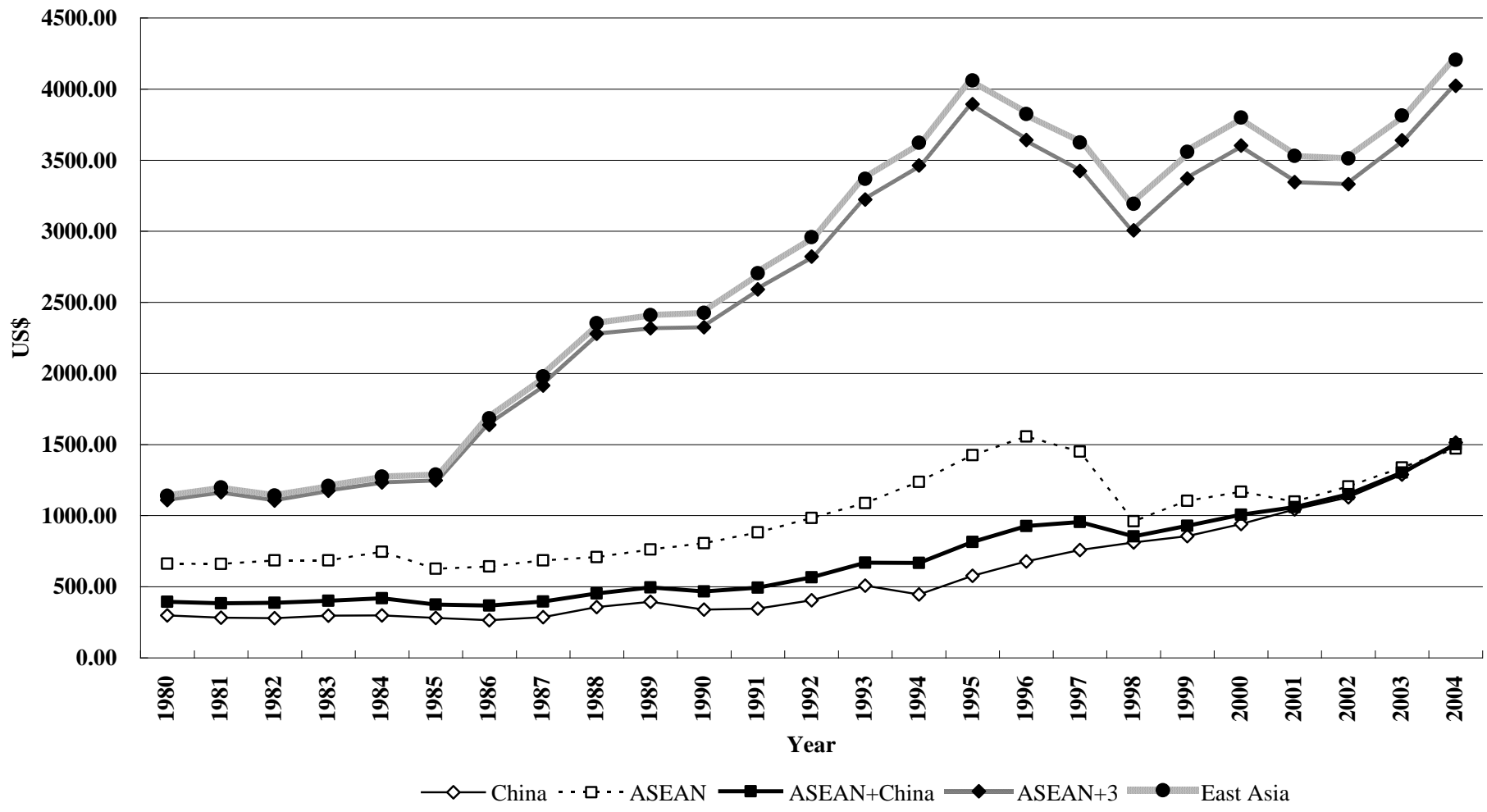
Figure 1 Trends in Per Capita GDP
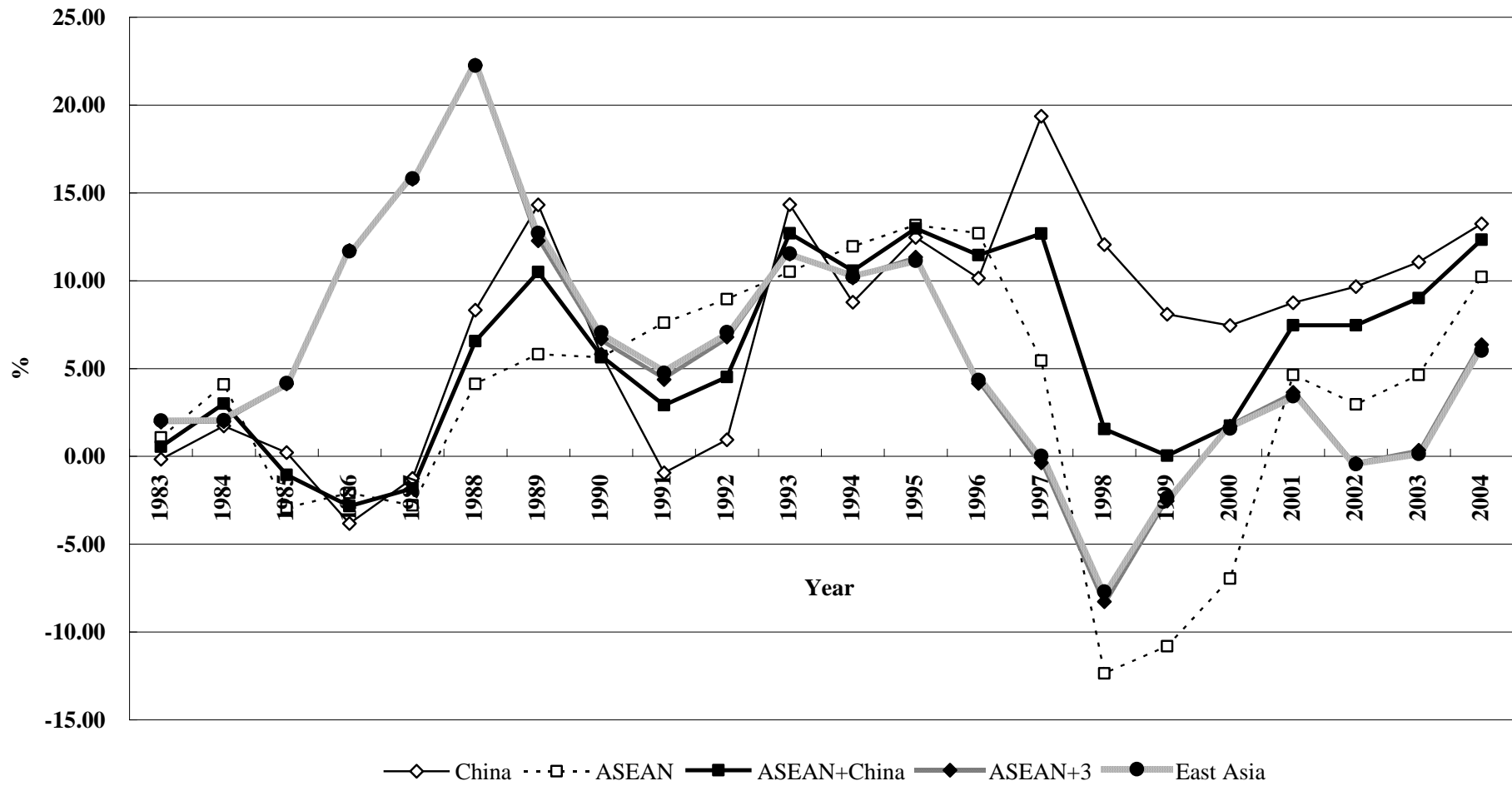
Figure 2　Economic Growth Rates（Tree-year averages）
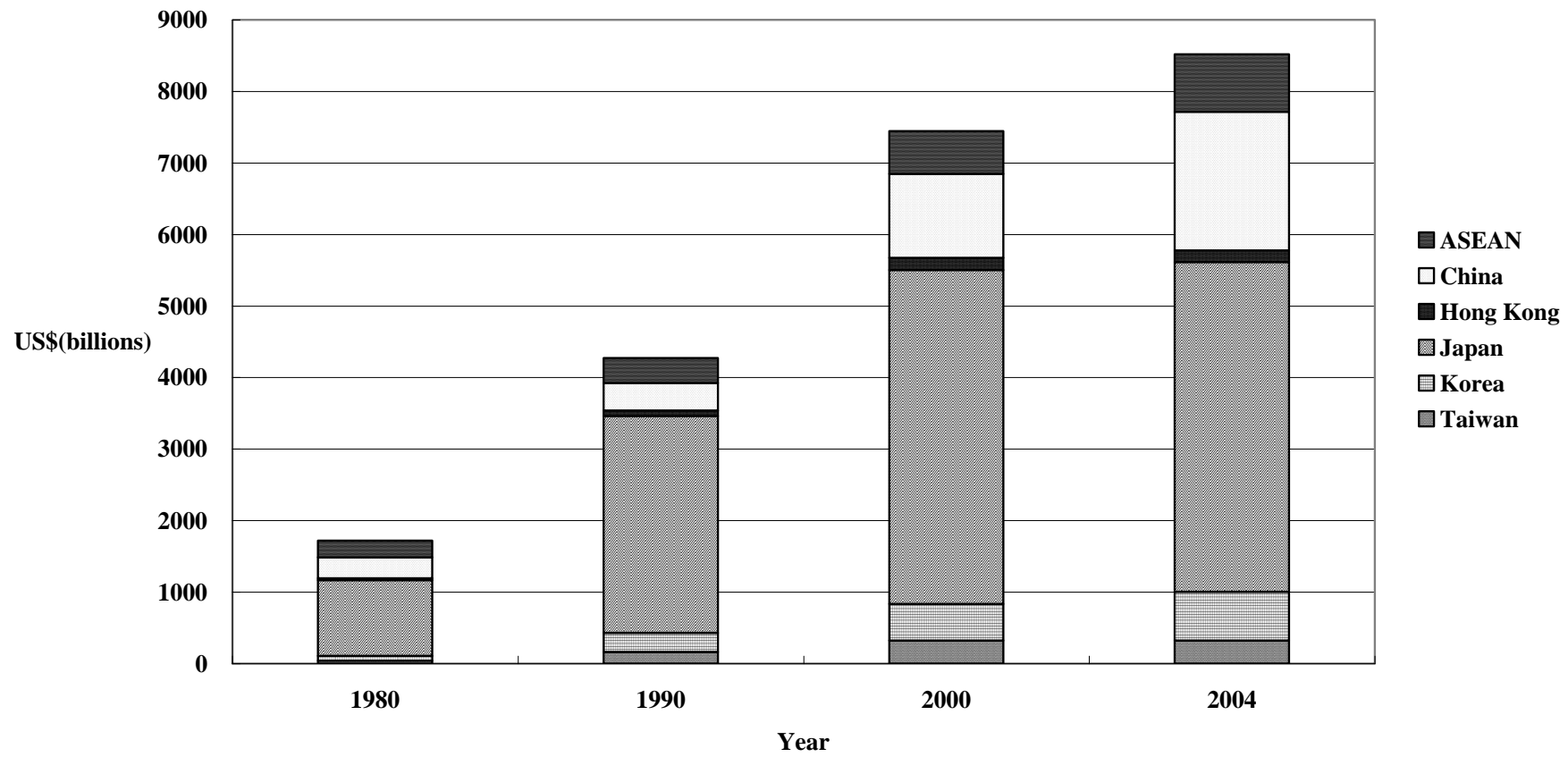
Figure 3 GDP for ASEAN, China, Hong Kong, Japan, Korea and Taiwan
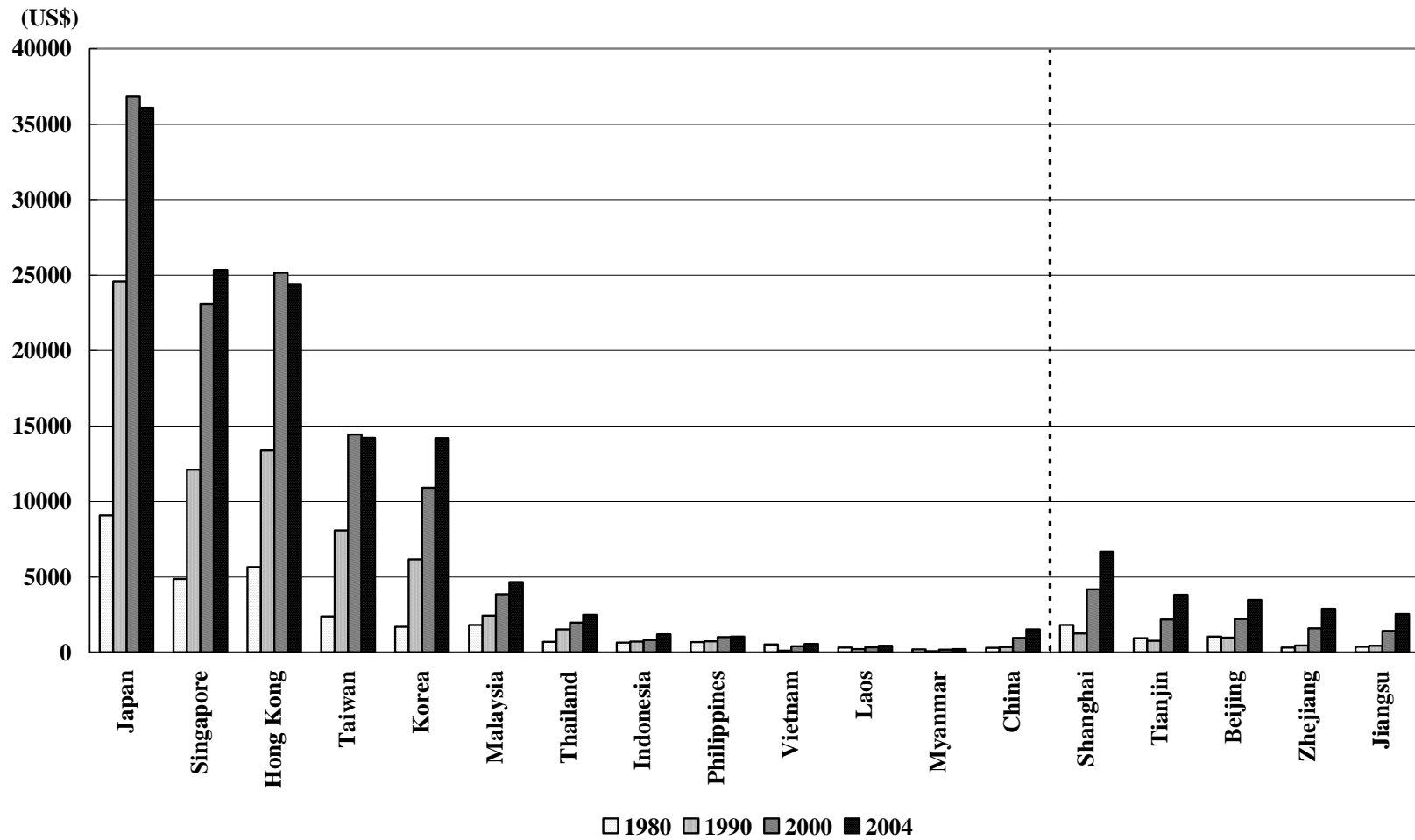
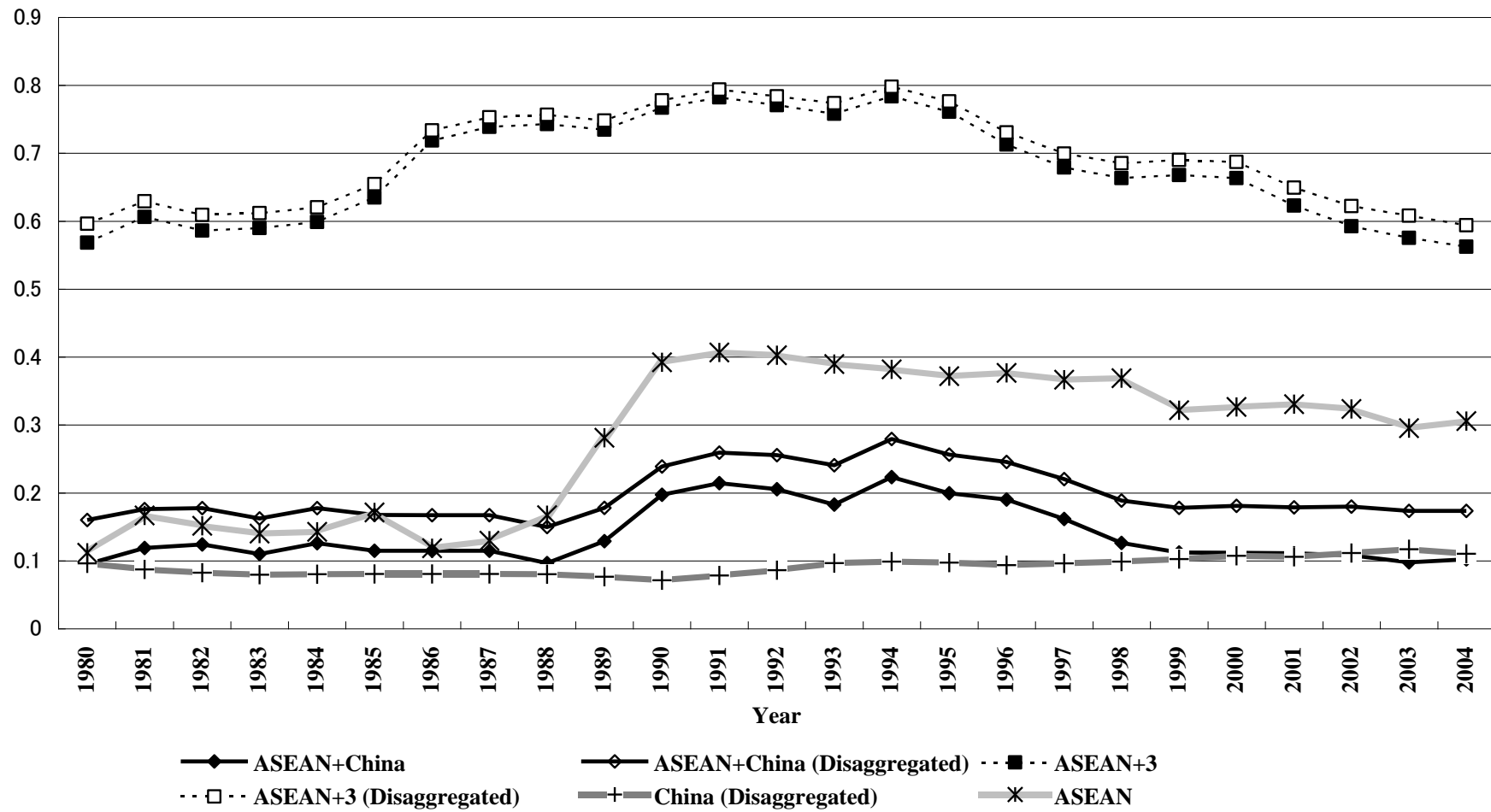**Figure 4　Per Capita GDP for ASEAN, China, Hong Kong, Japan, Korea and Taiwan**

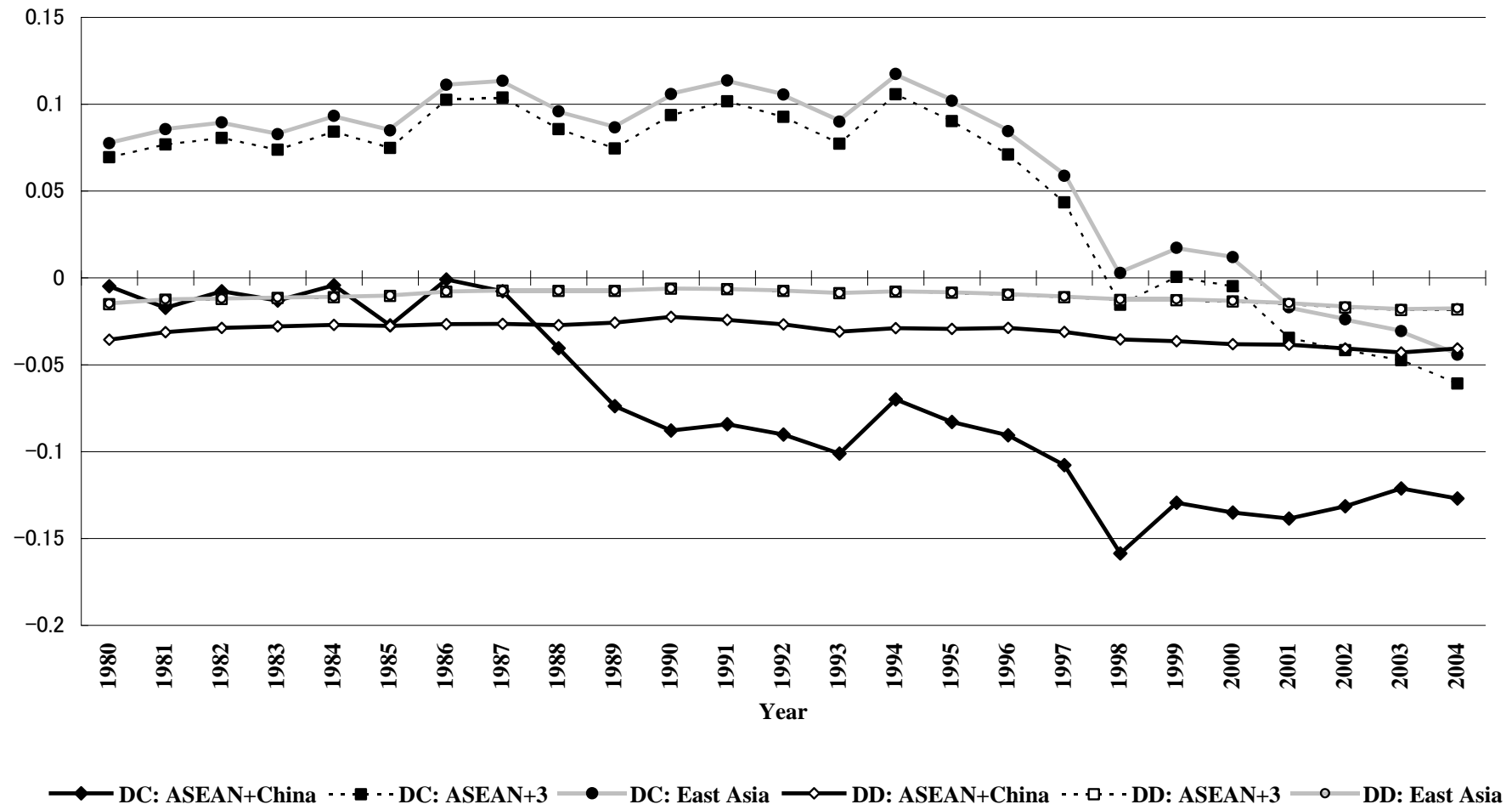**Figure 5 Inequality in East Asia based on Atkinson Measure, with ε=1**
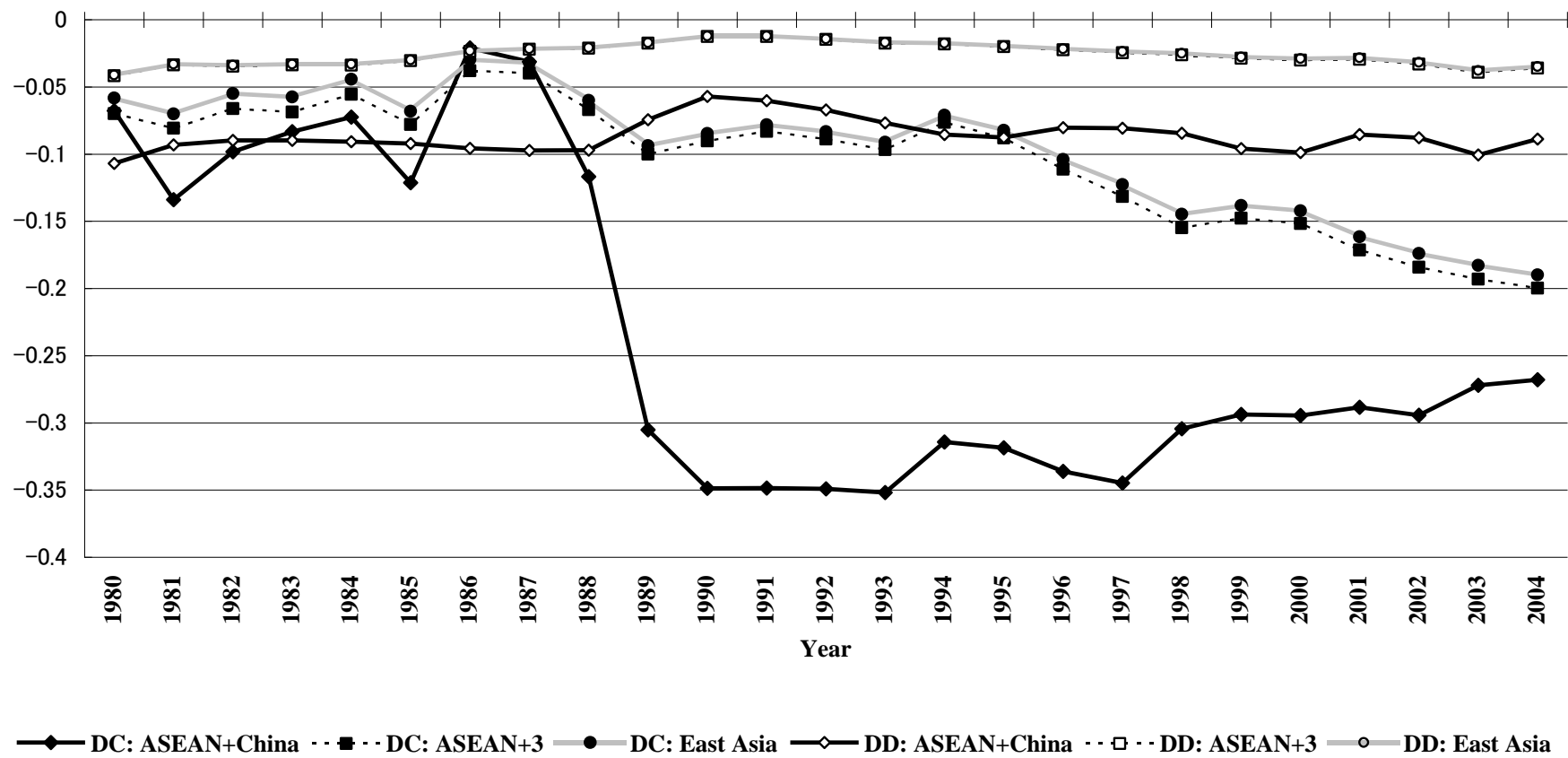
Figure 6 Diffrences in Atkinson Measure, DC and DD, with ε=0.5

Figure 7   Diffrences in Atkinson Measure, DC and DD, with ε=2.0