

Asian Economic Development in World Income Distribution: 1820–1996

KOKUBUN Keisuke
IKEMOTO Yukio
HAMASHIMA Atsuhiko

I. Introduction

The development of research concerning world income distribution depends on the availability of data. When new data on world income data appeared, it often promotes such studies. The first data on world income came from Jain [1975]. Subsequently some studies were conducted based on this data, including in Whalley [1979], Braulke [1983], and Grosh and Nafziger [1986]. Following Jain's data, Summers, Kravis and Heston [1978 and 1988] and the World Table [1980] became available. In the early 1980s these data encouraged more studies on world income distribution. For example Berry et. al. [1983a] and Berry et. al. [1983b], and Ram [1989] used the data of Summers, Kravis and Heston [1984], and Sprout and Weaver [1992] used the data of Summers, Kravis and Heston [1988].

An important contribution to study in this field was the development of data in terms of purchasing power parity (PPP) by Kravis et. al., by which real income can be compared between countries. The above-mentioned studies as well as this study are based on PPP.

The aim of this paper is to analyze the impact of Asian economic development on the historical changes in world income distribution from the years 1820 to 1996. According to Maddison [1995], at the

beginning of the 19th century, the share of Asian countries in the world GDP was not small. It was when Western economies entered into the period of modern economic growth that the Asian share began to decrease. At the same time, world income distribution was becoming more unequal. The increasing inequality in world income distribution was brought about by the economic growth in Western countries. This trend changed when the Asian economies began to take off after the 1960s in the "Flying Geese pattern". It was first the Japanese economy that began growing, and other Asian economies followed over a long period. First, the four East Asian "tiger" economies (Singapore, Hong Kong, Taiwan, South Korea) emerged, and then the ASEAN 4 (Malaysia, Thailand, the Philippines, Indonesia). At the present time, China is growing rapidly and other Asian countries are trying to follow similar growth. This Flying Geese pattern has raised the income level of Asian countries as a whole and narrowed the income gap between Western countries and Asian countries. As a result, world income distribution is becoming more equal than before. However, the Flying Geese pattern has also resulted in making the income distribution among the Asia countries more unequal.

It should be noted that Japan is included in Asia in this paper, though it is usually included as a Western and/or developed country. This is because our purpose is to examine the impact of Asian countries in world income distribution.

Changes in world income distribution can be explained by the simple Kuznets' model. Kuznets suggested in his 1955 paper that income inequality increases at the early/stages of economic development and then decreases at the later stages. These changes take on the appearance of an inverted U shape on a graph, where the horizontal axis indicates the level of economic development and the vertical axis indicates the level of income inequality. This is well known as the

“Kuznets’ Inverted U-shaped hypothesis”⁽¹⁾. However while Kuznets’ hypothesis referred to changes in income distribution within a country, this paper intends to apply it to understand changes in world income distribution.

Ram [1898] has already suggested that world income distribution may have reached the turning point of the Kuznets’ hypothesis in the mid-1970s. However, a problem of Ram’s paper is that it is based on data for a very short period, from 1960 to 1980. Our paper extends the time horizon to the early 19th century, and analyzes the causes of the change by the decomposition of the inequality index.

Kuznets gave an explanation of his hypothesis based on a sectoral growth model in which the shift from an agrarian economy to an industrial economy brought about the inverted U shape pattern⁽²⁾. In more general terms, a shift from a low-productivity industry to a high-productivity one will cause the inverted U shape pattern.

In reality, changes in income distribution occur by various causes and it is very rare for the inverted U shape to appear very clearly⁽³⁾. Many empirical studies have been conducted to examine Kuznets’ hypothesis and many of them did not support it.

This is applicable to case of world income distribution where the Kuznets’ pattern appears only in an ideal condition such as a large number of countries growing in a Flying Geese pattern. This will be illustrated in this paper.

Whalley [1979], Berry [1983a], and Sprout & Weaver [1992] showed that the income inequality within countries does not account for a large part of world income inequality. World income inequality can be divided into two parts: One is the inequality *among* countries and the other is the inequality *within* countries. The latter accounts for only a small proportion of world income inequality. Therefore, this paper neglects the income inequality within countries and this will not affect our conclusion.

The organization of this paper is as follows: In Section II, a theoretical explanation is given for the changes in world income distribution in the shape of a Kuznets curve. In Section III, data source and the methodology to adjust the data are explained. In Section IV, the methodology of the analysis on the changes in world income distribution is explained. Section V shows the results. The final section, section VI, is the conclusion.

II. Kuznets' Hypothesis and Flying Geese Pattern

In order to give some ideas for the causes of the changing world income distribution, the relationship between the Kuznets' hypothesis and Flying Geese pattern is discussed in this section. Kuznets' hypothesis insists that income inequality in a country increases at the early stage of economic development but that when it reaches some level, then income inequality begins to decrease⁽⁴⁾. If this relationship is drawn on a graph in which the horizontal axis indicates the level of economic development and the vertical axis indicates income inequality, it looks like an inverted U shape. Therefore, the Kuznets' hypothesis is called the "Kuznets' inverted U-shaped hypothesis". Kuznets himself mentioned some factors that cause the inverted U-shape in his paper. One of the factors is a shift from an agricultural economy to an industrial economy that occurs during the process of economic development. In more general terms, when the share of a high productivity sector is increasing (and the share of a low productivity sector is decreasing), the income inequality will change in the inverted U shape manner. It is not difficult to explain this pattern with the assumption that there are only the two sectors, high income and low income and that the income inequality within each sector remains unchanged. In extreme cases where there is only one sector, an agricultural sector at the beginning of the transition or industrial sector

at the end of the transition, the income gap between the sectors does not matter because there is only one. When both sectors have significant shares, the income gap between sectors matters, and the overall income inequality is larger than the extreme cases⁽⁵⁾.

This argument can be applied to world income distribution. In this case, the shift in the industrial structure may be replaced by the Flying Geese pattern. The Flying geese pattern is advocated by Akamatsu [1962] to explain a pattern of economic growth for a group of countries. The pattern is that a leading country grows first, followed by a second, which followed by a third, and so on, looks like flying geese. Therefore it is called "Flying Geese pattern". In the case of Asia, for example, it is considered that Japan is the lead goose, followed by four Asian tigers, then the ASEAN countries, then China and so on. In the case of world income distribution, the first goose would be the United Kingdom, and France, Germany, the USA, with Japan Following. In this model, East Asian countries follow after a long interval.

It is not difficult to show theoretically how the Kuznets' inverted U shape is based on the Flying Geese pattern. Our hypothesis is as follows: The world is composed of 10 countries, all of which are agrarian economies and have only agricultural sectors. The populations of these countries are the same and unchanged throughout the development process. The economic growth in this model is achieved by the shift from an agrarian economy to an industrial economy whose income is 20 times as high as that in the former sector. Income levels for each sector are the same for all countries. The economic growth rate is determined by the shift of population from agriculture to industrial sector, which is assumed to be 5 percent per annum. When the first country of the ten starts economic development, the others remain unchanged. The second country follows after an interval, then the third follows after the same interval, and so on.

Based on this hypothesis, it is shown that world income distribution

Figure 1. Economic Growth for Each Country

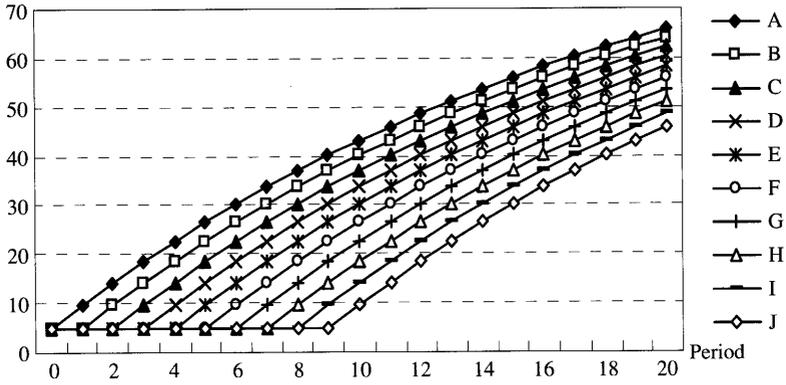
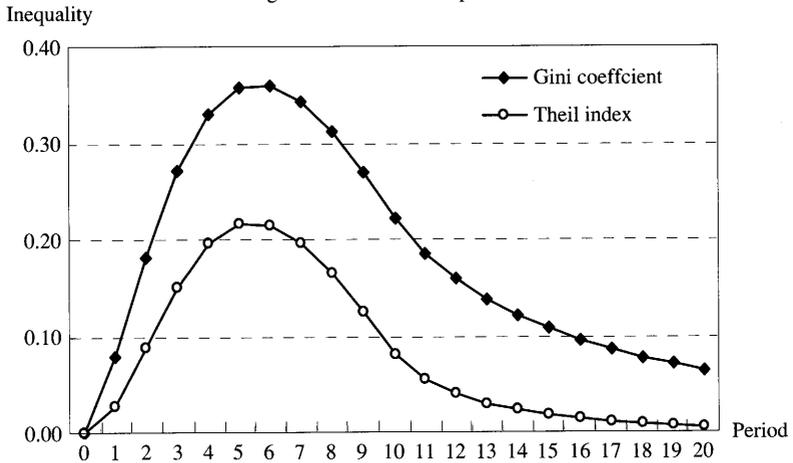


Figure 2. Inverted U-shape Pattern



is changing according to the Kuznets' hypothesis (see Figure 1 and 2).

Figure 1 shows the changes in per capita GDP for each country and Figure 2 shows the Gini coefficient and the Theil index of world income inequality. Figure 2 clearly shows that the Gini coefficient and the Theil index change like the inverted U-shape. World income inequality increases until the fifth period, reaches its peak in the sixth and then began to decrease. Needless to say, reality is not so simple as assumed here and such a case rarely appears. However, this exercise will help us to understand the causes of the changes in world income distribution.

Our hypothesis implies that economic growth will decelerate and stop at the end of the shift. This means that income inequality inevitably decreases when all the countries catch up to the leading country. In reality, not all countries can enter the catch-up process but remain unchanged on the one hand, and not all developed economies stop growing. By introducing new technologies, the developed countries can keep growing and world income distribution may not decrease.

Therefore it is important not to understand the Kuznets' hypothesis as a historical law that must occur only once in history. It is a special case that occurs when it accompanied by favorable conditions. In some cases it may not occur at all, and in other cases it may occur several times in history.

III. Data

III-1. Data Source

In order to estimate the inequality indexes such as the Gini coefficient and the Theil index, data on GDP and population for each country are needed. This paper is based on data from the following two sources:

- (1) Maddison [1995] *Monitoring the World Economy 1820-1992*
 - (i) Table A-3 "Population in 56 Sample Countries" (pp.104-116)

- (ii) Table C-16 "Levels of GDP" (pp.180-192) at 1990 prices
- (2) World Bank [1998]. *World Development Indicators 1998* (CD-ROM).
- (iii) World Table "Population, total"
- (iv) World Table "GDP at constant 1987 US\$"

The former covers a period of 170 years from 1820 to 1992, which is long enough to analyze the impacts of economic growth in Western and Asian countries on world income distribution. However, the World Bank data covers a short period of 30 years from 1965 to 1996, which is not suitable for our purpose by itself. Maddison's data are extended to 1996 by applying the real growth rate derived from World Bank data.

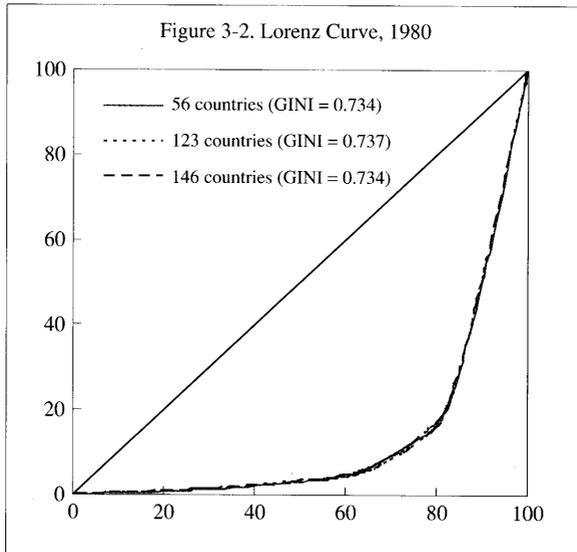
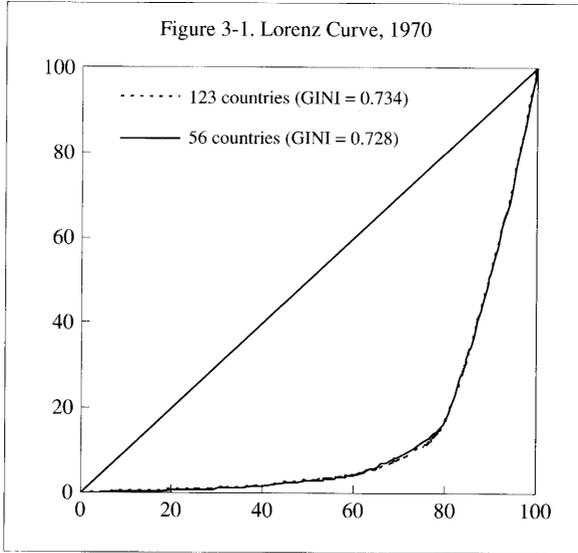
One problem of Maddison's data is that it includes only 56 countries while the World Bank data includes 123 countries (see Table 1). Since our purpose is to examine the change in world income distribution, it is desirable to cover as many countries as possible. In this sense, the World Bank data is more robust than Maddison's. A way to overcome this shortcoming is to expand the coverage of Maddison's data by some kind of estimation based on the World Bank data. However, this is not possible and we have to manage with a smaller sample size.

First we must check how accurately Maddison's data represent world income distribution. Figure 3 shows how the Lorenz curve changes as the sample size changes. This figure clearly shows the difference in the Lorenz curves to be negligible. The differences in the Gini coefficients are also negligible as shown in Table 2. Therefore, it may be safe to claim that Maddison's data can accurately represent world income distribution.

Table 1 Comparison between Maddison's and World Bank data

	Sample size	Year	Conversion rate	Base year
Maddison	Less than 56 countries	1820-1992	PPP	1990
World Bank	Less than 167 countries	1965-1996	Exchange rate	1987

Source: Authors.



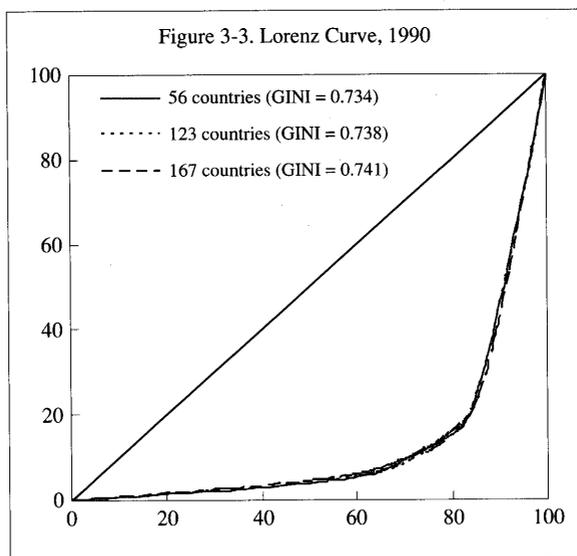


Table 2 The Gini Coefficient for Different Sample Size

No. of Countries	1970	1980	1990
56	0.728	0.734	0.734
123	0.734	0.737	0.738
146	—	0.734	—
167	—	—	0.741

Source: Estimated by the authors using World Bank Data.
 Note: Exchange rate is used.

All of the 56 sample countries used in this paper are listed in Table 3, and are classified by region. It should be noted that Japan is included in Asia, though it is usually classified as a Western/developed country. This classification is adopted because our purpose is to analyze the role of Asia in the changing world income distribution.

A serious problem of Maddison's data is that it is lacking as one goes back further in time. This is anticipated, however, because it

Table 3 Sample Countries

<u>Developed Countries (16)</u>
Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, USA
<u>South European Countries (5)</u>
Greece, Ireland, Portugal, Spain, Turkey
<u>East European Countries (7)</u>
Bulgaria, Czechoslovakia, Hungary, Poland, Romania, USSR, Yugoslavia
<u>South American Countries (7)</u>
Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela
<u>Asian Countries (11)</u>
Bangladesh, Burma, China, India, Indonesia, Japan, Pakistan, Philippines, South Korea, Taiwan, Thailand
<u>African Countries (10)</u>
Cote d' Ivoire, Egypt, Ethiopia, Ghana, Kenya, Morocco, Nigeria, South Africa, Tanzania, Zaire

Note: Japan is included in Asia.

becomes more and more difficult to estimate older data. Due to the lack of data, the inter-temporal comparison becomes more challenging and complicated. Precisely speaking, comparison should be made for the years when the sample countries are the same. However, this makes the comparison very complicated and the conclusion very ambiguous. If we can estimate the missing data through interpolations or extrapolations, such a complication can be avoided. This is what we have chosen to do in this paper. However, it may seem to be difficult to justify such an estimation because it will eliminate cyclical changes. In spite of the difficulty, it can still provide us with some important insights into the changes in world income distribution. It should be noted that our main purpose is to estimate the long-term trend of world income distribution, not the short-term fluctuation.

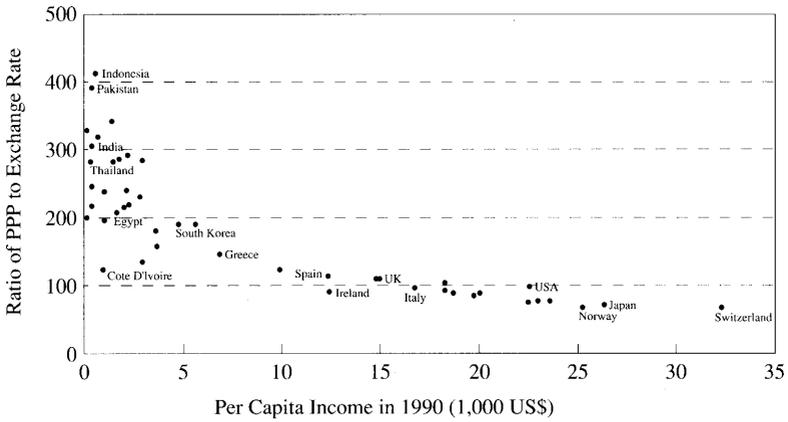
III-2. Purchasing Power Parity (PPP) and Exchange Rate

World income distribution is affected by the conversion rate with which local currencies are converted to a common unit. Usually the exchange rate is used to convert to US dollars as the World Bank data has done. However, the exchange rate does not exclude the effect of the differences in prices among different countries. On the other hand, to remove the effect of the differences in prices, the Purchasing Power Parity (PPP) is used as Maddison has done. Since we are interested in the world income distribution in real terms, this paper adopts the PPP rather than the exchange rate.

However, it is interesting to examine how the conversion rate will affect the inequality of world income distribution. Figure 4 shows the ratio of PPP to exchange rate, which is equivalent to the ratio of GDP in terms of PPP to GDP in terms of USD. The figure excludes China and Peru because their ratios are extremely high, that is, 825 and 1035 respectively. Since the population of China is so large that the ratio will affect our results considerably, we should be very careful whenever we deal with China.

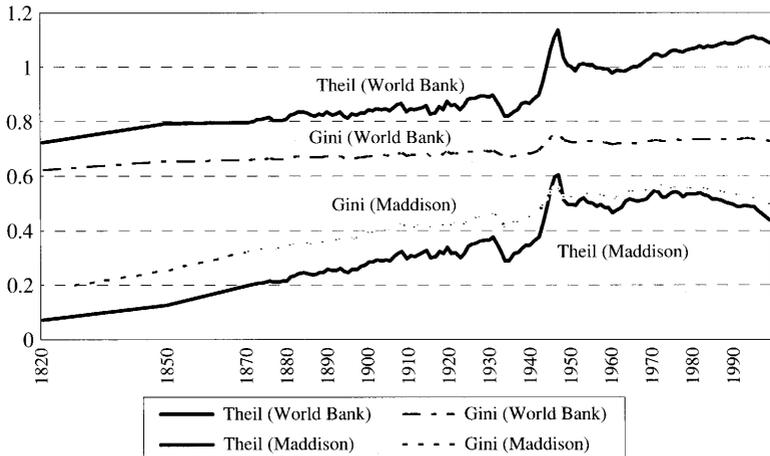
Figure 4 clearly shows that the ratio of PPP to exchange rate decreases as the per capita income increases. In other words, exchange rates underestimate real incomes of developing countries and overestimate that of developed countries. This is because the price level in developing countries is generally lower than that in developed countries. As a result, the inequality of world income distribution is overestimated than Maddison's data as shown in Figure 5. For example, the Gini coefficient ranges between 0.2 and 0.6 for Maddison's data, while it ranges between 0.6 and 0.8 for the World Bank data. The Theil index is extremely high for the World Bank, data which exceeds 1.0 after 1970.

Figure 4. PPP and Exchange Rate



Note: China and Peru are excluded from the figure due to their extreme values, which are 824 and 1035, respectively.

Figure 5. Comparison: Maddison and World Bank data



If there is no difference in the direction of change, it will not affect our conclusion seriously whichever one we choose. However, Figure 5 shows that the direction of change is different from one to the other. From 1820 to 1940, inequality increased gradually for the World Bank data while it remained constant for Maddison's. After 1970, it decreased for Maddison's data while according to the World Bank data, the Theil index increased and the Gini coefficient remained constant.

It should be mentioned here that this paper ignores the income distribution within a country. Precisely speaking, world income distribution is composed of distribution between countries and within countries. However, we are interested in changes the world income distribution among countries and the within-country component only complicates the analysis. Fortunately previous work on world income distribution show that the within-country component is very small in world income distribution and therefore it will not affect our results⁽⁶⁾.

IV. Methodology

This paper uses the Gini coefficient and the Theil index as inequality indices. Though there are many other inequality indices, these two are widely adopted and easily understood. The Theil index is particularly useful because it can be decomposed into two components, namely, between-component and within-component. This paper makes use of this characteristic to analyze the impact of a growing Asia on world income distribution.

The Gini coefficient is expressed as follows:

$$Gini = 1 - 2 \int_0^1 L(n) dn$$

where $L(n)$ indicates the Lorenz curve, $L(0) = 0$ and $L(1) = 1$.

And the Theil index is expressed as follows:

$$Theil = \frac{y_i}{Y} \sum_i \frac{\ln(y_i/Y)}{\ln(n_i/N)}$$

where y_i is the GDP of the i -th country

n_i is the population of the i -th country.

$$Y = \sum_i y_i$$

$$N = \sum_i n_i$$

The Theil index for country i in region j can be expressed as follows:

$$Theil = \frac{y_{ij}}{Y} \sum_i \sum_j \frac{\ln(y_{ij}/Y)}{\ln(n_{ij}/N)}$$

And this can be decomposed as follows:

$$T = T_w + T_b$$

where

$$T_w = \sum_j \frac{Y_j}{Y} T_j$$

$$T_j = \sum_i \frac{y_{ij}}{Y_j} \ln \frac{Y_{ij}/Y_j}{N_{ij}/N_j}$$

$$T_b = \sum_j \frac{Y_j}{Y} \ln \frac{Y_j/Y}{N_j/N}$$

$$N_j = \sum_i n_{ij}$$

$$Y_j = \sum_i y_{ij}$$

In this paper T_w is called “within-region component” and is equal to the weighted average of the regional Theil indices (T_j), the weight (Y_j/Y) being the share of GDP of the region. And T_b is called “*between-region* component,” which is equal to the Theil index when no income gap exists in each region.

In the context of this paper, the decomposition equation is interpreted as follows:

$$\begin{aligned} \text{World Income Inequality } (T) &= \text{Component of Developed Countries } (T_{wDC}) \\ &+ \text{Component of South Europe } (T_{wSE}) \\ &+ \text{Component of East Europe } (T_{wEE}) \end{aligned}$$

+ Component of South America (T_{wSA})

+ Component of Asia (T_{wAsia})

+ Component of Africa ($T_{wAfrica}$)

+ Between-Region Component (T_B)

Each region affects the overall income inequality (T) through the regional component T_{Bj} and through the between-region component (T_B).

V. Results

V-1. World Income Inequality

As Figure 5 shows, the inequality of the world income distribution increased for over 150 years from 1820 until around the 1970s, though there were some fluctuations such as in the 1930s and 40s. In 1820 the level of inequality was very low. That is, the Gini coefficient was only 0.181 and the Theil index was only 0.071 (see Table 4). This level is comparable to those of the most equal countries in the contemporary world. However, in the 1970s they reached the highest level, that is,

Table 4 Inequality in the World Income Distribution

Year	Gini Coefficient	Theil Index
1820	0.181	0.071
1850	0.256	0.129
1900	0.393	0.285
1930	0.446	0.349
1950	0.537	0.510
1960	0.528	0.484
1970	0.565	0.522
1980	0.552	0.531
1990	0.530	0.494
1996	0.494	0.437

Source: Authors' estimation.

Figure 6. Catching-up Process: Western Countries

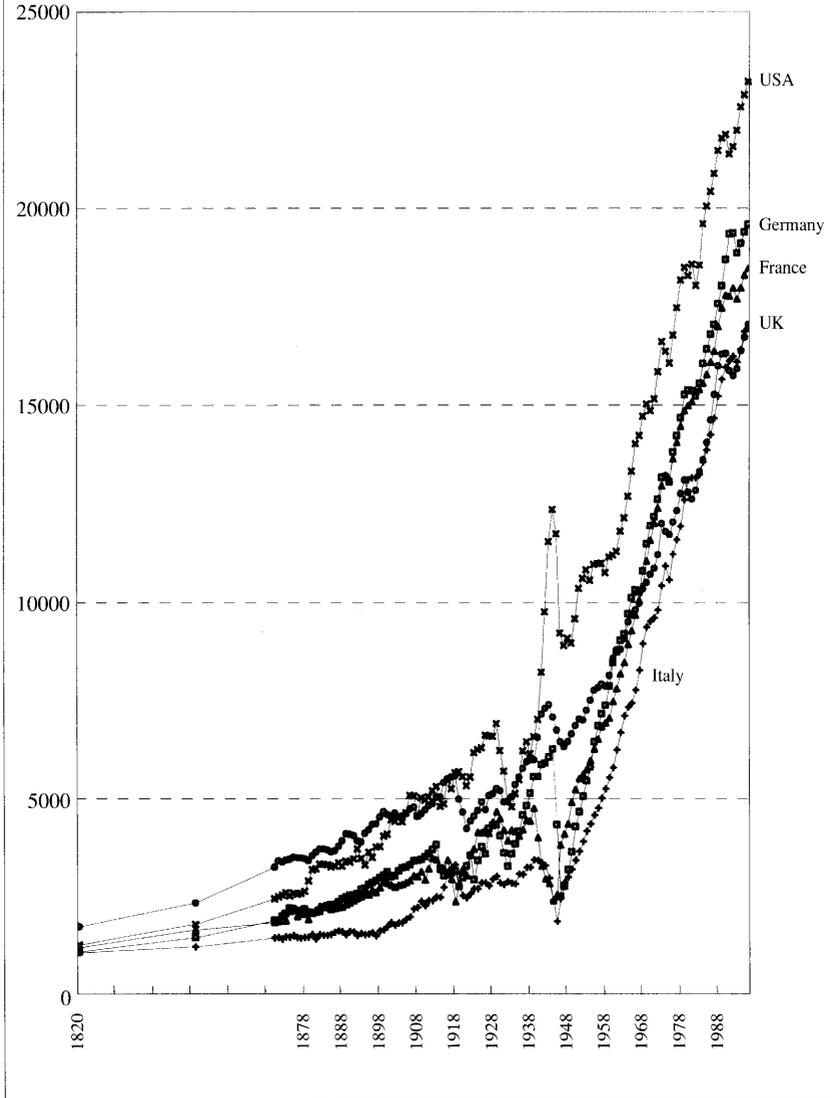
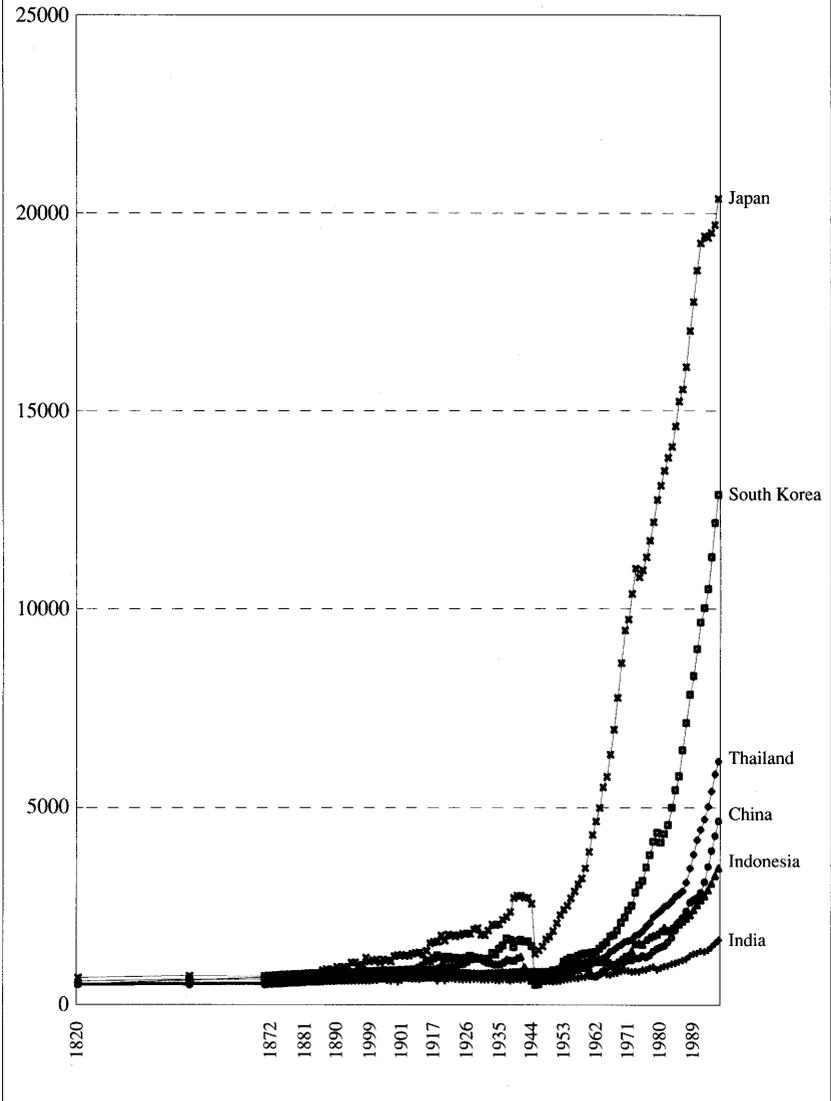


Figure 7. Catching-up Process: Asian Countries



0.565 and 0.522, respectively, which are as high as those of the most unequal countries in the world.

After the 1970s, inequality began to decrease. If this process is persistent, the changes, that is, increasing and then decreasing inequality, are consistent with the Kuznets' hypothesis. This paper claims that the decrease was caused by the catching-up process of Asian countries in the latter period. Though the catching-up of Asian countries as a whole narrowed the world income inequality, the inequality within Asian countries increased.

Figure 6 shows the changes in per capita income for Western countries. The changes are divergent until the mid-20th century and convergent in the latter half of the 20th century. This process corresponds to the first and second phases of the theoretical model shown in Section II-2, respectively.

However, Asian countries are still on a divergent process (see Figure 7). When Asian countries began to grow rapidly, especially after the 1970s, other Asian countries followed and entered the Flying Geese group. This phase corresponds to the first phase of the Kuznets' hypothesis. Though the Asian growth narrowed the income gap between Western countries and Asian countries, and therefore the inequality of the world income distribution, the Flying Geese pattern among Asian countries increased inequality within Asia.

V-2. Asian Development and World Income Inequality

This section examines the role of Asia by decomposing the Theil index. Table 5 shows the results. Firstly, it should be noted that the between-region component accounts for a large part of world income inequality. For example, in 1970, the between-region component is 0.408, which is 78.1% of the Theil index (0.522). This is in sharp contrast to the case of regional income inequality in a country. In this

Table 5 Decomposition of the Theil Index

	Theil Index (T)	Between-Region Component (T_B)	Within-Region Component	Asian Component (T_{wAsia})
1820	0.071 (100.0%)	0.066 (92.2%)	0.006 (7.8%)	0.001 (2.0%)
1850	0.129 (100.0)	0.118 (92.0)	0.010 (8.0)	0.002 (1.6)
1900	0.284 (100.0)	0.252 (88.9)	0.032 (11.1)	0.004 (1.4)
1930	0.349 (100.0)	0.305 (87.4)	0.044 (12.6)	0.013 (3.6)
1950	0.510 (100.0)	0.444 (87.0)	0.066 (13.0)	0.014 (2.7)
1960	0.484 (100.0)	0.423 (87.4)	0.061 (12.6)	0.033 (6.9)
1970	0.522 (100.0)	0.408 (78.1)	0.114 (21.9)	0.091 (17.4)
1980	0.531 (100.0)	0.402 (75.8)	0.129 (24.2)	0.112 (21.1)
1990	0.494 (100.0)	0.349 (70.7)	0.145 (29.3)	0.130 (26.3)
1996	0.438 (100.0)	0.293 (66.9)	0.145 (33.1)	0.129 (29.4)

Source: Authors' estimation.

Note: Figures in the parenthesis indicate the percentage contribution to the total inequality.

case, a country is divided into several regions and the regional income gap accounts for only a small part of the national income inequality, at most about one-third. Though this is partly because the income inequalities within a country are ignored, in the case of world income distribution, this effect is not large enough to alter our conclusion⁽⁷⁾. This result implies that income inequality among countries in a region in the world is very small.

Historically it can be said that the regional income levels in the world have been diverging while the income levels of countries in a region have been converging to the regional level. However, Asia's experience since 1970s changed this pattern. Since the 1960s, income inequality among Asian countries has been increasing. In 1960, the Theil index of Asian countries was only 0.033, and increased to 0.091 in 1970, 0.112 in 1980, 0.130 in 1990, and 0.129 in 1996 (see Table 5). In terms of percentage contribution to the world income inequality, it increased from 6.9% to 17.4% in 1970, 21.1% in 1980, 26.3% in 1990,

Table 6 Theil Index by Region

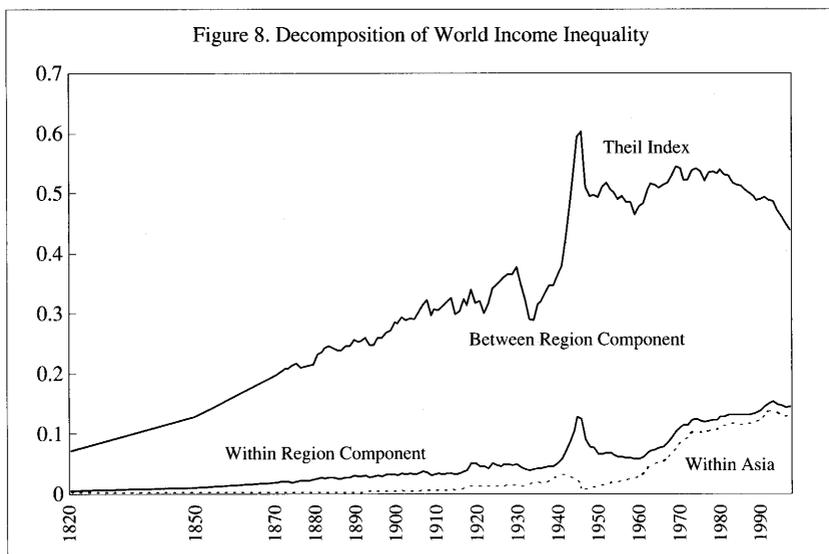
	Theil Index (T)	Theil Index by Region (Unweighted)					
		Asia	Developed Countries	South Europe	East Europe	South America	Africa
1820	0.071	0.003	0.016	0.001	0.001	0.001	0.007
1850	0.129	0.004	0.023	0.002	0.001	0.010	0.019
1900	0.284	0.014	0.040	0.046	0.012	0.118	0.086
1930	0.349	0.049	0.029	0.079	0.028	0.156	0.166
1950	0.510	0.078	0.061	0.039	0.025	0.130	0.230
1960	0.484	0.168	0.023	0.041	0.019	0.107	0.209
1970	0.522	0.410	0.013	0.102	0.014	0.088	0.228
1980	0.531	0.457	0.010	0.110	0.006	0.028	0.228
1990	0.494	0.406	0.008	0.108	0.013	0.019	0.235
1996	0.438	0.320	0.009	0.111	0.035	0.028	0.245

Source: Authors' estimation.

Note: Figures in the parenthesis indicate the percentage contribution to the total inequality.

and 29.4% in 1996. This has meant that income distribution among Asian countries is becoming more and more unequal. The Theil index among Asian countries, which is not weighted by the income share, increased from 0.168, and increased to 0.410 in 1970, 0.457 in 1980, but after reaching the peak around 1980 it began to decrease to 0.406 in 1990, and 0.320 in 1996 (see Table 6). These changes in Asian inequality were the result of the Flying Geese pattern as shown in Figure 7. It is caused by the dynamic process of diffusion of economic growth from Japan, to the four Asian Tigers, to ASEAN countries and China, and so on. What was observed in Asia is the Kuznets' pattern.

The increasing contribution of Asia to world income inequality mentioned above can be explained that the effect of decreasing income inequality among Asian countries was offset by the effect of increasing weight of Asia in world income distribution.



The increasing average income, on the other hand, decreased the regional inequality in the world (see Figures 8 and 9) by catching up the developed countries. This corresponds to the second phase of the Kuznets' curve as shown in II-2.

VI. Conclusion

This paper has examined changes in world income distribution from 1820 to 1996 based on the per capita GDP in terms of PPP for 56 countries. Our hypothesis was that world income inequality has been changing as the Kuznets' hypothesis shows. This paper applied the hypothesis to a world model. In other words, the economic growth at the center initially increases world income inequality, but at a later stages when a considerable numbers of countries begin to grow and catch up to some extent, world income inequality begins to decrease. The factor that reduced world income inequality was the catching-up

process of Asian countries after the 1960s and 1970s. Though the process increased the inequality among Asian countries, it decreased the regional income gap in the world and therefore world income inequality as a whole.

- 1 Kuznets [1955].
- 2 A theoretical explanation is given in Ikemoto [1991].
- 3 Ikemoto [2000].
- 4 Kuznets [1955].
- 5 For a detailed explanation, see Ikemoto [1991] Chapter 3.
- 6 Whalley, John [1979], Berry [1983a], Sprout and Weaver [1992].
- 7 See footnote 6.

References

- Akamatsu Kaname [1962], "A Historical Pattern of Economic Growth in Developing Countries", *The Developing Economies*, Institute of Asian Economic Affairs, Tokyo
- Berry, A., Bourguignon, F. and Morrisson, C. [1983a], "Changes in the World Distribution of Income between 1950 and 1977", *Economic Journal*, Vol.93
- Berry, A., Bourguignon, F. and Morrisson, C. [1983b], "The Level of World Inequality: How Much Can One Say?", *Review of Income and Wealth*, Vol.29
- Braulke, Michael [1983], "A Note on Kuznets'U", *Review of Economics and Statistics*, Vol.65
- Grosh, M. and Nafziger, E. [1986] "The Computation of World Income Distribution", *Economic Development and Cultural Change*, Vol.34
- Ikemoto Yukio [1991], *Income Distribution in Thailand: Its Changes, Causes, and Structure*, Institute of Developing Economies, Tokyo.
- Ikemoto Yukio and Uehara Mine [2000], "Income Inequality and Kuznets' Hypothesis in Thailand" *Asian Economic Journal*, Vol.14 No.4, Dec. 2000.
- Jain, Shail [1975], *Size Distribution of Income: A Compilation of Data*, World Bank, 1975, Washington, D.C.
- Kuznets, Simon [1955], "Economic Growth and Income Inequality", *American Economic Review*, Vol.45
- Maddison, Angus [1995], *Monitoring the World Economy 1820-1992*

- Ram, Rati [1989], "Level of Development and Income Inequality: An Extension of Kuznets-Hypothesis to the world Economy", *KYKLOS*, Vol.42
- Sprout, R. and Weaver, J. [1992] "International Distribution of Income: 1960-1987", *KYKLOS*, Vol.45
- Summers, R., Kravis, I. and Heston, A. [1978], *United Nations International Comparison Project: Phase II; International Comparisons of Real Product and Purchasing Power*, Baltimore, Johns Hopkins University Press
- Summers, R., Kravis, I. and Heston [1984], A "Changes in the World Income Distribution", *Journal of policy Modeling*, Vol.6
- Summers, R., Kravis, I. and Heston, A. [1988], "A New Set of International Comparisons of Real Product and Price Levels Estimates for 130 Countries, 1950-1985", *Review of Income and Wealth*, Vol.34
- Whalley, John [1979], "The Worldwide Income Distribution: Some Speculative Calculations", *Review of Income and Wealth*, Vol.25
- World Bank [1998], *World Development Indicators 1998 (CD-ROM)*.
- World Bank [1980], *World Tables*. Washington, D.C.: John Hopkins University Press for the World Bank