Japan's Strategy for Economic Cooperation with Asian Countries*

Yasuyuki Sawada

Professor, Graduate School of Economics, University of Tokyo

Abstract

As Asia has made remarkable progress in economic development and poverty reduction, the global balance of economic power, in which the United States, Japan and Europe have acted as the three major forces, is changing drastically. In light of the new development, this paper discusses what kind of economic cooperation strategy Japan should pursue in Asia from the perspective of the official development assistance (ODA) strategy. There is an ongoing change in the global trend of ODA, as emphasis is shifting drastically from support for growth to direct assistance for poverty reduction, from bilateral assistance to multilateral assistance, and from transfer of public funds to public-private partnership. We also see the growing importance of assistance and international cooperation provided not only by China as an emerging donor but also by South Korea, which has recently become a formal member of the Development Assistance Committee (DAC), and non-governmental organizations (NGOs) such as the Bill and Melinda Gates Foundation and private companies. With regard to academic research, rigorous scientific studies on development policies have been emerging one after another in the field of development economics based on the randomized controlled trial (RCT) approach, bringing about a kind of "revolution" in academia. In the meantime, Japan has been forced to reduce the amount of its ODA, as achieving fiscal consolidation has become an urgent task. It has been pointed out that Japan cannot help but decline to the status of a "middling donor" in the near future. Moreover, there are voices questioning why Japan needs to implement ODA now despite its fiscal problems. On the other hand, some people recognize anew the importance of the past ODA because as many as 163 countries and regions offered assistance to Japan after the Great East Japan Earthquake. This paper discusses three major roles played by economic cooperation, particularly ODA, in Japan's Asia strategy: (1) acting as a lubricant for growth and poverty reduction in Asia; (2) implementing policy measures to reduce and deal with catastrophic risks in Asia and around the world; and (3) exercising leadership in achieving the development goals of the international community from the Asian perspective. The Asian strategy should be underpinned by strategic activities such as engaging in intellectual production and communication, thereby contributing to international public goods. "Internationally competitive academic research" constitutes the

core of such activities, so steadily accumulating the achievements of excellent academic research programs will enhance the value of ODA as a tool of diplomacy and promote national interests in the medium to long term.

I. Introduction

As Asia has made remarkable progress in economic development and poverty reduction, the global balance of economic power, in which the United States, Japan and Europe have acted as the three major forces, is changing drastically. GDP of Japan, the world's second largest economy after the United States, was overtaken by that of China in 2010, and compared with GDP per capita, China is closing the gap on developed countries. Baumol (1986) reported that in the postwar world economy, countries catching up to the advanced countries and countries whose economic gap between advanced countries has widened existed, but in the last quarter of the century, each country's economic position changed drastically. GDP per capita of China, which was one of the poorest countries in the 1950s, is now on the same level with middle-income countries. The whole East Asia-Pacific region has developed remarkably. As for South Korea, Taiwan, Hong Kong, and Singapore once called Newly Industrializing Economies (NIEs), Singapore has developed, its GDP per capita is larger than that of Japan, and investments in the financial business, distribution industry, manufacturing industry, and life-science industry have expanded. Moreover, the economic growth of other Southeast Asian countries, such as Thailand, in which the severe flood occurred in 2011 resulting in many Japanese companies suffering great damage, the Philippines, which was once called the "Asian underachiever", and Myanmar, in which demilitarization was achieved and democratization and economic reform is being carried out, and foreign economic relations are drastically changing to the open economy, has been steady recently. Furthermore, even in Bangladesh, which was one of the poorest countries in the world, we can see a sign of the continuous economic growth mainly based on the labor-intensive readymade garment (RMG) industry.

It's known that the Penn World Table, a famous database used for international comparison of national economic indicators, has non-negligible measurement errors especially for the data on developing countries (Deaton and Heston, 2010). However, recently "the amount of light at night" from remote sensing data has been used as an objective indicator showing the level of economic activity (Chen and Nordhaus, 2011; Henderson, et al., 2012). We can see the change in the world economy from the change of the light at night in 18 years, from 1992 to 2010 (Figure 1). Figure 1(1) shows the distribution of the light in the world in 1992 and

Figure 1(2) shows the distribution in 2010. The amount of light in Japan at the right upper edge of Figure 1 has not changed a lot, but the amount of light at night in East Asia, Southeast Asia, and South Asia such as coast areas in China or South Korea has increased for the last 18 years. And from that, we find that economic activity in these areas has developed so much (Henderson, et al., 2012). The United States, Japan and Europe have acted as the three major forces, Asian countries have developed rapidly, and they are gradually setting up position as a center of economic growth in the world.

In this article, we will discuss the economic cooperation strategy that Japan must develop in Asia from the viewpoint of ODA. In Section 2, we capture the recent drastic poverty reduction trend in Asia. Then in Section 3, we discuss each of the three roles that Japan's ODA must carry out in Asia; first, helping economic growth or poverty reduction by private investments; second, mitigating and coping with big risks such as natural disasters, infectious diseases, and economic crises; and third, leading the development goals in international society. In Section 4, based on the discussion, we conclude Japanese economic cooperation strategy for Asia.

Figure 1. Night lights in the world

(1) 1992   (2) 2010
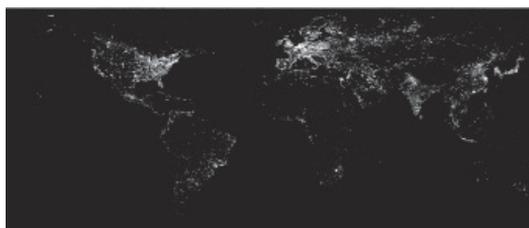
Data source: -DMSP OLS Global Composites Version 4, "stable_lights" data, National Geophysical Data Center, National Oceanic and Atmospheric Administration, <http://ngdc.noaa.gov/eog/maps.html>

II. Poverty reduction in Asia

The whole East Asia-Pacific region, especially China, has developed remarkably in medium- and long-term, so that poverty problems in this area are drastically solved. Figure 2 shows the trend of the regional poverty rate based on the poverty line of living less than 1.25 dollar per day which is used internationally including Millennium Development Goals (MDGs) (Chen and Ravallion, 2010). It shows that the poverty head count ratio in the Sub-Saharan Africa has remained high and the poverty ratio in Latin American and Caribbean (LAC) countries has not dropped significantly for the last three decades. It is assumed that the LAC countries are falling into "The Middle-Income Trap". On the other hand, the poverty rate in Asia-Pacific region has drastically dropped from about 80% to 13% for the last 30

years[1].

Figure 2. Regional trend of incidence of poverty
(Poverty line: living less than $1.25 per day)
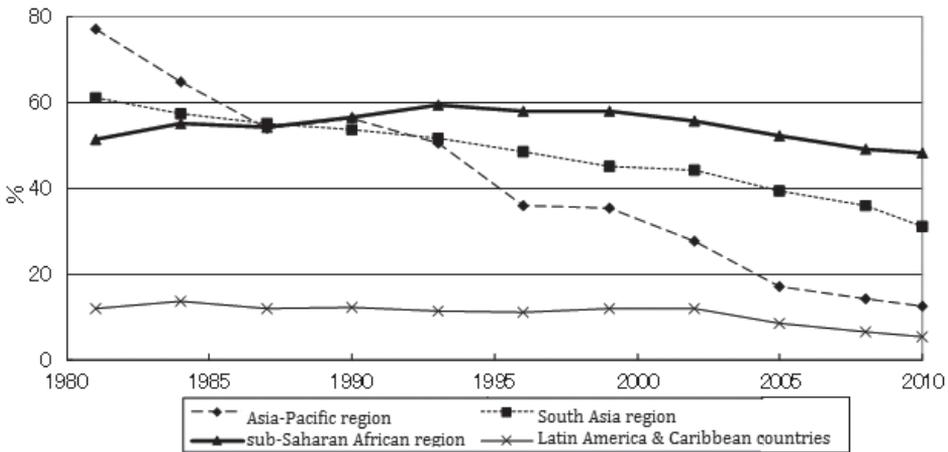
Data Source: *Regional aggregation using 2005 PPP and $1.25/day poverty line*, Data last updated:
April 18, 2013, PovcalNet, World Bank.

There is not only rapid growth in China and the East Asia-Pacific region, but the South Asia region shows signs of favorable growth and it has achieved 6.6% growth for the last 11 years. From this point, Asia becomes more important as not only a production base in the world but also a "consumer market" based on the fact of their income increase. Kharas (2011) estimated the movement of the middle class which is defined as a group of people living with an income between 10 to 100 dollars per day. According to his estimation result, it is expected that the ratio of the middle class in Asia will be more than 50% in the world after several years (Table 1). In fact, as Honma (2013) mentioned, many Japanese food related companies are trying to enter overseas markets such as Asia, giving up the Japanese market because it has struggled with continued growth.

This movement is applied not only to food related companies but also to the manufacturing industry, retail trade, financial industry, and even education service industry. The background is "population bonus", the tendency of increasing in the working-age population. It is considered that some Asian countries including Japan will rapidly become an aging society and the future problem of a "population onus", a population with a relative decrease in the working-age group, will be a burden economically. However in the whole Asia region, the remarkable effect of increasing production and creating market due to population bonus will continue until the end of the 21st century.

Figure 3 shows the transition of the regional population based on the world population

---

[1] However we cannot deny the possibility that emerging countries in Asia will fall into "the Middle-Income Trap".
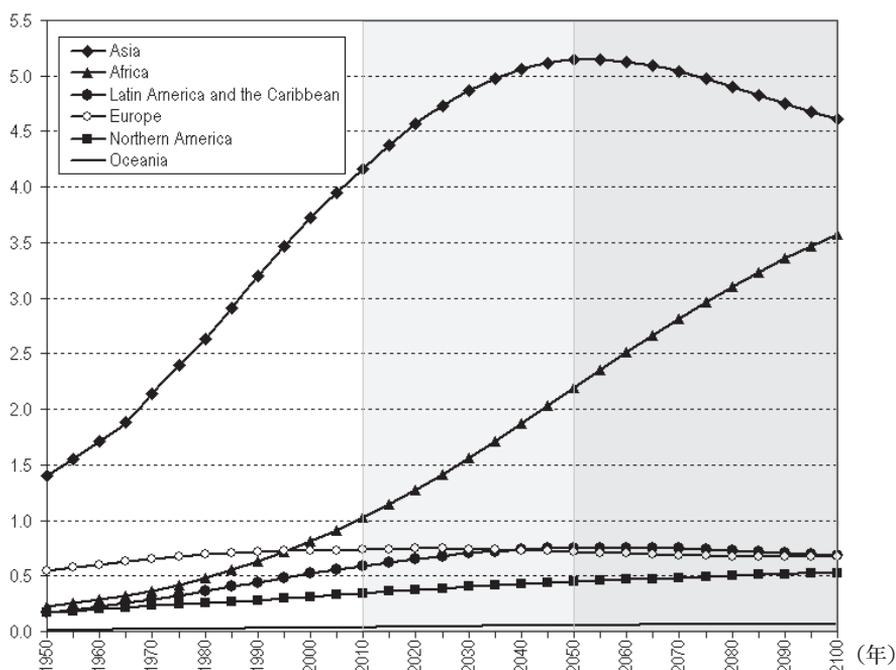
estimation by the United Nations Population Division. During this century, Asia will keep more than half the population of the world, and then the center of the world population will gradually shift to Africa.

Table 1. Size of "middle-class", living between 10 to 100 dollars per day

	2009		2020		2030	
	Number (million)	Share (%)	Number (million)	Share (%)	Number (million)	Share (%)
North America	338	18%	333	10%	322	7%
Europe	664	36%	703	22%	680	14%
Central and South America	181	10%	251	8%	313	6%
Asia-Pacific	525	28%	1,740	54%	3,228	66%
Sub-Saharan Africa	32	2%	57	2%	107	2%
Mideast - North Africa	105	6%	165	5%	234	5%
World	1,845	100%	3,249	100%	4,884	100%

Data Source: Kharas, Homi (2011) "The Emerging Middle Class in Developing Countries," Brookings Institution.

Figure 3. The prospect of world population
(Unit: billion)

Data Source: World Population Prospects, the 2010 Revision, Figure 2: Estimated and projected population by major area, medium variant, 1950-2100 (billions), United Nations, Department of Economic and Social Affairs, <http://esa.un.org/wpp/Analytical-Figures/htm/fig_2.htm>

Based on the favorable economic development, the achievement of MDGs in Asia is promising (United Nations, 2012). Especially, as we see in Figure 2, Asia has accomplished the most remarkable decrease in the poverty rate in the world. In the whole of South Asia, the poverty rate has decreased slowly, but in the whole of East and Southeast Asia, the numerical target related to the first goal of the MDGs, "Eradicating extreme poverty and hunger; halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day" has already been achieved. As for the second MDG, "To achieve universal primary education", the whole Asia region has advanced remarkably. The primary school attendance rate in East Asia and Southeast Asia were 95% and 93% even in 1999, and then it increased a little bit. In Southeast Asia, that rate was 79% in 1999 and it increased to 91% in 2009. Hence, in the whole Asia region, the second goal in the MDGs has almost been achieved. On the other hand, as for the third goal, "To promote gender equality and empower women", problems on gender differences in education, labor and political participation still exist. For example, in 2011 the share of female seats in assembly in South Asia and Southeast Asia was only 18%.

Next, as for the fourth MDG, "To reduce child mortality", and fifth goal, "To improve maternal health", the Asia region has improved health conditions of children and expectant and nursing mothers steadily. In East, Southeast, and South Asia, each region's maternal mortality was reduced by 63%, 57% and 53% from 1990 to 2008. In South Asia, the maternal mortality is 280 per 100,000, which is the second highest rate after that of Sub-Saharan Africa. However it has been improved. Also, Asia has steadily decreased the mortality of children. The most successful region is East Asia and the infant mortality rate has decreased 58% from 1990 to 2008.

II-1. Bangladesh

Bangladesh, which used to be regarded as one of the poorest countries based on all the social indexes like child mortality and school enrollment rates, is now a typical country which constitutes rapid Asian growth with drastic poverty reduction. In the 1970s, it was one of the poorest countries in the world. Faaland and Parkinson (1975) famously commented: "If the problem of Bangladesh can be solved, there can be reasonable confidence that less difficult problems of development can also be solved. It is in this sense that Bangladesh is to be regarded as the test case of development." For the last decade, Bangladesh has achieved a sustainable economic growth more than 5% per annum. As Mottaleb and Sonobe (2011) pointed out, the background of this rapid growth is the rapid growth in the RMG industry for exports, facilitating human capital accumulation and adoption foreign technology. The RMG industry share of exports was only a few percent in the early 1980s, but now its share is more than 75% (Table 2).

Table 2. The growth of the RMG industry in Bangladesh

Fiscal year	The number of garment factories	The amount of exports (billion USD)	The share of the RMG industry in the total export (%)
1983-84	134	0.03	3.9
1987-88	685	0.43	35.2
1991-92	1,163	1.18	59.3
1995-96	2,353	2.55	65.6
1999-00	3,200	4.35	75.6
May-04	4,107	5.17	74.2
Aug-07	4,740	10.7	75.8

Data source: Mottaleb and Sonobe (2011)

Also, it is the investment for infrastructure that has helped these industries develop, and Japan's ODA has played an important role in setting in place the infrastructure. A notable example of Japan's ODA is the construction of Jamuna Bridge, which is the longest and largest bridge in Bangladesh's history. Jamuna River is one of the three main rivers in Bangladesh, flowing north to south through the central area, dividing Bangladesh to east and west. Jamuna River is a bottleneck for the transportation between east and west; it has physically separated the east, where Dhaka is located, and west, and it has been a drag on western development. Jamuna Bridge, which was built with concessional loans from Japan, Asian Development Bank, and World Bank in 1998, is a multipurpose bridge for laying down gas pipeline, railway, power cables, a two-lane dual carriageway, and so on. This bridge has contributed to Bangladesh's economic growth and poverty reduction through the correction of regional disparities between the east and west (Ghosh et al., 2010). Sawada (2012) evaluated the poverty reduction effect by Jamuna Bridge using survey data of 1,485 households collected by the Research and Evaluation Division (RED) of BRAC (Ghosh et al., 2010). This data is composed of 787 households in Sirajganj, the west region of Jamuna Bridge, and 698 households in Tangail, the east of it. The effect Jamuna Bridge brought is considered to have appeared in the west, so we let the households in Sirajganj be the "treatment group", the households in Tangail be the "control group," and then estimated the treatment effects or policy effects of Jamuna Bridge construction. Sawada (2012) finds that treatment effect is statistically significant, indicating that the construction of Jamuna Bridge alleviates the poverty situation on the western side of the bridge.

Also in Bangladesh, the population growth, seen as a "population explosion", has been drastically reduced by continuous economic growth. The Demographic and Health Survey in 2011 showed that the total fertility rate (TFR) decreased 5.1 in 1989 to 2.3 (Table 3). Also, the relative school attendance rate of women to men in the primary and secondary education has reversed. Figure 4 shows that the ratio of the secondary school attendance rate of women to men in 1985 was in 1:1.25, but that it was reversed in 2000.

Table 3. The transition of the total fertility rate in Bangladesh
(15 to 49 year old women)

	1971-75	**1984-88**	**1989-91**	**1991-93**	**1994-96**	**1997-99**	**Mar-01**	**Jun-04**	**Nov-09**
Data	1975 BFS	1989 BFS	1993-94 BDHS	1991 CPS	1996-97 BHDS	1999-00 BDHS	2004 BDHS	2007 BDHS	2011 BDHS
Total fertility rate	**6.3**	**5.1**	**4.3**	**3.4**	**3.3**	**3.3**	**3**	**2.7**	**2.3**

Data source: Bangladesh Demographic and Health Survey 2011

Figure 4. The sex ratio of secondary school attendance rate (women to men, %)
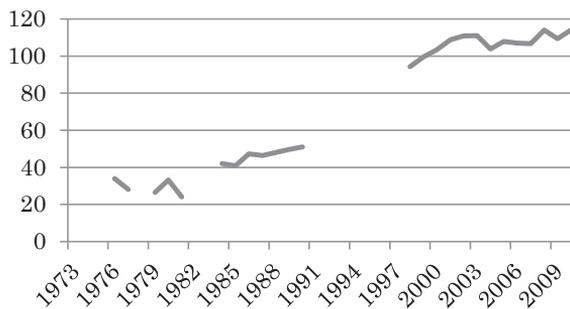
Data source: World Development Indicators, World Bank.

The background of the drastic improvement on these social indexes is continuous economic growth at more than 5% for the last 10 years and the expansion of RMG production and exports (Mottaleb and Sonobe, 2011). Heath and Mobarak (2012) concluded that the RMG industry increased job opportunities for women, which stimulated educational investment for women. Also we may be able to say that the higher opportunity cost of rearing children caused by more female job opportunities leads to the rapidly declining birthrate.

Bangladesh has developed and improved social indexes drastically and these trends may continue in the future. Yet, the country also has various potential risks against the success. In 2013, the conflict between the parties in and out of the government intensified and *Hartal*, a sort of general strike action, started to happen frequently due to concerns on the ruling of war crimes in the Liberation War at the special court and the way of preparation for the last general election held at the beginning of 2014. Also, the incident of the collapse of a garment factory building in April 2013 triggered the expansion of the protesting movement against the lack of safety measures in the RMG industry. This political instability can be said to be a "manmade disaster" for the economy in a way and a serious negative risk for economic growth. Also, Bangladesh has suffered from severe cyclones and floods repeatedly since its independence, so natural disaster risk is potentially catastrophic. Moreover, the economic recession in the developed countries which provide main markets for the RMG products of Bangladesh is a potential risk for the country's economic growth. The case of Bangladesh

shows that even though it has been developing successfully, potential disasters including natural disasters like cyclones and floods, technological disasters like the collapse of buildings, and manmade disasters such as economic crises and political instability can be a serious risk factor for continuous economic growth.

III.   Economic cooperation in Japan's Asia strategy through ODA

One of the most important public policy in order to stimulate the economic growth in the developing region and reduce poverty following the MDGs is ODA. However, the global ODA trend is now shifting from boosting growth to more direct poverty reduction support, from concessional loan to debt reduction and grant, from supporting projects to program and financial support, from bilateral to multilateral support, and from pure public fund transfer to public-private cooperation. The weight of ODA is shifting. South Korea, officially becoming a member of DAC, and China are emerging as a remarkable donor. It is notable that Korea is now trying to systematize and to make use of their development experience like the *Saemaul Movement* for ODA. Also, public-private partnership, support, and aid by the non-public sector, such as NGOs, businesses, and private funds like the Bill and Melinda Gates Foundation, which plays an important role in the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), what are called "global funds", are becoming more important. Japan's ODA takes some remarkable actions that JICA and the Gates Foundation formed using strategic partnership in order to tighten the measures for the eradication of polio, and that used innovative support called "loan conversion" for measures to eradicate polio in Pakistan. Also in the academia, it is a "revolutionary" situation since many frontier micro econometric studies about the rigorous evaluation of the development policy have been progressing based on the RCTs in the modern development of economics.

In this situation, it has been pointed out that Japan, suffering from fiscal problems, will have to be a "middle-ranking donor" in the near future. Also, some people are wondering why ODA is now needed for Japan with tightened government budget. On the other hand, others revaluate past ODA since as many as 163 countries provided support to Japan after the Great East Japan Earthquake. What should Japan's ODA be in the future? In this section, we will discuss the roles of ODA in Japan's Asia strategy. We will especially discuss three major roles of what Japan's ODA should be specialized in: (1) acting as a lubricant for growth and poverty reduction by private investment; (2) implementing policy measures to reduce and deal with catastrophic risks; and (3) exercising leadership in achieving the development goals of the international community.

III-1.   *Acting as a lubricant for growth and poverty reduction by private investment*

ODA's economic-growth promoting effect has been studied widely. One of the most striking and influential studies on ODA in the last decade was Burnside and Dollar (2000). This study showed that ODA contributes to growth only if the receiving country's economic

governance is appropriate. Yet, it stimulated intensive debates by Easterly, Levine, and Roodman (2004) and Rajan and Subramanian (2008). In the end, a collective view on ODA's economic-growth promoting effect has not achieved. Roodman (2007) described the situation as "anarchy" of research on ODA.

In academic research, the reason they cannot obtain the common qualitative results may be in that a lot of research analyzes data mechanically without caring for ODA's heterogeneity. ODA contains grant aid, concessional loans, and technical cooperation, and each has a different effect. The degree of the economic development and governance of the recipient countries also influence the overall effect of ODA. Moreover, we should keep in our mind that ODA is just one of the many ways to transfer money and resources from developed countries to developing countries. Other modalities include FDI, immigrants' remittances, bank loans, and indirect investments. Not only in the East Asia region for which the quantitative scale of ODA is quite small, but also strongly aid-dependent South Asian and Sub-Saharan African regions where the whole country's capital constraint could be solved only by ODA for years, the weight of private flows such as FDI for the resource sector has been increasing as the central figure. This situation suggests that it is fundamentally difficult to identify the impact of ODA in isolation.

III-1-1. *Public-Private Partnership and the Japan ODA Model*

That said, we cannot ignore the role of ODA in facilitating industrial infrastructure developments and to stimulate economic growth owing to the private investment especially in the Asian region. An important key would be the complementarities between ODA and other modes of private resource flows. Theoretically, it can be assumed that there are different channels in which ODA influences direct investment and other private resource inflow into aid-receiving countries. These channels include a positive "infrastructure effect" by improving economic and social infrastructure in the recipient country, a negative "rent-seeking effect" by encouraging unproductive rent-seeking activities, a positive "financing effect" by improving the ability of the recipient country to finance outflows of profit repatriation from FDI, and a negative "Dutch-disease effect" by distorting resource allocations between tradable and nontradable sectors (Kimura and Todo, 2010). In addition to these effects of aid, ODA involves a "vanguard effect" of inducing foreign direct investment. It is assumed that this vanguard effect makes it easier for ODA donor countries to get information on recipient countries, gives the effective insurance function for country risk, and influences the system of the recipient country by technical cooperation.[2] Kimura and Todo (2010) verified how ODA influenced the inflow of the direct investment using macro data of ODA donor countries and recipient countries closely. Kimura and Todo (2010) are especially important in that they estimated the "vanguard effect" separated into the "infrastructure effect" and the "rent-

---

[2] The vanguard effect is different from the infrastructure effect and the rent-seeking effect because with these two effects, ODA from one country induces the direct investment from not only the country but also all of the other supporting countries.

seeking effect," which had never been examined. Their empirical analysis showed that while ODA from donor countries did not have the effect to urge the direct investment in recipient countries in general, Japan's infrastructure support has the vanguard effect exceptionally. Hence, Japan's ODA has the effect to promote the direct investment from Japan to the recipient country but not from other developed countries to the recipient country. Once ODA, especially ODA for infrastructure, from Japan to the recipient country increases by 1%, the amount of the flow of the direct investment from Japan to the recipient increases by 0.074%. Moreover, 6% of Japan's direct investment for East Asia is caused by the ODA. Since growth enhancing effects of FDI have been found repeatedly in the existing studies, we may say that public-private partnership in Japan's ODA has contributed to the economic development of aid recipient countries in Asia.

Kang, Lee, and Park (2010) replicated the study by Kimura and Todo (2010) using Korean data, testing whether the ODA from South Korea causes to the direct investment from South Korea to the aid recipients. Intriguingly, the study finds that ODA from South Korea has FDI promotion effects, supporting a similar mechanism to the Japan ODA model in Korea's ODA.

III-1-2. *The long-term effect of technological cooperation*

Technical cooperation aid has a purpose to improve productivity by transferring technologies and knowledge directly in various areas such as manufacturing, agriculture, education, medicine, and public administration. These modes of assistance can contribute to broad technical transfer as much as international trade and FDI (Sawada, Matsuda, and Kimura 2012). Sawada et al. (2012) formulate a model of technological progress through accumulation of human capital *h*, which represents ability of technical learning, following the model of Benhabib and Spiegel (2005). They also extended the model by incorporating FDI from foreign countries, (*FDI*) and degrees of trade openness toward foreign countries (*OPEN*). Finally, a model of technological catch-up is constructed as follows:

$$\frac{1}{T}\left(\log A_{iT} - \log A_{i0}\right) = \left(\gamma + \frac{c}{s}\right)\Phi(h_i, TC_i, FDI_i, OPEN_i) - \frac{c}{s}\Phi(h_i, TC_i, FDI_i, OPEN_i)\left(\frac{A_{iT}}{A_{mT}}\right)^S, \qquad (1)$$

where A_{it} is the total factor productivity of *i* country in year *t*, country *m* is the technology leading country, country *i* is the follower country. The function, Φ, shows the ability of the follower country to innovate its own technologies and absorb foreign technologies, and this corresponds to "social capability" in Ohkawa and Rosovsky (1973) according to Abramovitz (1986). Ohkawa and Kohama (1989) stated that "social capability is the ability of introducing and copying the advanced techniques from developed countries. Enhancing human ability and improving the system or organization is necessary for social capability to increase." These roles of "ability of adopting technologies" are also formulized by Keller (1996).

In equation (1), we suppose the capability of adopting technology Φ as a function of the

initial or long term average level by human capital h, the amount of technological cooperation *TC*, flow of *FDI*, and openness to foreign trade *OPEN*. According to Benhabib and Spiegel (2005), parameter c, γ, and s decide whether the growth of a country converge into that of the leading country or spread instead.[3] From the definition in equation (1), it can be a logistic function model when $s = 1$, and exponential function model when $s = -1$. In order to estimate (1), we formulate the capability of adopting technology Φ as a linear function and construct an estimation equation as below:

$$\frac{1}{T}\left(\log A_{iT} - \log A_{i0}\right) = b_0 + b_1\left(h_i + b_4 TC_i + d_1 FDI_i + e_1 OPEN_i\right)$$
$$- b_2\left(h_i + b_4 TC_i + d_1 FDI_i + e_1 OPEN_i\right)\left(\frac{A_{i0}}{A_{m0}}\right)^{b_3} + u_i, \tag{2}$$

where u_i is a stochastic error term. Using this nesting formula, we can verify the validity of logistic function model and exponential function model by checking $b_3 = 1$ or $b_3 = -1$. Also empirically, we can test if TC accelerates international technology spreading by looking if b_4 has a positive coefficient or not. Moreover, we can estimate the effectiveness of TC, FDI and Foreign openness as a spreading pass of technology by comparing relative size of estimation b_4, d_1 and e_1.

In the estimation result in Table 2 (3-2) from Sawada, Matsuda, and Kimura (2012) using data from 85 countries from 1960-1995, $b_1 = 0.012$, $b_2 = 0.01$, $b_3 = 1.701$, $b_4 = 0.008$, $d_1 = 0.0003$, and $e_1 = 0.014$. They show that international technology transfer through the openness to foreign has the biggest effect, followed by the effect through TC. The effect through FDI flow has a positive value, but is the smallest impact toward the ability of adopting technology in recipient country.

Also, the estimated result implies the logistic function model in technical transfer since estimated coefficient b_3 is bigger than 1. Therefore, the recipient country faces the possibility of being technically left behind by the leading country, depending on the value of the parameter. From the estimated results of the model based upon technological growth data in 1960-95, Sawada, Matsuda, and Kimura (2012) found that Bangladesh, Iran, Nepal, and Pakistan were the countries caught by the trap, so to say the technological poverty trap, where they cannot catch up to its technology level because of the large initial technological gaps they had. In these countries, it is implied that TC could have played an important role in moving these countries out of the trap and enhancing the ability of adopting technologies, thus accelerating the catch up.

III-1-3.   *Two ways of catching up and the role of ODA*

Here, we integrate the model of international technological transfers in equation (1) into

---

[3] By using these framework, we can also see the effect of technology transfer in service trade.

the augmented Solow model constructed by Mankiw, Romer, and Weil (1992). On the transition path towards the steady state, the Solow's basic equation can be written approximately as:

$$\frac{\dot{y}_{it}}{y_{it}} = \underbrace{\frac{\dot{A}_{it}}{A_{it}}}_{\equiv g} + \lambda\left(\log y_i^* - \log y_{it}\right), \ \lambda > 0, \tag{3}$$

where *y* is GDP per capita, and *y** is the steady-state level of GDP per capita, i.e.,

$$y_i^* = A \times \left(\frac{s_K^\alpha s_H^\beta}{(n+g+\delta)^{\alpha+\beta}}\right)^{\frac{1}{1-\alpha-\beta}}, \tag{4}$$

where s_K and s_H are the physical and human capital saving rates, respectively; and *n*, *g*, *δ* depict population growth rate, technology growth rate, and capital depreciation rate, respectively. From equations (3) and (4), we obtain:

$$\frac{\dot{y}_t}{y_t} = g - \lambda \log y_t + \frac{\lambda\alpha}{1-\alpha-\beta}\log s_K + \frac{\lambda\beta}{1-\alpha-\beta}\log s_H - \frac{\lambda(\alpha+\beta)}{1-\alpha-\beta}\log(n+g+\delta) + \lambda \log A \tag{5}$$

Rewriting equation (5), we get:

$$\underbrace{\frac{\dot{y}_t}{y_t} + \frac{\lambda(\alpha+\beta)}{1-\alpha-\beta}\log(n+g+\delta)}_{adjusted\ growth\ rate \equiv G} = g\ \underbrace{-\lambda \log y_t}_{pure\ catch\text{-}up\ effect} + \underbrace{\frac{\lambda\alpha}{1-\alpha-\beta}\log s_K + \frac{\lambda\beta}{1-\alpha-\beta}\log s_H + \lambda \log A}_{country\text{-}specific\ steady\text{-}state\ income}$$

By combining equations (1) and (3), we obtain an equation which defines the economic growth based on 2 ways of catch up, i.e., "technological catch up" and "income catch up:"

$$G_{it} = (1+\lambda)\left[\underbrace{\left(\gamma+\frac{c}{s}\right)\Phi_i}_{innovation} - \underbrace{\frac{c}{s}\Phi_i\left(\frac{A_{it}}{A_{mt}}\right)^s}_{imitation}\right]\underbrace{-\lambda \log y_{it}}_{pure\ catch\text{-}up\ effect}$$
$$+ \underbrace{\frac{\lambda\alpha}{1-\alpha-\beta}\log s_K + \frac{\lambda\beta}{1-\alpha-\beta}\log s_H + \lambda \log A_{i0}}_{country\text{-}specific\ steady\text{-}state\ income} \tag{6}$$

From this equation (6), we know that economic growth can be divided into four components; technology innovation, technology imitation, pure income catch-up, and country-specific steady state income level defined by the investment rate of physical and human capital.

Technical cooperation can support the country to raise its total production level and economic growth rate by accelerating its technological innovation and imitation abilities. Okamoto (2013) argues that emerging Asian countries have been rapidly increasing their ability of innovating new technologies. Facilitation of the imitating and innovating technologies using "open innovation" by ODA should be crucial for the Asian economy's

sustainable growth.

A concessional loan can be interpreted as the aid in aim of directly encouraging technology innovation and imitation. Also, improvements of education and health, namely, the accumulation of human capital through various ODA modalities can contribute to the economic growth. Kimura and Todo (2010) and Sawada, Matsuda, and Kimura (2012) suggest the importance of strengthening the complementarities of ODA with private capital and resources such as FDI and international trade. Japanese ODA should be a policy tool which is win-win to both the aid donor and aid receiving country, being the "grease" for achieving economic growth and poverty reduction through public and private investments. These roles of ODA are explicitly seen as the "Japanese ODA model" or "the trinity of aid, investment and export", which are the key of Japanese ODA. Japanese ODA had been efficient through human resource development, serving infrastructure and supporting small size firms. Moreover, investment on resource and BOP is becoming to act in the same mechanism as this. Japanese ODA is now expected to be a main way of leading the coordination of private and public, and therefore required more tactical planning and practices to efficiently motivate the coordination such as infrastructure packages and aid suggested by the public sector. Just as mentioned, this model of ODA is beginning to be one of the philosophies shared among developing donors, starting from Japan, such as Korea, China and Thailand. It deserves the attention that is being shared among Asian developing donors through high-level meetings such as the Asia Development Forum.

III-2. *Policies of reducing and coping with catastrophic risks*

Even though economies in Asia have been steadily grown, there are risks in sustainable growth, as we saw in the case of Bangladesh. They are namely the risk of catastrophic disasters such as natural disasters, technological disasters, economic crises and violence-related disasters. Based on data from the Centre for Research on the Epidemiology of Disasters (CRED), Asia is the region which has had the most occurrences of natural disasters in the past 10 years, in the point of view of numbers of disasters, number of victims, and economic damage (Table 4). Natural disasters can be roughly divided into four groups: "climatological disasters," "geophysical disasters," "hydrological disasters," and "meteorological disasters". 40% of those disasters take place in the Asian region, and the number of victims and economic damage by disaster in Asia covers 90% and 40% of that in the world, respectively (Table 4).

Table 4. Natural disaster occurrence and impacts by region
(Annual average figures between 2001 and 2010)

(1) Number of Natural Disasters

	Africa	Americas	Asia	Europe	Oceania	Global
Climatological	9	12	11	17	1	50
Geophysical	3	7	21	2	2	35
Hydrological	44	39	82	24	6	195
Meteorological	9	34	40	14	7	104
Total	65	92	153	58	16	384

Data: Annual Disaster Statistical Review 2011, CRED, IRSS & UCL, 2012.

(2) Number of Victims (in millions)

	Africa	Americas	Asia	Europe	Oceania	Global
Climatological	12.29	1.22	63.45	0.27	0	77.23
Geophysical	0.08	1.02	7.77	0.01	0.04	8.92
Hydrological	2.18	3.31	100.82	0.35	0.04	106.7
Meteorological	0.35	2.72	35.88	0.11	0.04	39.1
Total	14.91	8.27	207.92	0.74	0.12	231.95

Data: Annual Disaster Statistical Review 2011, CRED, IRSS & UCL, 2012.

(3) Damages (in Billion USD)

	Africa	Americas	Asia	Europe	Oceania	Global
Climatological	0.04	1.9	3.45	3.23	0.48	9.1
Geophysical	0.69	4.75	17.38	0.57	0.69	24.08
Hydrological	0.28	3.15	11.15	5.57	1.24	21.39
Meteorological	0.08	40.47	9.62	4.03	0.56	54.77
Total	1.1	50.27	41.61	13.4	2.97	109.35

Data: Annual Disaster Statistical Review 2011, CRED, IRSS & UCL, 2012.

Natural disasters can destroy people's lives, disregarding whether it is a developing or developed country. Moreover, we noticed from the Great East Japan Earthquake, that natural disasters such as earthquakes and tsunami can cause technological disasters such as the accident of the nuclear power plant. Looking back, we are still in the aftermath of the global economic crises, triggered by the Lehman Brothers shock in 2008. Moreover, while many countries in Africa still face political disputes, terrorist attacks are having serious effects even in developed countries. These various catastrophic disasters in the world can be divided into four big categories, natural disasters, technological disasters, economic crises, and wars/conflicts (Sawada, 2007). The last three categories can be called manmade disasters as well. CRED provide the long-term data including biological disasters such as epidemics of infectious disease. They are also providing data about "technological disasters", such as the radiation leakage from a nuclear power plant, industrial disasters like the collapse of infrastructure, and accidents of transportation. Also, the Reinhart and Rogoff dataset, Correlates of War (COW) data compiled by the University of Michigan accumulates and discloses the time series data of economic crises such as financial crises, debt crises, and hyperinflation and violence-related disasters such as terrorist attacks, civil conflicts, and

wars. By looking individually at the four types of disasters' average frequency of occurrence by annual data used above, natural disasters and technological disasters are increasing rapidly while economic crises and the number of wars seem stable, with no signs of declining.

III-2-1. *The effectiveness of insurance mechanism among Asian region*

How far does the market and non-market insurance mechanism function against various disasters in the East and Southeast Asian region? We test and discuss the efficiency and effectiveness of insurance mechanisms in this section. We employ the framework of consumption insurance or full consumption risk-sharing in order to examine the overall efficiency of various market and/or non-market insurance mechanisms against disasters. We present the results of Sawada (2011) which used the international consumption risk-sharing model of Lewis (1996) with nontradable goods. We consider an infinite-horizon optimization problem, assuming N countries in Asia. Following Lewis (1996) we can derive a set of necessary conditions of "full consumption insurance" by solving a social planner's problem as below:

$$
\max_{\{c^T, c^N\}} \sum_{j=1}^{N} \omega^j \left\{ \sum_{t=1}^{\infty} \sum_{s^t} \left(\frac{1}{1+\delta^j} \right)^t \pi\left(s^t\right) u\left[c_{jt}^T\left(s^t\right), c_{jt}^N\left(s^t\right) \right] \right\}
$$
$$
s.t. \sum_{j=1}^{N} c_{jt}^T\left(s^t\right) \le \sum_{j=1}^{N} y_{jt}^T\left(s^t\right), \forall s^t,
$$
$$
c_{jt}^N\left(s^t\right) \le y_{jt}^N\left(s^t\right), \forall s^t,
$$
(7)

where, δ is the subjective discount rate, π is the probability that state s occurs, c^T is the consumption of tradable goods, c^N is the consumption of non-tradable goods, y^T is the endowment of tradable goods, and y^N is the endowment of non-tradable goods. We employ Negishi's Pareto weight denoted by ω. The objective function is the discounted sum of present value of expected utility, which is aggregated over the whole Asian region with the Negishi weights. The social planner chose the optimum consumption of tradable/non-tradable goods that maximize this objective function under budget constraints of the amount of tradable goods among the whole Asian region and non-tradable goods in each country. Based on Backus and Smith (1993)'s formulation, this problem has first-order conditions which satisfy:

$$
\gamma \Delta \log(c_i/c_j) = \Delta \log(e_{ij}),
$$
(8)

where c is total consumption and e is the real exchange rate of country i for j country currency. Therefore, the optimal consumption path will be the one where the consumption growth rate of each country correspond to the changes of relative price shown by the real exchange rate. To test the theoretical result of equation (8) using actual data, we transform equation (8) into the following equation (9):

$$\Delta \log c_i = a_1 \underbrace{\frac{1}{N}\sum_{j=1}^{N}\Delta \log c_j}_{average\, consumption\, growth} + a_2 \underbrace{\frac{1}{N}\sum_{j=1}^{N}\Delta \log e_{ij}}_{real\, exchange\, rate} + \zeta \Delta \log y_i + u_i,$$

(9)

where u shows a stochastic error term. Note that equation (9) is a variable addition test formulation: since $\Delta \log y$ which is the growth of GDP per capita is excluded from (8), the "full consumption insurance" hypothesis, where the insurance mechanism is as a whole effective, can be tested by testing the null hypothesis that $\zeta = 0$ in equation (9).

We used aggregated data of Asian countries covering the period between 1980 and 2007, extracted from the following sources: The nominal exchange rate and PPP rate is from the Penn World Table. The data about natural disasters is from the EM-DAT, and data about economic crises is from the website of Professor Carmen Reinhart of Harvard University. We used the data of natural disasters in 12 countries in East and Southeast Asia; Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, Philippines, Taiwan, and Thailand. For data of economic crises, we used that of eight countries; China, Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan, and Thailand. Table 5 shows the number of occurrences of these natural disasters and economic crises from each year.

Table 6 reports the estimation results of equation (9). Out of four specifications, specification (A) is based on OLS, specification (B) is the estimation using the country fixed effects. (C) and (D) are the estimations using IV-fixed effects, employing disaster variables as a set of instrumental variables for GDP per capita which is treated as an endogenous variable. (C) is the estimation using 8 countries with both data of economic crises and natural disasters, and (D) is the estimation of 12 countries with data of natural disasters.

The estimation result in Table 6 indicates that the full consumption insurance hypothesis, i.e., H_0: $\zeta = 0$, is strongly rejected at 1% significance level in all specifications. These results show that the insurance mechanism for disasters in the Asian region is far from complete. Also, in our best estimates of specifications (3) and (4), the estimated coefficient of ζ is 0.426 and 0.897, respectively. These estimation results imply that in eight countries in specification (C), which are relatively high/middle income countries in East and Southeast Asia, 57% of income change caused by natural disasters or economic crises are diversified away by broader market and non-market insurance mechanisms within the region, and the remaining 43% are non-insured shock arising from disasters, directly affecting consumption in each country. On the other hand, in specification (D). When we include low income countries such as Laos, only 10% of income changes due to disasters are diversified, and the insurance mechanism is ineffective for the other 90% of the income shocks. According to the first stage estimation results, insurance mechanisms are ineffective to the inflation crises and drought, i.e., one of the climatological disasters. Therefore, it can be said that construction of insurance mechanisms for these disasters are especially important.

Table 5. Incidence of disasters in East and Southeast Asia

	Currency	Inflation	Banking	Geophysical	Meteorological	Hydrological	Climatological	Biological
# of Countries	8	8	8	12	12	12	12	12
Year								
1980	1	1	1	7	0	0	6	4
1981	0	1	2	6	8	7	4	3
1982	0	0	2	8	9	9	6	5
1983	2	0	4	8	9	0	6	5
1984	3	1	3	6	6	9	3	3
1985	0	1	4	8	0	9	5	5
1986	1	0	4	5	8	9	5	3
1987	0	0	4	4	7	6	7	3
1988	0	0	2	8	6	8	5	4
1989	1	0	0	7	0	7	3	3
1990	1	0	0	6	1	9	6	6
1991	0	0	0	4	9	8	5	3
1992	0	0	3	6	0	8	5	5
1993	0	0	2	6	9	9	4	1
1994	1	1	3	4	7	8	3	1
1995	0	0	3	6	6	7	3	2
1996	0	0	3	6	7	0	2	5
1997	5	0	8	5	7	6	5	5
1998	2	1	7	3	6	6	4	7
1999	0	1	7	5	6	0	6	5
2000	3	0	6	5	9	0	2	6
2001	0	0	6	4	8	1	0	2
2002	0	0	2	6	9	8	4	9
2003	0	0	0	6	0	0	3	1
2004	0	0	0	8	1	1	5	8
2005	0	0	0	5	9	2	7	8
2006	0	0	0	6	7	2	4	6
2007	0	0	0	8	7	0	5	6

Note: Twelve countries were covered for natural disasters (Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, the Philippines, Taiwan, Thailand, and Viet Nam) and eight for economic disasters (China, Indonesia, Japan, Korea, Malaysia, the Philippines, Taiwan, and Thailand).

Table 6. Test of full consumption risk-sharing hypothesis of Sawada (2011)
(Dependent variable: per capita consumption growth rate)

		(A)	(B)	(C)	(D)
	Method	OLS	FE	IV-FE	IV-FE
Per capita GDP growth rate		1.009***	1.010***	0.426***	0.897***
		(0.128)	(0.179)	(0.093)	(0.09)
Observations		336	336	214	336
Adjusted R-squared		0.538	0.539	0.506	0.514
Number of countries		8	12	8	12
First stage joint F statistics				7.28	8.4
Sagan's over identification test (p-value)				0.224	0.189

Note: Robust standard errors in parentheses. *** $p<0.01$; ** $p<0.05$; * $p<0.1$. Year dummies are included.

III-2-2. *Toward establishment of international insurance mechanism against catastrophic disasters*

What is the role of Japan's ODA? The test results in Table 6 indicate the lack of insurance mechanisms in the Asian region and importance of promoting such mechanisms to reduce the damage arising from catastrophic disasters. In general, market mechanisms often find themselves unsuited for such catastrophic disasters. We can verify this limitation especially in low income countries by comparing specifications (C) and (D) in Table 6. Therefore, Japan's ODA should aim at filling the gap by providing effective policy tools to avoid the remaining catastrophic risks which threaten the poor in the region. Since economies in the Asian region are strongly connected through a tight supply chain network, not only is there direct damage from catastrophic disasters but also the indirect damage can widely spread across the region. Establishment of insurance mechanisms within the region are indispensable to support the sustainable growth of Asia, the center of global economic growth.

First, we should actively use the ODA to construct a stable global monetary system with an early warning system and emergency financing facilities to prevent and cope with economic crises in developing countries. After repeated financial and currency crises, feasibility of an "early warning system" for a future economic crisis has been widely discussed at high-level forums such as the G20 meetings. Yet, as Rose and Spiegel (2009) point out, a reliable early warning system has yet to be developed. On the other hand, there has been progress in developing bilateral and multilateral financial arrangements against crises. In 2009, for example, the International Monetary Fund (IMF) established a new prevention facility against economic crises. In East Asia, the bilateral currency swap agreement under the Chiang Mai Initiative (CMI) has been broadened into a multilateral framework since 2010, i.e., "Chiang Mai Initiative Multilateralization (CMIM)," through which each member country can weather negative impacts of economic crises collectively by a multilateral currency swap arrangement. This is a regional insurance mechanism with both "mutual cooperation" and "public assistance" functions working against economic crises. It will be important for Japan to keep supporting these schemes as a part of its Asian economic cooperation strategy.

Second, while mitigation strategies for global climate change is important, adaptation strategies are indispensable as well. ODA plays an important role in facilitating adaptation policies in developing countries which are vulnerable to climate change and resultant epidemics of infectious disease, draughts, and shrinkage of lebensraum by rising sea levels. These catastrophic risks are difficult to cope with only by private market mechanisms and public mechanisms of developing countries, and therefore ODA can play an important role. In the field of natural disasters, specific examples include a large scale investment for physical infrastructure financed by concessional ODA loans to control losses due to natural disasters.

Third, ODA can support new innovative preparation mechanisms for natural disasters such as "parametric insurance" or "index insurance." This type of insurance pays out on the pre-determined index. It is an excellent system that alleviates the transaction costs required

by conventional indemnity-based insurance systems to assess damage.[4] Examples include micro-insurance schemes based on rainfall, temperature, or remote sensing measurements such as the Normalized Difference Vegetation Index (NDVI). There are ongoing programs in India, Thailand, Eastern African countries, and other developing countries. Another notable example is the Caribbean Catastrophe Risk Insurance Facility (CCRIF), which is a parametric, multinational hazard regional-level insurance fund for hurricanes and earthquakes that works with the international reinsurance market. Haiti was a member of the facility, and after the Haiti Earthquake in January 2010, the government received 7.75 million dollars in earthquake insurance—around 20 times its premium—as soon as two weeks after the quake. This is evidence of the importance of preparing a new insurance system such as CCRIF. In the Asian region, the Pacific Disaster Risk Financing and Insurance (PDRFI), a similar cross-country insurance fund, is spreading among Pacific Island nations.

Advanced nations can deal with a major disaster by managing their financial resources. But developing nations, which carry diverse risks of major disasters, have weak financial groundwork and are less tolerant of such risks. Disasters come in a complex way, as was the case with the Great East Japan Earthquake.

This is why a global system of pooling the risks of the different types of disasters would be effective for both developing and advanced nations to diversify the risks of disasters. In other words, we should also work on the securities and reinsurance markets to develop a global disaster insurance system that would encompass various regional frameworks such as CCRIF and CMIM beyond disaster types.

When we consider the actual form of such a system, there are numerous issues involved, such as whether it would be an institutionalized system such as a disaster fund, or something more flexible such as a coordination forum. Yet, Japan has experienced diverse forms of disasters, including the Second World War, the Great Hanshin-Awaji Earthquake, and the financial crises of the late '90s. Japan should therefore have sufficient capacity to take the lead in developing a system that undertakes comprehensive preparations against the risks of a variety of disasters. Also, this is the right direction because Japan has been supporting the concept of "human security" as the core philosophy of its ODA policies.

III-3. *Leading development goals in international society*

From a broader point of view, Japanese ODA can also play an important role to "lead the development goals of international society". Needless to say, ODA has been a vital policy means to achieve the MDGs in each sector. However, we now need to maximize the use of ODA as a future policy tool of actively supporting the next-generation international development goals, looking forward to post-2015 over the achievement of the MDGs. Indeed,

[4] In the context of Africa, Miguel (2009) proposes a new type of foreign aid—Rapid Conflict Prevention Support (RCPS), which would reduce the risk of conflicts by using this information to estimate droughts and natural disasters, and by transferring aid immediately. Such a scheme can be materialized, for example, by monitoring network systems like Famine Early Warning Systems (FEWS) of U.S. Agency for International Development (USAID).

Japan has contributed the current development goals by supporting the "OECD New Development Strategy", "Kyoto Protocol", "Global Fund" and so forth. Also, the Japanese ODA has given full play of its comparative advantage and best practices such as support by assisting mainstreaming infrastructure development, the "Kaizen" project to improve productivity of firms using technological cooperation, One Village One Product (OVOP) projects for regional development, and cooperation in the field of disaster prevention, in both hard and soft dimensions.

In this process, strategic contributions to international public goods through high level academic outputs are required to lead the world for setting the next international development goals. Indeed, rigorous scientific studies on development policies have been emerging one after another in the field of development economics based on the RCT approach led by institutions such as JPAL, World Bank, the DAC-related Network of Networks on Impact Evaluation (NONIE), and International Initiative for Impact Evaluation (3Ie). "Internationally competitive academic research" will constitute the core part of Japan's ODA related activities in order to enhance the quality of ODA as a tool of diplomacy and promote national interests in the medium to long term.

Also, in 2010, South Korea became a member of the DAC of the Organisation for Economic Co-operation and Development (OECD). Meanwhile, emerging economies such as China, India, and Brazil, which have yet to graduate from the list of ODA recipients, are increasingly acting as emerging donors, providing assistance to less developed countries (LDCs). While various types of new "emerging" donors are rising in their presence, Japan, which was once the world's biggest donor, seems to be fast losing its presence due partly to its fiscal straits. However, now that Japan's ODA budget is shrinking, it is all the more important to take this opportunity to improve the quality of its assistance by selecting and focusing on such areas as the environment and disaster prevention where the country can capitalize on its own experience. Developing an effective strategy that can address these needs will be crucial if Japan is to take a lead in promoting development goals in the international community in the post-2015 process. In this context, cooperating with Korea, an emerging donor sharing similar experiences and philosophies in economic development as Japan, would be important. The Japan-Korea cooperation in ODA will stimulate the rule making process based on "East Asian experience of development and aid" in the DAC.

IV. Concluding Remarks

The world economy once led by three cores, i.e., the USA, Japan and Europe, has changed drastically by the emergence of the Asian region. Not only a rapidly growing China but also those countries in South Asia and Africa that have long been considered to be trapped in poverty are beginning to see signs of steady growth. Against this backdrop, some people are questioning why Japan needs to provide ODA at a time when the country is facing its own fiscal crisis. At the same time, however, the fact that 163 countries and regions offered assistance to Japan in the wake of the March 11, 2011, earthquake made many people re-

appreciate the value of its overseas assistance to date. What should constitute Japan's ODA program in the coming years? Having this background, this paper discussed the direction Japan should take in its future Asian economic cooperation strategy.

There is an ongoing change in the global trend of ODA such as changes in modalities, donors and stakeholders. In the meantime, Japan has been forced to reduce the amount of its ODA, as achieving fiscal consolidation has become an urgent task. It has been pointed out that Japan cannot help but decline to the status of a "middling donor" in the near future. Japan has three keys to achieving success with its ODA strategies in Asia: First, ODA should be defined as a lubricant to facilitate economic growth and poverty reduction through private-sector investments in Asia, thereby serving as a means to bring benefits to both Japan and recipient countries. Second, ODA should function as a mechanism for avoiding the impact of various great risks that may arise in the world. For instance, ODA should be utilized to prevent the likelihood of poor people getting affected by natural and manmade disasters. Third, developing an effective strategy that can address these needs will be crucial if Japan is to take a lead in promoting development goals in Asia and the whole global development community in the post-2015 process. "Internationally competitive academic research" constitutes the core of such activities, so steadily accumulating the achievements of excellent academic research programs will enhance the value of ODA as a tool of diplomacy and promote national interests in the medium to long term.

References

Abramovitz, Moses (1986), "Catching Up, Forging Ahead, and Falling Behind", *Journal of Economic History* 46 (2): 385-406.

Baumol, William J. (1986), "Productivity Growth, Convergence, and Welfare: What the Long-run Data Show", *American Economic Review* 76(5): 1072-85. 143-173

Backus, David K. and Gregor W. Smith (1993), "Consumption and real exchange rates in dynamic economies with non-traded goods", *Journal of International Economics* 35(3-4): 297-316.

Benhabib, Jess and Mark Spiegel (2005), "Human Capital and Technology Diffusion" In *Handbok of Economic Growth*, 1A, Chap. 13, ed. by P. Aghion and S. Durlauf, Amsterdam: North Holland, Pages 935-966.

Burnside, C. and Dollar, D. (2000). Aid, Policies, and Growth. *American Economic Review* 90: 847–868.

Chen, Shaohua, and Martin Ravallion (2010), "The Developing World Is Poorer Than We Thought, but No Less Successful in the Fight against Poverty", *Quarterly Journal of Economics* 125(4): 1577-1625.

Chen, Xi and William D. Nordhaus (2011), "Using Luminosity Data as a Proxy for Economic Statistics", *Proceedings of the National Academy of Sciences* 108(21): 8589-94.

CRED (2012), *Annual Disaster Statistical Review 2011*, CRED, IRSS & UCL.

Deaton, Angus, and Alan Heston (2010), "Understanding PPPs and PPP-Based National

Accounts", *American Economic Journal: Macroeconomics* 2(4): 1-35.

Easterly, W., Levine, R. and Roodman, D. M. (2004). Aid, Policies, and Growth: Comment. *American Economic Review* 94: 774–780.

Faaland, Just and John Richard Parkinson (1976), *Bangladesh*: *The Test Case for Development*, C Hurst & Co Publishers Ltd.

Ghosh, Shyamal C., Hasanur Rahman, and AKM Masud Rana (2010), "Revisiting Jamuna Bridge Resettlement Areas: Exploring Livelihood Status of the Affected People", *BRAC Research Report*, September 2010, Research and Evaluation Division (RED), BRAC, Bangladesh.

Health, Rachel and Mushfiq Mobarak (2011), "Supply and Demand Constraints on Educational Investment: Evidence from Garment Sector Jobs and the Female Stipend Program in Bangladesh" *mimeographed*, Yale University.

Henderson, Vernon, Adam Storeygard, and David N. Weil (2012), "Measuring Economic Growth from Outer Space", *American Economic Review* 2012, 102(2): 994–1028

Honma, Masayoshi (2013) "Japan's Asia Strategy from the Perspective of Food and Agriculture (in Japanese)," *Financial Review* Vol.116.

Kang, Sung Jin, Hongshik Lee and Bokyeong Park (2011), "Does Korea follow Japan in foreign aid? Relationships between aid and foreign investment", *Japan and the World Economy* 23(1): 19-27.

Keller, Wolfgang. (1996). "Absorptive Capacity: On the Creation and Acquisition of Technology in Development", *Journal of Development Economics* 49: 199-227.

Kharas, Homi (2011) "The Emerging Middle Class in Developing Countries", *mimeographed*, Brookings Institution.

Kimura, Hidemi and Yasuyuki Todo (2010) "Is Foreign Aid a Vanguard of FDI?: A Gravity-Equation Approach" *World Development* 38(4): 482-497.

Lewis, Karen K. (1996), "What Can Explain the Apparent Lack of International Consumption Risk-sharing?" *Journal of Political Economy* 104 (2): 267 - 297.

Mankiw, Gregory, David Romer, and David N. Weil (1992), "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics* 107(2): 407-437.

Miguel, Edward (2009), *Africa's Turn?* MIT Press.

Mottaleb, Kohndoker Abdul and Tetsushi Sonobe (2011), "An Inquiry into the Rapid Growth of the Garment Industry in Bangladesh", *Economic Development and Cultural Change* 60(1), 67-89.

Okamoto, Yumiko (2013), "Japan's Innovation Strategy toward Asia (in Japanese)," *Financial Review* Vol.116.

Ohkawa, Kazushi and Hirohisa Kohama (1989), *Lectures on Developing Economies: Japan's Experience and Its Relevance*, University of Tokyo Press.

Ohkawa, K., and Rosovsky, H. (1973) *Japanese Economic growth: Trend Acceleration in the Twenty Century*. (Stanford: Stanford University Press).

Rajan, R. and Subramanian, A. (2008). Aid and Growth: What Does the Cross-Country Evidence Really Show? *Review of Economics and Statistics* 90(4): 643-665.

Roodman, D. M. (2007). The Anarchy of Numbers: Aid, Development, and Cross-Country Empirics. *World Bank Economic Review* 21(2): 255－277.

Rose, Andrew K. and Mark M. Spiegel, (2009), "Cross-Country Causes and Consequences of the 2008 Crisis: Early Warning", *CEPR Discussion Paper* 7354.

Sawada, Yasuyuki (2007), "The Impact of Natural and Manmade Disasters on Household Welfare", *Agricultural Economics* 37 (s1), 59-73.

Sawada, Yasuyuki (2011), "On the Effectiveness of Overall Insurance Mechanisms against Disasters in East and Southeast Asia", Ponciano S. Intal Jr., Sothea Oum, and Mercy J.O. Simorangkir, Eds., *Agricultural Development, Trade and Regional Cooperation in Developing East Asia*, Economic Research Institute for ASEAN and East Asia (ERIA).

Sawada, Yasuyuki (2012), "Infrastructure, Social Cohesion, and Jobs in Development: A Note on the WDR Bangladesh Case Study" *mimeographed*, Research and Evaluation Division (RED), BRAC, Bangladesh.

Sawada, Yasuyuki, Ayako Matsuda, and Hidemi Kimura (2012) "On the Role of Technical Cooperation in International Technology Transfers", *Journal of International Development* 24(3): 316-340.

United Nations (2012), *The Millennium Development Goals Report 2012*, United Nations.