

On the Japanese Contribution to the Equalization of World Income

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1. Introduction

In recent years, the integration of Japan and the rest of the world has been deepened in aspect of capital movements, migrations, and travels. The ratio of Japan's total overseas assets to gross national product (GNP) jumped from 15 percent in 1980 to 60 percent in 1991. The number of people who departed from or arrived at Japan increased from the 1980 total of 10.4 million to the 1991 total of 28.8 million.

As Japan has been more closely integrated with the global economy, both the political and the economic stability of other countries have become more crucial for Japan's security. In future, Japan will need to be more concerned with the welfare levels of other economies. Fortunately, because of the economic growth in the past four decades, Japan can afford to assist less-developed countries (LDCs). Japan accounted for 18 percent of the global GNP in 1993. In what follows, we evaluate the present Japanese contribution to the equalization of world income and discuss desirable revision of Japanese policies.

The plan of this paper is as follows: Section 2 shortly reviews the progress of the world income distribution and the convergence of countries. Section 3 analyses the contribution of Japanese private sector to poverty stricken countries through international trade, capital movements, and migrations. Section 4 evaluates Japan's official development assistance (ODA) in comparison with other developed countries'.¹ In recent years, the United States loudly complains that Japan is not bearing an equitable share of the burden of supplying international public goods. Although the catchy phrase, 'burden sharing' becomes very popular in the policymaking process of Japan's ODA, there is few empirical studies that test whether the ODA is actually a provision of international public goods or not. If the ODA is a provision of pure public goods, that is, each donor country only concerns with the total amount of the

¹ According to DAC, we qualify grants and loans which satisfy the following three conditions as ODA. 1) undertaken by the official sector, 2) with promotion of economic development or welfare as main objectives, 3) at concessional financial terms (if a loan, at least 25% grant element).

world aid and if the size of each donor's aid is determined as a Nash equilibrium, that is, each donor takes the size of other donors' aid as given, the expansion of Japanese aid will be completely canceled by the same amount contraction of some other donor's aid. In such case, the collaboration of donor countries is indispensable for the successful expansion of the world aid. In Section 5, we study the ODA of the Development Assistance Committee (DAC) members and estimate how much the ODA has characteristics of a provision of international public goods.

2. Income Distribution and Economic Growth in the World Economy

The World Bank (1992) classifies economies into four groups by per capita income. Table 1 summarizes main economic and social indicators of each group.² The table shows that more than a half of the people in the world live in low-income developing economies with per capita incomes of \$610 or less in 1990. The group of the high-income economies with per capita incomes of \$7,620 or more has 15.5% of world population and produces 73.2% of world GDP.

Insert Table 1

There has been an improvement in social indicators in developing countries over the last 30 years. According to *Human Development Report 1992* published by United Nations Development Program, the average life expectancy of developing countries has been extended by 17 years in the last 30 years and the average adult literacy rate has been increased by one third in the last 20 years. But the fact that the life expectancy

² In order to decide the concessional term of aid, the World Bank and DAC use the per capita GNP of recipient country and the income grouping in Table 1. Japan's ODA policy follows this guideline (see Kohama 1992). According to 1992 guideline, Japan basically gives grant aid only to the countries of which the 1990 per capita GDP is less than \$1195 and do not give any type of ODA except technical cooperation to upper-middle-income and high-income countries. For example, in 1993, Japan ceased giving grant aid to Thailand, of which the 1990 per capita GNP was \$1420.

and the adult illiteracy rate of the low-income economies except China and India are still 55 years and 56% respectively indicates the difficult social situation of these economies.

We can review the transition of income distribution in the global economy by Table 2.³ The upper and the lower figures in each cell denote the distribution of GDP and that of GDP+ODA respectively. The table shows the following facts. First, the income share of both the lowest and the lower-middle income tier continues to decline in the period 1971-88. The decline of the lowest income tier is striking. This fact implies that the distribution of the world income has been inequalized. Secondly, the redistribution effect of ODA is negligible. Even the income of the lowest tier is raised only by 5%. As an another problem of the present ODA flows, we can point out that the amount of ODA received by the lower-middle income tier is greater than the lowest income tier.

Insert Table 2

It has been well known that the ODA flows constitute a small portion even of the least developed countries' income. That is why, donor countries tried to make aid a catalyst for recipients' development (see Krueger et. al. 1989). Therefore, the fact that the distribution of the world income has been inequalized is more serious than the fact that the redistribution effect of the ODA is negligible.

Recent empirical researches on economic growth found that although the simple correlation between per capita growth and the initial level of per capita GDP is close to zero and the variance of growth rates is especially large among less developed

³ In several aspects, this table is incomplete. First, the table takes into account only the countries of which GDP data is available. Secondly, the table neglects the inequality of income within each country. The World Bank (1992) reports that the richest 10% of all the households in Brazil got 46.2% of total household income in 1983. Thirdly, the table takes account of neither the other official flows than ODA nor aids from non DAC member countries and private voluntary agencies.

economies, the correlation becomes substantially negative if measures of initial human capital are held constant. Moreover, given the level of initial per capita GDP, the growth rate is substantially positively related to the starting amount of human capital (see Romer 1990b, Barro 1991, Blomstrom 1992, Levine and Renelt 1992). The importance of human capital is not a new fact finding in development economics. For example, Schultz (1971) stressed that the social rate of return to schooling exceeds the private rate of return to it.

As Table 1 shows, the explosive population growth in LDCs reduced the growth of per capita income. In growth models with endogenous fertility, such as Becker and Barro (1988), any change that reduces the cost of schooling tends to reduce fertility and tend to increase per capita income. In effect, people shift from saving in the form of children to saving in the form of human capital. Barro (1991) found that countries with high human capital have low fertility rates.

Developing countries recognize the importance of human capital and spend about 20% of government expenditure for education (UNESCO 1992). But according to DAC (1992), per student government expenditure for education in developing countries was in declining trend in 1980's because of the adverse economic situation.

Since the attainment of basic education crucially depends on households' intentions, the improvement of the quality of life is a necessary condition for human capital accumulation. So that, not only the assistance to schooling and the technical cooperation but also aid to meet basic human needs (BHN), such as food aid, health programs, and programs to improve rural water supply, will contribute toward increasing human capital.⁴ As we have seen, recent empirical results of development economics indicate the importance of human capital. Especially for LLDCs, it seems

⁴ On determinants of the speed of human capital accumulation, see Shultz (1993,)

that the aid to meet BHN is more efficient than aid to construct economic infrastructures.⁵

3. Contribution of Private Economic Activities

What is potentially the most supportive of economic development in LDCs is the private sector with an overwhelming size of funds. As is well known, all the participants benefit from economic transaction usually. But in international transaction, it seems that “benefit of exchange” is not fully enjoyed because of many kinds of obstacles to transaction. In such case, if Japan’s private sector expands transaction with LDCs, it will contribute to economic development there. In this section, we review transactions between developed and developing countries: capital movements, trade, and migrations.

3.1. International Capital Movements

According to Summers and Heston (1991), per worker capital in low-income countries, such as India, measured in 1988 international prices is less than \$2,000, in lower-middle income countries, such as Thailand and Philippine, it is around \$3,000, and in high-income countries, such as the U.S., Japan, and West European countries, it takes value between \$30,000 to \$50,000. This huge gap in capital labor ratios and continuous immigration of LDCs’ workers into high-income countries indicate that present international capital movements are too small to equalize factor prices among countries.⁶

From current account balances, we know the size of net capital inflows into LDCs. But we should be careful with official balance of payment statistics, because errors and omissions are so large that the sum of all the countries current account balances, which

⁵ On the importance of BHN strategies in LLDCs, see Streeten et. al. (1981).

⁶ There is a theoretical possibility that capital inflows slow down the development of LDCs. Chamley (1992) presented a model in which capital inflows increase wage rates, which is an opportunity cost of getting education, and hinder accumulation of human capital. Fukao and Hamada (1990, 1994) presented a model in which capital inflows reduce interest rates and hinder savings.

should be zero by definition, records a deficit of several hundred billion U.S. dollars. According to an estimate by IMF (1991), which corrected errors and omissions in the statistics, the sum of all the developing countries' current account balances records surplus since 1982, the year when the international debt problem came to the surface. That is, there is no net capital inflow into developing countries.

The World Debt Table of the World Bank reports a breakdown of capital movements except short term capital. According to the Table, after the international debt problem, direct foreign investment replaced with bank loans as a major channel through which middle-income countries finance their external deficits. Low-income countries mainly relies on official capital flows as a source of finance before and after the international debt problem. This tendency is also revealed in geographic difference of major channels of finance. East Asian and Pacific countries, which include successful middle-income countries, receive huge amount of foreign direct investment inflows. And recently, bank loans to this region are also increased. In contrast with this, South Asian and Sub-Sahara African countries mainly relies on official capital flows as a source of finance.

As a channel of international finance, direct investment is more desirable for LDCs than bank loans or bond finance in several aspects. First, when a LDC has a large debt burden, its payments to creditors do not fall if its real income falls. And especially in the case of bank loans with floating-rate contracts, the economic risk that borrowers take is very serious. In contrast with this, in the case of foreign direct investment, a fall in LDCs' income simply reduces the earnings of foreign investors. Secondly, in the case of foreign direct investment, the investors have more ability to monitor projects and they have more incentive to do so than lenders have in the case of

bank loans or bond financing.⁷ Thirdly, in the case of foreign direct investment, we can expect substantial technology transfer from parent companies.^{8, 9}

Next, we turn to capital flows from Japan to LDCs. In the case of private capital movements, analysis of bilateral flows is not so much meaningful as official flows. For example, when investors including some Japanese deposit money at an Eurobank, and the bank lends the money to borrowers around the world, we can not identify how much of loans to LDCs is financed by Japanese money. It seems that items of balance of payment statistics, which is worthy of being analyzed, are current account balance, official lending, and direct foreign investment. We will discuss about official loans in the next section.

The Japanese surplus on current account surpasses 100 billion U.S. dollars since 1992. Japan is the sole substantial capital exporter in main industrialized countries since Germany became a capital importer because of 1990 unification. Although the Japanese surplus is sometimes criticized as an export of unemployment by its trade partners, from a long-term viewpoint, the Japanese surplus reduce real interest rates in world financial markets and certainly assist LDCs' development. But we should also notice that the main ultimate borrower in the world financial market is the U.S., which has the biggest current account deficit.

We can analyze geographical destination of Japan's foreign direct investment using Ministry of Finance statistics. Table 3 summarizes cumulus of Japan's direct investment by income categories and by region. The same income categories as Table 1 is used. What is the most striking in Table 3, is that direct investment to the

⁷ For problems of international bank loans, see Krugman and Obstfeld (1987), Kawai and Murase (1992), and Teranishi (1993).

⁸ Blomström et. al. (1992) and Blomström and Kokko (1993) empirically study the positive effect of foreign direct investment on host countries.

⁹ There is a story that multinational enterprises invest in developing countries to monopolize resource rents. But as LDCs' governments become more independent and more sophisticated and foreign direct investment becomes more prominent in manufacturing industries, this type of harmful effects become unlikely. For this issue, see Caves (1982) and Fukao et. al. (1994).

low-income countries, in which about 60% of world population live, is negligible. Especially, if we exclude investment to Liberia, which is a ship registry country of convenience, and that to Indonesia, affluent resources of which attract investment, the direct investment to low-income countries is less than 1.5% of Japan's total direct investment. In case of East Asia and Pacific to which Japan is rapidly increasing direct investment, more than half of Japan's direct investment goes to high-income countries, such as NIEs.

Insert Table 3

Why direct investment to low-income countries is so small? Ministry of International Trade and Industry (1991) reports the results of questionnaire survey of foreign affiliates of Japanese companies. Responding to a question about local troubles, many manufacturing affiliates in low-income countries choose 'political instability,' 'lack of infrastructures,' 'prohibition from or restriction on remittance of profit to Japan,' and 'restriction on import of intermediate goods.'

To sum up, Japan's huge fund does not flow into low-income countries, which have 60% of world population, either through indirect investment by private sector or through direct investment. Since outward investment from Japan is almost completely liberalized since the end of 1970's, it is apparent that private capital does not flow into low-income countries because it is not profitable. It seems that there is little room for government intervention in this issue. But some policies, such as an assistance to improve infrastructures in low-income countries or extension of official insurance system for international investment, will promote private capital flows into low-income countries.

3.2. International Trade

As Mundell (1954) pointed out, trade and factor movements are substitutes as the equalizers of the factor price as long as both economies are imperfectly specialized. For example, if a labor-abundant LCD exports labor-intensive goods and imports capital-intensive goods, the wage rate of this country will increase and the national welfare will be improved just in the same way as there were capital inflows.

In recent growth models of open economies, such as Krugman (1990), production and export of manufactured goods by LDCs promote their economic growth through learning by doing effect or through improvement of production efficiency caused by continuous competition with foreign producers. The hypothesis that relatively open countries and especially countries oriented to export of manufactured products tend to grow faster than relatively closed countries has been supported by several empirical researches, such as Edwards (1992), Levine and Renelt (1992), and Fukuda and Toya (1993). According to this hypothesis, Japan can contribute to LDCs' development through import of their manufactured products.

Table 4 shows main industrialized countries' tariff and non-tariff barriers by industry. The figures are based on Deardorff and Stern (1986,87). In case of manufacturing sectors except food, beverages, and tobacco, Japan's tariff and non-tariff barriers are relatively low. By contrast, the U.S., U.K., and France have high non-tariff barriers in several manufacturing sectors. In the case of agriculture, forestry, and fisheries, Japan's trade barriers are strikingly high. Since LDCs have comparative advantage in these sectors, if Japan liberalize imports in these sectors, it will contribute to development of LDCs.

Insert Table 4

Japanese imports of manufactured products are highly concentrate on developed countries. Table 5 reports that in 1991 less than one quarter of Japan's imports of

manufactured products excluding food and kindred products came from LDCs excluding NIEs, which are classified as high-income or upper-middle-income countries by the World Bank. As a trend, Japan's imports of these products from China, India, and ASEAN countries are growing much faster than from either Europe or North America. But in case of imports from Africa and Latin America, both the import shares and the growth rates of imports are very low. As a market of Asian countries' manufactured products, Japan's importance have not grown substantially (Bank of Japan, *Kaigai Keizai Toukei Nenpou*). Therefore, it seems that Japan's imports from Asian countries have increased more substantially than imports from Africa and Latin America because Asian countries gained competitiveness and countries in Africa and Latin America lost it over the period.¹⁰ The World Bank (1993) reports that in 1980-91 period average annual growth rate of nominal export in U.S. dollar term of all the lower-middle income countries in East Asia and Pacific was 10.2%, that of Latin American countries was 2.9%, and that of Sub-Sahara African countries, 2.7%.

Insert Table 5

As we have seen, Japan's trade barriers in manufacturing sectors are already low. Therefore, in the same way as capital movements, what the Japanese government can do to increase imports from LDCs is limited. But in the case of agricultural, forestal, and fishery products and food and kindred products Japan has lot to do in liberalization of imports.

Another policy issue is Japan's protectionism in the future. Now Japan is one of the most industrialized country with high labor cost. As Japan loses comparative advantage in labor intensive sectors, political pressures into protectionism will certainly

¹⁰ For more comprehensive analysis on this issue, see Lawrence (1992).

become more prominent. If Japan can resist with this temptation, it will benefit not only Japanese consumers but also LDCs.¹¹

3.3. International Labor Movements

Since labor is scarce and wage rate is high in developed countries, workers in LDCs have an incentive to migrate to developed countries. If developed countries admit migrant workers, labor will become less abundant in LDCs and not only the migrant workers but also workers who stays in LDCs will get higher wage incomes. On the other hand, since capital becomes less scarce in LDCs, capital income in LDCs will decline. In a standard neoclassical model, it can be shown that average welfare level of all the people who initially lived in LDCs before the start of the migration will be improved.¹²

There can be additional effects to the above basic ones. If highly skilled workers, such as medical doctors and engineers exit, LDCs may suffer decline of production level, deterioration of social services, or reduction of tax payers.¹³ On the other hand, migrant workers may remit a part of their income to their relatives in LDCs. Receipt of this type remittance is an important source of foreign currency for some LDCs. In 1989 Bangladesh received 770 million U.S. dollars of remittance from migrant workers, which is equivalent to 59% of this year's total import (the World Bank, *World Tables*, 1992).¹⁴ LDCs may benefit from migration through relief of

¹¹ Whether the U.S., E.U., and Japan permit middle-income countries taking strategic trade policies or not will also greatly affect future development of these countries. For this issue, see Krugman (1987) and Murakami (1992).

¹² For more detail, see Ruffin (1984) and Kuwabara (1991).

¹³ See Bhagwati and Hamada (1974).

¹⁴ LDCs' currencies tend to be overvalued in their official exchange rate. In such a case, migrant workers and their relatives have an incentive to exchange their foreign currency for local currency in a

congestion in public goods (Usher 1977), reduction of unemployment, and technology transfer if migrant workers return to their home country after they get skills in developed countries.¹⁵

To sum up, it seems that developed countries' admission of unskilled migrant workers will improve average welfare level of all the people who lived before the start of migration. Japanese government keeps the principle that it only admits migrant workers with special skills. In 1992, gross inflow of migrant workers into Japan was 108 thousand persons (the Ministry of Justice 1993), which is 1.6 times greater than that of 1987, but still much less than inflows into North American or West European countries (the Ministry of Labor 1992). Judging from statistics on illegally staying aliens, it is certain that much more migrant workers will inflow if Japan relax its restrictions on immigration. According to the estimation by the Ministry of Justice based on entrance and exit record, in 1991 216 thousand aliens illegally stayed in Japan (the Ministry of Labor 1992). Most of the illegally staying aliens have come from low-income countries.¹⁶

Admission of immigrants brings a number of social costs to the host country, such as congestion of public goods and decline of existing unskilled workers' income. And immigrant workers tend to take insecure jobs or hazardous jobs. Therefore it seems that before relaxing its restrictions on immigration the Japanese government should reform Japanese labor system to reduce undesirable side effects of admission

black market and there is high probability that balance of payment statistics will underestimate the remittance. For this issue, see Taylor (1987).

¹⁵ For more comprehensive welfare analysis, see Simon (1989), Borjas (1990), and Borjas and Freeman (1993).

and to improve job securities and safety at workplace. As Bhagwatti (1991) and Chuma (1993) stress, all the developed countries have some restrictions on unskilled workers' immigration. But Japan must recognize that in this issue, Japanese contribution to LDCs is smaller than other developed countries which admit more immigrants than Japan.

4. Official Development Assistance

As we have seen in the previous section, the contribution of private economic activities for promoting economic development of lower income countries is limited. In order to contribute to the equalization of world income, we need official flows, such as Official Development Assistance (ODA) from developed countries. From the viewpoint of the recipient side, official flows from developed countries are very important sources of scarce foreign currency, especially for lower income countries. In 1990, the share of official flows in total net financial flows was more than 50% in total developing countries, and it was more than 80% in Sub-Sahara Africa (DAC 1992).

In this section, we evaluate Japan's ODA in comparison with other developed countries' and discuss desirable revision of Japan's aid policies.¹⁷

4.1. The Characteristics of Japan's ODA

Since 1989, Japan has been the top donor. In 1991, its ODA was \$10.95 billion, which exceeded \$9.64 billion of the U.S.¹⁸ Because of economic development and

¹⁶ In 1991, the top ten home countries of illegally staying aliens are Thailand, Korea, Philippine, Malaysia, Iran, China Pakistan, Bangladesh, Taiwan, and Burma, in descending order. The majority of exposed illegal immigrants worked as factory workers, construction workers, or hostesses.

¹⁷ Since ODA accounts for main part of official flows, we will concentrate on it. In 1991, 80% of Japan's total official flows was ODA (MITI 1993). For comprehensive surveys of Japan's aid, see Kohama (1992) and Yamazawa and Hirata (1992).

continuing large current account surplus, the demand that Japan should increase foreign aid have become more active within Japan and from abroad. In order to meet the demand, Japanese government has laid several medium-term target programs and quickly expanded its ODA in 1980's.

The medium-term target programs includes plans to improve the quality of Japan's ODA. Japan has been criticized of the low quality of its aid. There are three standard measures of aid quality; grant element (G.E.), grant-aid ratio, and tying status. G.E. and grant-aid ratio are measures of financial conditions. G.E. indicates concessionality. For example, grant aid does not have to be repaid and has a G.E. of 100%. Tying status is a measure of procurement conditions, and has three categories; generally untied, partially untied (also called LDC untied), and tied. Generally untied aid allows bidding by any suppliers, partially tied aid limits bids to suppliers from the donor country and LDCs, and tied aid restricts bidding to suppliers from the donor country. The condition of procurement has been improved substantially since 1970's. In 1991, 65.9% of Japan's bilateral ODA was generally untied. This ratio exceeded the average of all the DAC member countries, 42.1%. In case of yen loans, only 27% of resources are procured from Japanese firms in 1990. Now, the criticism that Japan's ODA is mercantilistic is incorrect. It is said that Japanese firms are becoming more reluctant to invent new aid projects since they can not expect their tender to be accepted.

Although the financial conditions, such as G.E. and grant aid, have been improved, Japanese aid is still characterized by less concessional conditions than other developed countries'. In 1990 Japan's G.E. and grant-aid ratio were 74.8% and 39.8% respectively,

¹⁸ The figure of the U.S. do not include forgiveness of non-ODA debt, such as military debt.

which were lower than DAC member countries' averages, 94.1% and 77.2%. It should be taken account that financial conditions of aid are closely related to per capita income level of recipient countries. Japan's ODA started in 1950's as reparations and technical aid to Asian countries, and has been concentrated on this region because of its close relationships. Japan's main recipients, such as Asian Newly Industrialized Economies (NIEs) and members of Association of Southeast Asian Nations (ASEAN) have succeeded in their economic growth. Because Japan's ODA policy follows the guideline of the World Bank and DAC which restricts concessional aid to upper-middle income and high-income countries (see footnote 2), Japan's ODA tend to be less concessional.

From the viewpoint of the equalization of world income distribution, one of the major problems of Japan's ODA is that Japan concentrate its aid more to middle and high-income countries than to low-income countries. In 1990, Japan's ODA to Least Developed Countries is 18% of total ODA and 0.06% of GNP, which are lower than the averages of DAC members, 26% and 0.09%. Again, this fact reflects geographical distribution of ODA which is determined by historical factors and economic relationships. But now, Japan should open its aid for low-income countries, such as Sub-Saharan African and South Asian countries.¹⁹

4.2 Human Capital, Economic Growth, and ODA

In Section 2, we have seen that the redistribution effect of ODA is negligible. If we would like to use ODA to equalize world income distribution substantially, huge

¹⁹ In other donor countries as well, geographical distribution of ODA greatly reflects historical factors. European countries tend to grant their aid to former colonial countries. U.K. to India and Spain to Latin America. The geographical distribution of U.S. aid reflects its international security policy. Now, countries in Middle East and North Africa are main recipients. In 1990, Israel was the top recipient of U.S. bilateral aid, and Egypt was No. 2. Since per capita GNP of Israel exceeds \$ 1000, it seems that the

increase of ODA (especially for low-income countries) would be required. We should use ODA as a catalyst for LDCs' development.

Recent empirical studies and the endogenous growth theory, such as Lucas (1988) emphasize the importance of human capital for economic development. As Table 1 shows, in low-income countries basic social indicators, such as life expectancy at birth and adult illiteracy rate, are still poor. If donor countries used the major part of their ODA to meet BHN, such as food aid, health programs, and basic education, it would greatly contribute for accumulation of human capital and economic growth in low-income countries. But now, Japan's aid is allocated mainly to economic infrastructures, such as roads, ports, and electric-power production in middle-income countries. In 1989-90, 31.9% of Japan's ODA is used for economic infrastructures and 18.9% for social infrastructures. In case of total ODA from all the DAC member countries, 25.3% for economic infrastructures and 23.5% for social infrastructures.

Japan should also change its aid principle. Japan traditionally preferred to finance the foreign exchange share of investment costs and avoided direct assistance to finance the local currency costs and the annual recurrent costs, such as teachers' salaries. Since it is difficult for low-income countries to finance even the local currency costs and the annual recurrent costs, it seems that assistance to finance such costs is also important to meet BHN in low-income countries,

5. Aid as a Provision of Impure Public Goods

aid to Israel is certainly very "strategic." America's aid had same characteristics in 1960 and 70's. Around 1970, South Vietnam was the top recipient.

In the previous section, we evaluated Japan's aid policy in comparison with other developed countries and discussed desirable revisions. If there is a substantial interaction among developed countries' aid policies, unilateral expansion of Japan's aid might be canceled by the contraction of some other donor's aid. We need cooperation among developed countries. In this section, we empirically examine the interactions. The key concept is the impureness of aid as a provision of public goods.²⁰

In the case of aid, if aid flows contribute to more stable international orders and all the donor countries get common benefits, or if aid flows mitigate poverty among developing countries and satisfies altruistic mind of all the donors, then aid is considered to be a pure public good. The utility level of each donor does not depend on its own aid flow, but on the total aid flow from all the donors. In contrast with this, if a donor use aid for export promotion, own national security, or it gets satisfaction only from its own aid activities, then aid can be analyzed as expenditure to private goods. In such case, the utility level of a donor does not depend on other donors' aid flows. We can consider an intermediate case of the above two extreme cases. That is, aid is a provision of impure public goods. Following the theory of public goods, we define impure public goods as goods that do not completely satisfy two conditions; nonexcludability and nonrivalry, which are satisfied in the case of pure public goods.²¹

²⁰ On the mercantilistic aspects and recent transition of Japan's aid, see Yanagihara and Eming (1991). For empirical analysis on geographical allocation of aid, see Cline and Sargen (1975), Dudley and Montmarquette (1976), Teranishi (1983), and Okamoto and Yokota (1992). Okamoto and Yokota report that recipient's importance as export market, per capita income, and country size are significant determinants of geographical allocation of Japan's aid. Roberts (1984) analyzes relationship between philanthropies and redistribution by government.

²¹ Empirical study on international public goods started in the field of burden sharing problems in NATO. For this issue, see Sandler and Murdoch (1990) and Ihori (1992). As a comprehensive survey of aid problems, Krueger et al. (1989) is useful. Riddell (1987) studies moral aspect of aid. On the issue of burden sharing between the U.S. and Japan, see Islam (1991).

In the following, we will estimate how much the bilateral ODA of each DAC member country has characteristics of a provision of pure public goods.²² This question has an important implication for desirable coordination system among donor countries. Suppose that the ODA is a provision of pure public goods and the size of each donor's ODA is determined as a Nash equilibrium, that is, each donor takes the size of other donors' aid as given. Then the expansion of one country's ODA will be completely canceled by the same amount contraction of some other donor's ODA. In such case, the collaboration of donor countries is indispensable for the successful expansion of the world aid.

5.1 The Theoretical Model

The government of the i th country chooses its private consumption level c_i and the size of its aid flow x_i so as to maximize the utility of its people. We assume that developed countries' bilateral aid flow is determined as a Nash equilibrium, that is, each donor takes the size of other donors' aid as given.²³ We assume that the welfare level of country i can be denoted by the following Cobb-Douglas utility function.

$$\max_{\{c_i, x_i\}} U^i = \left[\delta_{3i} x_i + (1 - \delta_{3i}) \left(\sum_{j \neq i} x_j + x_i + \delta_{2i} a \right) \right]^{\delta_{1i}} c_i^{1 - \delta_{1i}} \quad (1)$$

subject to

$$y_i = x_i + c_i .$$

²² In the case of multilateral aid, the size of each country's contribution is determined in multilateral negotiations. And it will be difficult to model the negotiation process. Therefore we will concentrate on bilateral aid.

²³ In Chigira and Fukao (1993), we tested whether the size of each DAC member country's ODA is determined as a Nash equilibrium or determined by a Lindahl mechanism, by applying Sandler and Murdoch (1990)'s method. We got the result that the size of ODA is determined as a Nash equilibrium.

We adopt Ithori (1992)'s formulation of impure public goods.²⁴ The parameter δ_{3i} denotes the degree of privateness of aid. If aid is a provision of pure public goods, δ_{3i} will be equal to zero. To the contrary, if aid has similar characteristics to expenditure to pure private goods, δ_{3i} will be equal to one. The relative price of consumption goods and aid resources is assumed to be constant (which is normalized to be one) for simplicity. y_i denotes gross national product (GNP), and a denotes the economic condition of recipient countries.

The total amount of the global aid is equal to country i 's own provision of aid plus that of the other countries;

$$\sum_{j \neq i} x_j + x_i = X_i.$$

Therefore, the optimization problem can be rewritten as

$$\max_{\{c_i, \tilde{X}_i\}} U^i = \left[X_i - \delta_{3i} \tilde{X}_i + (1 - \delta_{3i}) \delta_{2i} a \right]^{1-\delta_{1i}} c_i^{\delta_{1i}} \quad (2)$$

subject to

$$y_i + \tilde{X}_i = X_i + c_i,$$

where \tilde{X}_i denotes the total amount of all the countries' aid except country i 's, that is

$$X_i = \sum_{j \neq i} x_j.$$

If aid is a provision of pure public goods ($\delta_{3i}=0$), \tilde{X}_i will be equivalent to income transfer from the other countries to country i . And the optimization problem, (2) can be interpreted in the following way. Country i decide how to allocate its 'total income' $y_i + \tilde{X}_i$ between two purposes, aid X_i and its own consumption c_i .

²⁴ Ithori (1992)'s formulation is more general than ours.

The amount of world total aid flows that is optimal for country i can be derived from first-order conditions of the optimization problem (2). The optimal level of world total aid flows from the viewpoint of country i is

$$X_i = \delta_{1i}y_i + \{\delta_{1i} + (1 - \delta_{1i})\delta_{3i}\}\tilde{X}_i - (1 - \delta_{1i})(1 - \delta_{3i})\delta_{2i}a. \quad (3)$$

We shall estimate this aid provision function in the following.

5.2 The Empirical Analysis

The aid provision equation (3) is estimated for fifteen DAC member countries, Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, U.K., and the U.S., using annual data from 1971 to 1988.²⁵

In Nash equilibrium, all the donors' ODA flows, x_i ($i = 1, \dots, 15$) are determined simultaneously by their aid provision functions (3) for $i = 1, \dots, 15$. Denominating the both side of equation (3) by donor i 's income, we derived the following empirical model of donor i 's aid provision function.

$$\left(\frac{X_i}{y_{it}}\right) = \beta_{1i} + \beta_{2i}\left(\frac{\tilde{X}_{it}}{y_{it}}\right) + \beta_{3i}\left(\frac{a_t}{y_{it}}\right) + \varepsilon_{it} \quad (4)$$

where subscript i denotes the donor country ($i = 1, \dots, 15$) and subscript t indicates the year ($t = 1971, \dots, 1988$), β_{1i} , β_{2i} , and β_{3i} denote unknown parameters, and ε_{it} is an error term. a_t denotes the average per capita real GDP of LDCs which measures economic conditions of recipient countries. y_{it} represents donor i 's real GDP. We use Summers and Heston (1991)'s Real GDP data (1985 international prices). X_t

²⁵ Our data set starts from 1971, because data of grant element before 1971 are not available. From our estimation, we exclude three DAC donors, Ireland, Finland, and New Zealand, available data of which are

equals the sum of all the fifteen donor countries' bilateral ODA flows (in U.S. dollar term, 1985 price). And \tilde{X}_{it} equals X_{it} minus donor i 's ODA flow. To take account of the difference of grant elements among donor countries, we multiply each countries bilateral ODA by its grant element in that year.²⁶ The data of ODA flows and grant elements are obtained from DAC, *Development Cooperation*.²⁷ ODA flows are deflated by GDP deflator of the U.S..

Each donor's aid provision function is estimated separately. Since the variable (\tilde{X}_{it}/y_{it}) is endogenous, we estimated equations by two step least square method, using (y_{jt}/y_{it}) for $j \neq i$ and (a_{it}/y_{it}) as instrument variables. In the case that there is a significant autocorrelation in error terms, we assume a first-order autocorrelation and estimate equation (4) by Fair's method (Fair 1970). After the estimation, we derived consistent estimators of δ_{1i} , δ_{2i} , δ_{3i} using the relationship between equation (3) and equation (4). Using the estimated value of δ_{3i} , a null hypothesis that aid is a provision of pure public goods, $\delta_{3i}=0$, with an alternative hypothesis, $\delta_{3i}>0$, is tested.

5.3. The Empirical Results

The estimated 2SLS parameters of (4) are summarized in Table 6. Estimated values of δ_{3i} in Table 7 tell us whether the ODA is actually a provision of public goods or not. The prominent fact is that δ_{3i} of the U.S. is quite different from other DAC donors'. δ_{3i} of all the DAC donors except the U.S. are close to one (the maximum is

incomplete. Since three donors' share in total DAC aid flows is very small, it is unlikely that the exclusion have a substantial effect on our results.

²⁶ In DAC, *Development Cooperation*, only grant element of total ODA are reported and grant element of bilateral ODA is not available. We calculated the latter using the fact that grant element of multilateral ODA is 100% by definition.

Japan's 1.25, and the minimum is Australia's 0.98). In contrast with this, δ_{3i} of the U.S. is 0.30. A null hypothesis that aid is a provision of pure public goods, $\delta_{3i}=0$, with an alternative hypothesis, $\delta_{3i}>0$, is rejected at a significance level of 0.01 for all donors except the U.S.. This result implies that only for the U.S. aid has some characteristics of public goods and for other countries aid has very similar characteristics to private goods.

Insert Table 6, Table 7

There would be two interpretations of the difference of aid behavior between the U.S. and the other donors. The first one is that after World War II, the U.S. has been the leader of Western countries; the hegemon, and providing aid to LDCs as public goods in order to defend "free world."²⁸ Other countries has been taking a "free ride." They used their aid for their self-interest. The second interpretation is the following. The U.S. could keep its influence on LDCs through other tools than aid, such as exports of arms, export of technologies and so on. The dependence of the U.S. on import resources has been substantially lower than almost all the other developed countries. So, the U.S. has had smaller incentive to provide aid for its self-interest than other developed countries. According to the second interpretation, there is a possibility that the U.S. would reduce its provision of aid and will take a "free ride," if some other donor increased its aid flows.

²⁷ Our ODA data have several problems. First, neither other official flows than ODA nor aid by non-DAC donors is included. Secondly, food aid and tied aid are very likely overestimated because resources in donor countries tend to be more expensive than in international markets.

In order to decide which interpretation is correct, we need more detailed analysis, such as study on geographical distribution of each donor's aid.

6. Conclusion

In this paper, we evaluated the present Japanese contribution to the equalization of world income and discussed desirable revision of Japanese policies. Our study can be summarized as follows.

The global income distribution has not been equalized since 1970's. It seems that low-income economies are trapped in stagnation because of the shortage of basic social infrastructures in a wide sense, such as sanitary conditions, medical cares, political stability, and basic education.

In the case of contributions through private economic activities, Japan does not contribute to low-income countries' development substantially. For example, Japan's direct investment to low-income countries is negligible. Since Japan has already lifted its main restrictions on international capital movements and trade, there is not much room for Japanese government to do. In the case of agricultural, forestal and fishery products and food and kindred products, Japan's trade barriers are strikingly high. Since LDCs have comparative advantage in these products, if Japan liberalize imports of these products, it will contribute to development of LDCs. The relaxation of Japan's restrictions on immigration will also assist low-income countries. But we should note that admission of immigrants brings a number of social costs to the host country, such as congestion of public goods and decline of existing unskilled workers'

²⁸ For the transition of the U.S. aid policy, see Kawaguchi (1980) and Krueger et. al. (1989).

income. And immigrant workers tend to take insecure jobs or hazardous jobs. It seems that before the relaxation Japan needs to reform its labor system to reduce undesirable side effects of admission and to improve job securities and safety at workplace for immigrant workers.

In the case of ODA, Japan has been the greatest donor in the world since 1989. Japan's ODA is mainly used for economic infrastructures in Asian middle-income countries. In order to contribute to the equalization of world income, Japan should allocate more part of its ODA to low-income countries. And it seems that BHN strategy is effective to assist low-income countries' development.

In Section 5, we estimated how much the bilateral ODA of each DAC member country has characteristics of a provision of pure public goods. We found that only for the U.S. aid has some characteristics of public goods and for other countries aid has very similar characteristics to private goods. One possible interpretation of this difference is that after World War II, the U.S. has been the leader of Western countries; the hegemon, and has been providing aid to LDCs as public good. The fact that there exists a country which is providing aid as public goods implies that there is a possibility that one donor's unilateral expansion of aid might be canceled by other donor's corresponding contraction of aid. In such situation, the collaboration of donor countries is indispensable for the successful expansion of the world aid.

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Table 1. Basic economic and social indicators

Country Group	Range of GNP per capita 1990	Number of Countries	Population share 1990	GDP share 1990	GNP per capita 1990	Average annual growth rate of GNP per capita (percent) 1965 - 90	Life expectancy at birth (years) 1990	Adult illiteracy (percent) 1990	Average annual growth rate of population (percent) 1965 - 90
Low-income economies	~ 610	43	57.9 (20.3)	4.1 (1.4)	350 (320)	2.9 (1.7)	62 (55)	52 (56)	2.2 (2.5)
Lower-middle-income economies	611~ 2,465	41	11.9	4.2	1,530	1.5	65	32	2.3
Upper-middle-income economies	2,466~ 7,619	17	8.7	6.8	3,410	2.8	68	19	2.0
High-income economies	7,620~	24	15.5	73.2	19,590	2.4	77	5	0.8
World			Total (billion) 528.4	Total (trillion U.S. dollars) 22.3	4,200	1.5	66	45	1.9

Note: The figures in parenthesis are for the low-income economies except China and India. Since the four countries groups do not cover the world economy, neither the sum total of population share nor that of GDP share is not equal to 100 percent.

Source: World Bank, *World Development Report*.

**Table 2. Percent of world income received by five income tiers:
Before and after ODA**

(percent)

		1971	1975	1980	1985	1988
Lowest	GDP	4.08	3.78	3.40	2.96	2.76
	GDP+ODA	4.15	3.93	3.58	3.09	2.92
Lower middle	GDP	7.53	7.14	6.78	6.06	5.58
	GDP+ODA	7.63	7.36	6.96	6.19	5.71
Middle	GDP	11.77	12.89	12.94	12.59	12.12
	GDP+ODA	11.89	12.99	13.11	12.66	12.18
Upper middle	GDP	25.53	25.81	27.45	27.17	26.82
	GDP+ODA	25.54	25.83	27.50	27.25	26.84
High	GDP	51.09	50.38	49.43	51.22	52.77
	GDP+ODA	50.79	49.89	48.85	50.81	52.35

Note: The GDP data (1985 international prices) are based on Summers and Heston (1991). ODA data are from DAC, *Regional Distribution of ODA*.

Table 3. Geographical Destination of Japanese FDI (end of 1991)

(Million U.S. dollars)

Country group	East Asia, Pacific	South Asia	Sub-Sahara Africa	Middle East, North Africa	North and South America	Europe, Central Asia	Total
Low-income economies	16,171 (3,438)	536	6,339 (800)	67	41	0	23,154 (4,882)
Lower-middle-income economies	11,671	0	85	1,018	19,675 (1,874)	269	32,718 (14,917)
Upper-middle-income economies	4,451	0	71	1,972	10,243	520	17,257
High-income economies	41,063	0	0	539	161,381	67,849	270,832
Other economies	915	5	6	0	7,489	0	8,415
Total	74,271	541	6,501	3,596	198,829	68,638	352,376

Note: Other economies denote Cayman, Goa, Canary, Nauru, West Caroline, North Mariana, and Cook Islands. Taiwan is classified as high-income economy. The figures in parenthesis in low-income economies do not include investments to Indonesia and Liberia. The figures in parenthesis in lower-middle-income economies do not include investment to Panama.

Source: Ministry of Finance, *Zaisei Kinyu Tokei Geppo* and World Bank, *World Development Report*.

**Table 4. Post-Tokyo Round (1987) Tariffs and
Estimated Ad Valorem Equivalents of Nontariff Barriers in the Major Industrized Countries**

(percentages)

Sector	Japan		U. S. A.		West Germany		France		England	
	Tariff	Nontariff	Tariff	Nontariff	Tariff	Nontariff	Tariff	Nontariff	Tariff	Nontariff
Agr., for., & fisheries	21.8	48.5	1.8	0.3	4.7	3.6	4.6	10.9	4.5	11.5
Food, bev., & tobacco	28.5	27.1	4.7	14.5	11.2	4.5	9.1	8.8	10.3	8.9
Textiles	3.3	5.2	9.2	12.4	7.4	7.9	7.3	12.3	6.7	9.7
Wearing apparel	13.9	2.7	22.7	17.8	13.4	7.0	13.2	4.3	13.3	9.1
Leather products	3.1	0.0	4.2	0.0	3.2	0.0	1.6	0.0	1.2	0.0
Footwear	15.7	6.1	8.8	4.3	11.7	2.5	11.3	1.9	12.5	3.2
Wood products	0.3	0.0	1.7	0.0	2.9	0.0	2.4	0.0	3.1	0.0
Furniture & fixtures	5.1	0.0	4.1	0.0	5.6	0.0	5.6	0.0	5.6	0.0
Paper & paper prod.	2.9	0.0	0.2	0.0	5.2	0.0	5.5	2.3	4.9	0.0
Printing & publishing	0.1	0.0	0.7	22.3	2.1	0.0	2.2	10.1	2.1	0.0
Chemicals	4.8	1.1	2.4	0.0	8.0	0.0	7.6	1.5	7.9	1.7
Petroleum & rel. prod.	2.2	1.3	1.4	0.0	1.8	0.0	0.5	89.2	1.1	0.0
Rubber products	1.1	0.0	2.5	0.0	3.8	0.0	3.5	0.0	2.7	0.0
Nonmetallic min. prod.	0.5	1.1	5.3	0.0	3.6	0.2	4.7	2.0	2.4	0.0
Glass & glass products	5.1	0.0	6.2	0.0	7.9	0.0	7.4	0.0	7.9	0.0
Iron & steel	2.8	0.0	3.6	11.3	4.7	16.1	4.9	22.2	4.7	12.6
Nonferrous metals	1.1	0.0	0.7	0.0	1.9	0.0	2.6	0.0	1.7	0.0
Metal products	5.2	0.0	4.8	0.0	5.5	0.0	5.4	0.7	5.6	0.0
Nonelectric machinery	4.4	0.0	3.3	0.0	4.5	0.0	4.4	0.0	4.2	0.0
Electric machenery	4.3	0.0	4.4	0.2	8.3	1.0	7.7	10.0	8.1	1.8
Transport equipment	1.5	0.0	2.5	3.9	7.7	5.9	7.9	4.9	7.2	5.1
Misc. manufacturing	4.6	0.8	4.2	0.0	5.6	0.0	5.8	4.5	3.0	0.0
All sectors	6.2	8.2	3.3	2.4	5.7	2.5	4.9	24.4	4.9	3.3

Source: Deardorff and Stern (1986, 87).

Table 5. Japanese imports of manufactured products: Regional composition and its transition

Partner	(percent)		
	Percentage composition 1980-81	Percentage composition 1990-91	Average annual growth rate of nominal imports (U.S.dollar base, percent)
World	100.0	100.0	13.9
South-East Asia	22.2	30.3	17.4
NIEs	14.2	16.7	15.8
ASEAN	3.4	5.6	19.7
China	3.6	6.3	20.5
India	0.6	0.9	18.0
Africa	3.7	1.1	1.3
Latin America	4.6	3.5	10.9
North America	37.7	29.6	11.1
West Europe	25.7	29.7	15.5

Note: Imports of food and kindred products are excluded.

Source: Ministry of International Trade and Industries, *Tushou Hakusho*.

Table 6. Estimated results of equation (4)

Country	β_1	β_2	β_3	R^2	p
Australia	0.081	0.979* *	0.024	0.9962	0.266
Austria	- 0.048	1.008* *	0.156	0.9993	0.583
Belgium	- 0.004	1.028* *	- 0.169	0.9987	0.962
Canada	- 0.009	1.029* *	0.245	0.9924	0.575
Denmark	- 0.046* *	1.034* *	0.051	0.9996	-
France	- 0.249	1.137* *	1.616	0.9718	0.468
Germany	- 0.602* *	1.132* *	2.551* *	0.9922	-
Italy	0.649* *	1.054* *	- 2.739* *	0.9874	0.471
Japan	0.563* *	1.108* *	- 2.289* *	0.9467	0.352
Netherlands	- 0.189	1.038* *	0.943	0.9932	0.735
Norway	- 0.007	1.017* *	0.075	0.9995	0.856
Sweden	- 0.067	1.039* *	0.318	0.9967	0.669
Seitzerland	0.037*	1.009* *	- 0.148	0.9997	0.899
United Kingdom	- 0.231* *	1.068* *	0.926* *	0.9897	0.717
United States	0.839* *	0.888* *	- 2.506	0.8669	-

Notes: 2SLS is used. For all the countries except Denmark, Germany, and the U.S., the equation is estimated by Fair method since there is a autocorrelation in error terms.

* significant at the 0.05 level.

* * significant at the 0.01 level.

Table 7. Estimates of parameter δ_3

Country	δ_3	S.E.
Australia	0.98	0.0172* *
Austria	1.01	0.0066* *
Belgium	1.03	0.0107* *
Canada	1.03	0.0217* *
Denmark	1.03	0.0041* *
France	1.11	0.0446* *
Germany	1.08	0.0129* *
Italy	1.15	0.0797* *
Japan	1.25	0.1366* *
Netherlands	1.03	0.0183* *
Norway	1.02	0.0053* *
Sweden	1.04	0.0132* *
Switzerland	1.01	0.0046* *
United Kingdom	1.05	0.0208* *
United States	0.30	1.1316

Note: * * significant at the 0.01 level.