Discussion Paper No. 558

THE KYOTO PROTOCOL AND GLOBAL ENVIRONMENTAL STRATEGIES OF THE EU, THE U.S. AND JAPAN: A PERSPECTIVE FROM JAPAN

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October 2001

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by

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August 2001

* I would like to thank Takao Aiba, Peter Bohm, Mitsutoshi Hayamawa, Carsten Helm, Yoshie Ishida, Naoki Kojima, Mikako Kokitsu, Hiroki Kudo, Takako Nakajima, Hidetaka Nakanishi, Hidenori Niizawa, Naoko Nishimura, Ichiro Sadamori, Kanako Tanaka, Akinobu Yasumoto and Takehiko Yamato for their helpful comments and discussions. An earlier version of this paper was in Japanese. Research was partially supported by the Nissan Foundation and the Sumitomo Foundation.

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Abstract

Despite the objection of the Bush administration to the U.S.'s ratification of the Kyoto Protocol, its entry into force has come to be realistic due to the Bonn Agreement in July. The purpose of this paper is first to survey the framework of the Protocol, and then to analyze the strategic positions of the EU, the U.S., and Japan in negotiations for designing the details of the Protocol. Finally, this paper intends to consider the due strategy of Japan, as well as to identify the problems of the Protocol, which will be a help for designing a new framework that will enable the participation of developing countries.

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1. Introduction

Global warming caused by the emissions of green house gases (GHGs) including CO2 is accompanied by a double "exploitation." One is the "exploitation" of future generations by generations that have emitted a significant portion of GHGs. GHGs that are being emitted now do not contribute to the current global warming immediately. Instead, future generations will be affected by a temperature rise caused by accumulated GHGs. The other "exploitation" appears within the same generation. Those who live in countries that are enjoying rich lifestyles by emitting a substantial amount of GHGs are "exploiting" those who live in countries that are not emitting GHGs, by not paying for their GHG emissions. Thus, the global warming problem can be considered as a complicated problem regarding intra-generational and inter-generational "commons."

2. The Kyoto Protocol[1]

The UN Framework Convention on Climate Change was adopted in 1992 to address global warming, and was brought into force in 1994. The third session of the Conference of the Parties to UNFCCC (COP3) was held in Kyoto in 1997, where the Kyoto Protocol was adopted. The Protocol stipulates that 38 countries, including developed countries and economies in transition, will reduce their GHGs including CO2 respectively to total emissions 5.2% below the 1990 level during a period from 2008 to 2012. For example, reduction below 1990 levels of 8% is required for the EU, 7% for the U.S., 6% for Japan, and 0% for Russia.

In order to achieve this target, the Protocol has employed three mechanisms, known as the Kyoto mechanisms, while urging respective countries to make domestic reductions. Emissions trading is one of the Kyoto mechanisms. Suppose the reduction costs per unit of GHGs in Japan is 10, while that in Russia is only 1. If both countries are to reduce 1 unit respectively by themselves, it will cost 11. However, if only Russia is to reduce 2 units by itself, the reduction cost will be 2. In other words, emissions trading allows Japan to let Russia reduce Japan's emissions by 1 unit by paying a cost ranging from 1 to 10. Emissions trading is to set positive prices on GHGs emissions that have been free before.

Another of the Kyoto mechanisms is Clean Development Mechanism (CDM). Suppose a

[1] As for the Kyoto Protocol, see the home page of the United Nations Framework Convention on ClimateChange (http://www.unfccc.de/index.html).

country with an emissions cap, for example, Japan, builds power plants in a country without an emissions cap, for example, China. In this system, the difference between GHG emissions that would otherwise be caused by power generation using conventional Chinese technology in Chinese plants and those which would otherwise be caused by power generation using Japanese technology in will be considered as joint reductions by Japan and China. The last of the Kyoto mechanisms is called Joint Implementation (JI), which enables the transfer of emission reductions through technological transfer, etc., among countries with an emissions cap.

Joint Fulfillment could perhaps be called the fourth Kyoto mechanism. For example, 15 respective countries in the EU have made the unified commitment of 8% reduction below 1990 levels across the board, but the reallocation among themselves is approved.

The economic explanation of the Kyoto mechanisms is just to protect the earth through the pricing of GHGs. There is criticism towards emissions trading, such as "it entrusts the fate of the earth to the speculation elite"[2] or "it allows those who cannot make actual reductions to buy virtual emission reductions."[3] However, these criticisms are mere misunderstandings. The concept of emissions trading is to minimize the global total reduction costs, and the realization of lower reduction costs will facilitate further investment in reduction.

3. Strategies of the EU, the U.S., and Japan

Let us look at the strategies of the EU, the U.S., and Japan regarding the Kyoto Protocol. In Figure 1, the horizontal axis represents the amount of CO2 emitted to produce the GDP of US$ 1 million evaluated in purchasing power parity (CO2 ton), and the vertical axis represents CO2 emissions per capita (CO2 kg) in major countries in 1996. In this figure, the more you go to the upper-right direction, the less efficient the country will be. The slope of a line between the origin and each point shows GDP per capita (US$10,000). Therefore, the steeper the slope becomes, the larger the GDP per capita will be. When there are no points representing other countries in the upper-right direction from a given country's point, that country can be considered as an inefficient country. The U.S., Australia, Russia, Ukraine are considered as such. They can be called so-called "rogue countries" in CO2 emissions.

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[2] See Shohei Yonemoto, "CO2 International Emissions Trading: Risky American Proposal," *Ronza*, June 1997, pp.112-5, in Japanese.

[3] NHK TV program, "Greedy Society: How far Markets prevail?" December 2000.

These countries form a group called the "Umbrella" in negotiations over the Protocol.[4] The efficiency of the major EU countries, such as U.K. and Germany, is relatively high. As for Japan, CO2 emissions in terms of both GDP and per capita are a little lower compared with Germany and U.K. However, it can be considered comparable to typical EU countries when at least evaluated in terms of both of the two indicators. Located near the origin along the horizontal axis are developing countries such as China, India, Indonesia, and Bangladesh. It should be noted that India and Bangladesh are more efficient than the U.S. in terms of emissions per GDP.

Figure 1 is around here

Figure 2 shows the respective total emissions of CO2 in major countries.[5] The base year for reduction stipulated in the Protocol is 1990. The emissions of the former USSR, namely current Russia and Ukraine, etc., were reduced approximately 40% below 1990 levels in 1998 due to an economic recession. As the reduction target of Russia and Ukraine is 0% below 1990 levels, they can sell these excess reductions of 40% as emission permits. However, this portion called "hot air," is criticized by NGOs under the argument that these countries can sell such portions as emission permits without any reduction effort. The problem, however, may not be "hot air" itself, but the fact that "hot air" is in the hands of inefficient "rogue countries." The characteristic of the U.S. and Australia, which are also members of the "rogue countries," is that their emissions have increased compared with 1990 levels. On the other hand, in Germany and U.K., emissions are declining. Regarding Japan, emissions in 1999 had increased 6.8% over the 1990 level, which requires a reduction of 12.8% as of 1999 to achieve the Protocol target. This is one of the reasons that Japan is included in the Umbrella group, along with the U.S. and other countries.

Figure 2 is around here

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[4] The Umbrella is a negotiating group of countries consisting of Australia, Canada, Iceland, Japan, New Zealand, Norway, Russia, Ukraine, the U.S.A., but it is not a group of Joint Fulfillment such as the EU.

[5] Data are based upon *Handbook of Energy and Economy,* Ed., Econometric Analysis Division of the

Let us look at the position of the EU.[6] The total CO2 emissions of the EU in 1990 was about 900 million tC, with the main emitting countries of Germany and U.K. holding share of 280 million tC and 160 million tC respectively.[7] As the reduction required for all EU is 8%, they have to reduce 70 million tC in total. However, they have agreed on the reallocation of reduction commitments within the EU: the reduction ratio for Germany is 21% (60 million tC) and that for U.K. is 12.5% (20 million tC). Therefore, the reduction of approximately 80 million tC is planned to be done only by these two countries, which would over-achieve the total reduction target of the EU.

Why is such reduction possible only by Germany and U.K.?[8] Not only reduction efforts made by each EU country, but also, in the first place, the base year set in 1990 is favorable to the EU. It was in 1990 that the unification of East and West Germany — the emergence of the largest CO2 emitting country of the EU— was realized. In other words, East Germany, which was a "rogue country" with hot air, joined this group. Looking at the regional breakdown of CO2 emissions in Germany, the emissions in the former East Germany region showed a 41% decrease compared with the 1990 level, while those in the former West Germany region showed a 3% increase, in 1994. Secondly, both Germany and U.K. had used a lot of coal, which causes greater CO2 emissions. In both countries, a switchover from coal to natural gas took place mainly after 1990. Germany and U.K. are being supplied natural gas respectively from Russia and from oil fields in the North Sea. They made a shift to natural gas because the price was cheaper. It can be said that the EU position in negotiations over the Protocol is determined by the unification of Germany as well as oil fields in the North Sea and the pipelines of natural gas. Furthermore, 10 Eastern European countries with hot air are to join the EU in the future, which will facilitate the achievement of the reduction target despite the absence of actual reductions. However, it will still be a big challenge for the EU to achieve the Protocol target, as shown in Figure 2.

With how much cost, then, will the EU be able to reduce GHGs? According to a survey by the EU, the marginal cost for reducing emissions by 8% below the 1990 level is about 70

Institute of Energy Economics, Japan.

[6] See also J. Gummer and R. Moreland, "The European Union and Global Climate Change: A Review of Five National Programmes," Pew Center on Global Climate Change, June 2000 (http://www.pewclimate.org/projects/pol_review.cfm).

[7] Ton CO2 ton x (3/11) = Ton Carbon.

[8] See http://www.meti.go.jp/topic/data/e97924cj.html.

euro per ton of carbon.[9] On the other hand, the marginal reduction cost of Japan for achieving the Protocol target is said to be over 100 thousand yen per ton of carbon.[10] If the Kyoto mechanisms fully function, and the U.S. participates in the Protocol, an international price per ton of carbon is said to be around US$70. This means that the EU will be able to achieve the Protocol target efficiently within their boundary without depending on the Kyoto mechanisms at all.

If so, the diplomatic strategy of the EU, which acts in the EU's interest, is to acquire a relatively favorable position compared with outside of the EU, by making the Kyoto mechanisms inconvenient for the Umbrella group countries. In other words, their negotiation cards would include: the limitation on emissions trading, etc., as much as possible; no forest sinks; and the strict operation of CDM. Furthermore, environment-oriented political powers within and outside of the EU responded to that and have been supporting limitation on the use of the Kyoto mechanisms. On the other hand, the EU is trying not to limit emissions trading within the EU as much as possible to minimize the total costs all over their region, while trying to set a limit on international emissions trading.[11] In other words, the EU is intentionally trying to apply different policies inside and outside of their region.

However, in response to President Bush's statement, "I oppose the Kyoto Protocol because it exempts 80 percent of the world, including major population centers such as China and India, from compliance and would cause serious harm to the U.S. economy," the diplomatic strategy of the EU has entirely changed, which made them greatly compromise to the Umbrella group in the resumed session of COP6 in Bonn this July. This is because the EU considered that there would be no other choices for the entry into force of the Protocol, as stated below, as well as because the international price of emission permits would be significantly lowered by using Kyoto mechanisms without the U.S., which would force the EU themselves to somewhat depend on the mechanisms.

CO2 emissions per capita in Japan continued to rise until the early 70s, when the increase almost stopped due to the oil shock in 1973 - 1974. It continued to shift around 8 CO2t thereafter, but it turned again into an increase since 1987. From 1990 to 1999, the increase in

[9] http://europa.eu.int/comm/environment/enveco/climate_change/sectoral_objectives.htm
[10] See http://www.env.go.jp/council/06earth/y062-08/mat02.pdf.
[11] See EU's green paper published in March 2000,
http://europa.eu.int/comm/environment/docum/0087_en.htm.

the industrial sector is 0.8%, while that in the transportation sector is 23 % and for the commercial and residential buildings sector it is 15%. In order to achieve the Protocol target based on 1990 levels, a reduction of 12.8% is required. However, it cannot be easily achieved even if an economic recession drags due to the structural reform of the Koizumi administration. Just after the adoption of the Protocol, the Japanese government decided on the General Principles on the Promotion of the Measures to Cope with Global Warming in a Cabinet meeting in June 1998.[12] According to these General Principles, energy-derived CO2 emissions control is to be 0%, the emissions control of methane, etc., is to be –0.5%, reduction through technical innovation, etc., is to be –2.0%, reduction by forest sinks is to be –3.7%, the emissions control of CFC substitutes, etc., to be +2%, and the use of the Kyoto mechanisms is to be –1.8%, which will be a total of –6%. The policies in the General Principles are mainly based on command-and-control, and the share of those using the Kyoto mechanisms is 1.8%. However, since the price of emission permits is inherently fluctuating, it is impossible to fix the share from using market mechanisms previously.

The Japanese negotiation position changed dramatically in response to the U.S. objection toward ratification. The requirements for the entry into force of the Protocol are (i) that it must be ratified by more than 55 countries, and (ii) that it must be ratified by countries with an emissions cap whose aggregate 1990's emissions is at least 55% of the total CO2 emissions in 1990 of capped parties. The share of the U.S. in 1990 was 36.1% and that of Japan was 8.5%. Therefore, the total share excluding these two countries is to be 55.4%. As the shares of Canada and Australia are 3.3% and 2.1% respectively, the Protocol will not be able to come into effect if either of them do not ratify it following Japan. Canada is wavering between a choice of ratifying the Protocol without the U.S. or waiting for ratification by the U.S., while Australia is indicating that it might wait for the U.S. This means that Japan has become the pivotal player to decide the future of the Kyoto Protocol.

In COP6 held in The Hague in November last year, an agreement was not reached because the proposal of President Pronk was refused by Germany and others. One of the biggest interests of the Japanese government at that conference was the treatment of forest sinks. Although it estimated a 3.7% reduction through forest sinks below the 1990 level in the General Principles, only 0.5% was to be approved in the Pronk proposal. Although President Pronk offered a compromising proposal of 3% to Japan in June, Japan refused to accept it, demanding to add more. Japan also did not clarify its attitude toward the

[12] http://www.env.go.jp/earth/cop3/kanren/suisin2.html

ratification of the Protocol, saying the first thing to do is to urge the U.S. to come back to the Protocol regime. Although it was reasonable for Japan to maintain that attitude in order to proceed with the negotiation favorably to itself, the press and NGOs were offended. In the resumed session of COP6 in Bonn in July, the EU made substantial concessions to the Umbrella group, and Japan could secure a 3.8% reduction through forest sinks. It is said that Japan had almost all of its demands granted despite some remaining uncertainties.

The Japanese government argued for a lax compliance system as well as no limits on the Kyoto mechanisms. If it intends to use the Kyoto mechanisms including emissions trading, it is essential to design a robust compliance system as well as not to set limits on the use of the mechanisms. In this regard, the argument of the government lacks consistency. In the Bonn Agreement, the following statement is included: to maintain a commitment period reserve which should not drop below 90% of the Party's assigned amount under the Protocol, or 100 per cent of five times its most recently reviewed inventory, whichever is lowest. There are a number of problems in the reserve system.[13] First of all, reserves mean supply limits, which makes the price of emission permits higher than that in a case without reserves. Secondly, it does not encourage domestic reduction in the supplier countries of emission permits. Suppose the most recent emissions of Russia is 60% of the 1990 emissions. As it would have a right to emit 100% of the 1990 level, Russia's reserve would be 60%. Although it would be able to sell its hot air of 40% as emission permits, there would be no incentive for domestic reduction over this level. In other words, even if it reduces emissions, Russia will not be allowed to sell them. Third, a reserve system does not contribute to the compliance of each country. If Russia is able to make a domestic reduction over the level of hot air, countries on the demand side can buy those reductions. Therefore, a reserve system will cut off the route of compliance through this option. The Japanese government tolerated the reserve system, and deferred the issue of a legally binding penalty system.[14]

Then, how is the U.S. strategy? The U.S. Senate decided the followings by consensus in 1997. First, developing countries also need to have emissions reduction commitments. Second, the Protocol should not have an impact on the U.S. economy. Third, the ratification of the Protocol cannot be approved unless both of two requirements above are fulfilled.

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[13] http://www.unfccc.int/resource/docs/cop6secpart/l07.pdf

[14] It has been a central issue to restrict the usage of the Kyoto Mechanism, which is called supplementarity. See also K. Kaino, T. Saijo, and T. Yamato, "Economic Consequences of EU's Proposal of Quantity Restraints on the Kyoto Mechanism," *Energy and Resources,* Vol. 21(2), March

Although in Kyoto, the then Vice President Gore accepted a 7% reduction below the 1990 level, the U.S. emissions increased by 12.5% over the 1990 level in 1998 reflecting its economic boom in the 1990s. It means that they had to make 19.5% reduction as of 1998. Compared before (1972) and after (1982) the two oil shocks, CO2 emissions in the U.S. have been somewhat reduced. However, they increased by 23.6% in 1998 over the 1982 level. It can be said that the U.S.'s Protocol target will be difficult achieve unless something equivalent to continuous oil shocks, *inter elia*, a large amount of domestic carbon tax or a command-and-control type regulation, is introduced. The U.S., which does not favor tax and regulations, broadly approved forest sinks in the country and aimed to design a system that would not limit the use of mechanisms that would utilize overseas reductions. However, it can be said that these ways were cut off by the EU strategy.[15] The abandonment of the Protocol by the Bush administration means that the U.S. has returned to the position of the 1997's Senate's decisions. However, the Bonn Agreement should facilitate the U.S.'s return to the framework of the Protocol, due to a substantial concession by the EU.

The situations of the EU, the U.S. and Japan are often compared to a wet towel. The EU is a wet towel with a substantial amount of water, which can be wrung. The problem is whether the towel can be wrung after year 2013 when decarbonization, etc., is to be completed. Japan is a towel almost dried, with little water to be wrung. It is even uncertain whether it can achieve the Protocol target unless technology or people's lifestyles change. The U.S. is a wet towel with abundant water, but it is less willing to wring it, holding the American lifestyle and national interests as an excuse. It is also one of the problems in the Protocol that the EU, the U.S. and Japan have almost similar reduction commitments though their national conditions are quite different.

4. After Kyoto

Let us probe into problems in the Protocol. The first problem is that it took too much time to reach the agreement. The practical start point of the Protocol was COP1 in 1995 in Berlin,

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2000, pp.38-42, in Japanese.

[15] As for the U.S. Climate Change Review - Initial Report, see http://www.whitehouse.gov/news/releases/2001/06/climatechange.pdf. It is impossible to design an institution or a treaty where every party ratifies it when the issue is an international public good such as global warming. As a theoretical framework, see T. Saijo and T. Yamato, "A Voluntary Participation Game with a Non-Excludable Public Good," *Journal of Economic Theory*, Vol.84, pp.227-242, 1999.

followed by COP3 where the numerical targets were set, and finally, the resumed session of COP6 in 2001 at which operational rules were agreed upon. Thus, it will be from 2008 to 2012 that the numerical targets will be applied. The second problem is the base year for reduction. The important objective of UNFCCC was to stabilize GHG levels at 1990 levels by 2000. Although this objective was not achieved in most of the major countries, 1990 has been set as the base year tacitly in negotiation over the Protocol. The numerical targets seem to have been set with a country's specific economic situation and equitability with other countries taken into consideration, but it still gives an impression that the establishment process of the targets was slow. The third problem is that country specific figures for forest sinks were virtually decided in the political negotiations at the resumed session of COP6 in an artificial way, after the numerical reduction targets had been decided at COP3. Forest absorption figures should be decided at least based on scientific evidence instead of negotiations. The problem is that those baseless numerical targets had been decided before detailed rules were set. The fourth problem is that developing countries do not participate in the Protocol as was indicated by the U.S. The following paragraphs are intending to offer practical proposals to resolve these problems.

Given that the Protocol is to be effective, we have to start developing a new protocol for a period after 2013 by 2005. We also have to avoid wasting time in choosing an adequate base year. For that purpose, a country-specific GHG emissions path for 2013-2017 must be established. The selection of a path may depend on reduction efforts that have been made by a country concerned, its economic performance, its weather and climate, its energy consumption pattern, forest sinks, emissions per GDP and so on. This path must not be decided in a plenary session of the COP, but in a team, which consists of experts from three countries, each representing developed countries, semi-developed countries, and developing countries. When an emissions path for Japan is to be decided, the team should consist of experts from such three countries excluding Japan itself. In other words, an emissions path for one's own country would not be decided by the country concerned but by other countries.[16] In this case, Japan would also of course, be involved in the decision by providing information to these three decision-making countries, but the decision-making itself would be done by the three evaluating countries. Through such process, there would be a smaller possibility of making allowances for each other compared with other cases including bilateral evaluation. As a result, this would give

[16] This type of method in the theory of institutional design, see T. Saijo, "Strategy Space Reduction in Maskin's Theorem: Sufficient Conditions for Nash Implementation," *Econometrica* 56(3), 693-700, May 1988.

objectivity to an evaluation itself. Moreover, it would facilitate as well as save time for a decision compared with a process in a plenary, as an evaluation is to be made by only three countries. This process must be implemented in all of the UNFCCC ratifying countries. In case of a country without enough human resources, organizations including the International Energy Agency would give a support.

After country-specific emissions paths have been decided, reduction schedules would be decided at every annual Conference of the Parties (COP). Emissions paths for developing countries may be approved as they are, while developed countries may be required to reduce more.

Each country would use emissions trading and joint implementation (JI) as flexible mechanisms while implementing domestic reduction. As all countries participate in this system, CDM would be integrated into JI, and CDM specific problems including the measurement of emission reductions generated from CDM could be avoided.

Even in this system, however, there remains a possibility that the global total emissions would increase due to the participation of developing countries. To avoid this, the global total target – which would be set less than the total of national targets - would be set separately from country specific targets, and the administrative organization of emissions trading would keep emission permits supplied from developing countries to abandon some of them. The equivalent cost of this abandoned emission permits' value would be borne by developed countries in proportion to their accumulative emissions amount in the past.

5. Domestic Policies in Japan

As Figure 2 shows, although Japan also experienced the two oil shocks, its total CO2 emissions have increased when compared before and after the oil shocks. As in the case of the U.S., it is also difficult for Japan to achieve the Protocol target unless something equivalent to continuous oil shocks or policies with more effect are introduced. Remember the two oil shocks raised the price of crude oil ten times higher.

Securing its line in the General Principles almost as it is in the Bonn Agreement, the

Japanese government is likely to take command-and-control type measures.[17] In this case, the first problem is that entities escaping from regulatory loopholes would benefit, while those taking measures according to regulations would lose. The second problem is that entities whose marginal reduction costs are low would not reduce more than the regulatory level while entities whose costs are high would have to pay significant costs for reduction. Therefore, total costs could not be minimized in terms of the national total. The third problem is that a system regulating all over Japan must be maintained. This would require transaction costs and would also create various interests. The fourth problem is that the international price of emission permits would be lowered by the absence of Japan – which is expected to have a large demand for emission permits – in the emissions trading market, which would make the reduction costs of Japan relatively higher than other countries including the EU. The fifth problem is that if the Protocol comes into effect without the U.S., and Japan takes a command-and-control line, the emissions trading market will become too small to function.

We must design a simple and transparent system while avoiding these problems. Possible systems that could realize this objective are carbon tax and domestic emissions trading. Given that the Protocol target is considered as an international commitment that should be achieved, carbon tax may not achieve this target. Of course, we can use the Kyoto mechanisms to achieve reductions that could not be covered by the tax. However, in the current situation where the emissions amount of a given year is established 1-2 years after that year, this approach would not be sufficient, either. The background of Japanese government's support to a lax compliance system seems to be that they consider the Protocol target unachievable.

Therefore, I would like to propose here an upstream emissions trading system as a simple and transparent system that would ensure the achievement of the Protocol target. In such a system, the domestic importers of fossil fuels cannot sell their products without emission permits. This system will be able to reduce the number of participating entities and to minimize transaction costs compared with the downstream trading of fossil fuel consumption. Moreover, this system can secure equitability because the price of emission permits is to be set at the upstream, as well as create an incentive for reduction investment also at the downstream due to the price increase of goods and services that are fossil fuel intensive. It will be possible of course, that the consumers of fossil fuels may buy emission

[17] See T. Kusakawa and T. Saijo, "Economic Consequences of Japan's Isolationism on Global Warming," *Economic Seminar*, December 2000, pp.36-41, in Japanese.

permits abroad and get fossil fuels by presenting them to importers. The acquisition of emission permits overseas is also possible through CDM and JI, as well as emissions trading, by investing in GHG reduction technology including afforestation not only within a country but also in foreign countries. Therefore, in this regard, we should aim to be an "environmental trading country" instead of an "environmentally isolated country" by pursuing the General Principles. In the future, we might become able to hear the price of CO2 permits per ton of carbon everyday on TV news.

We often come across an argument that the pricing of GHG emissions through emissions trading would hamper economic growth. This is not necessarily true. If GHG emissions come to be priced, various technological improvements will take place in order to restrain this. This technological progress will lead to the creation of new industries to change the Japanese industrial structure itself. Through this process, we will be led to sustainable economic development.[18]

6. Concluding Remarks

I had an opportunity to talk with Mr. Seluka from Tuvalu, which is an island country with coral atolls in the South Pacific, at the resumed session of COP6 in Bonn. The population of this country is 12,000. He said their immediate problem was the increase of seawater flow into wells. He said sorrowfully, "We have to ask for overseas support because we have no technology to remove salts." This might be an unnecessary technology for such a country if there was not the rising sea level problem. I could not help but think about their future, in which the coral atolls will go under water together with their wonderful culture, and in which the people will be forced to migrate overseas only to experience discrimination and oppression as well as the loss of their identity. I also heard a statement by Professor Dr. A. Atiq Rahman from the Bangladesh Centre for Advanced Studies that "we should not choose a path where we would pursue economic development with the help of ODAs, polluting environment as well as emitting GHGs, only to end up with being transferred GHGs reduction technology", at a NGOs meeting on technological transfer. Developing countries themselves are also facing with a problem of free-ride.

The Bonn Agreement also stipulates to narrow the per capita emissions gap between

[18] See T. Ono, "Environmental Tax Policy in a Model of Growth Cycles," University of Tsukuba, mimeo., 2001.

developed and developing countries. Although it is not indicated in Figure 1, if we look at the changes over time (1971-1998), they show each country has been moving left, across the board. In other words, although the efficiency per GDP has improved, CO2 emissions per capita have not indicated any remarkable change. Per capita differences have not been narrowed for the past 30 years either within developed countries or between developed and developing countries. The Environmental Kuznets Curve shows that, in the long run, emissions per capita increase as income goes up, but it turns into a decrease when income reaches a certain level.[19] This effect may have not been seen during a period of only 30 years, but we cannot wait for 50 years or 100 years to see the effect of the Environmental Kuznets Curve. It is necessary to design a mechanism that will lead each country to move toward the lower-left direction in Figure 1. The Kyoto Protocol is an agreement among countries that would serve for this objective, and does not present the domestic policies of each country. It is also true in Japan that the Protocol objective cannot be achieved only by consumers with "awareness" that emphasize GHG reduction. Although it is of course important to have PR activities to increase consumers with awareness, it is more important to design a system including a mechanism that can control consumption through the price increase of goods and services that generate GHGs.

Although we tend to look at per capita emissions, what should really be given attention may be the amount of GHGs directly/indirectly input in goods and services that are used by a given individual. Suppose one country produces goods that would produce a large amount of GHGs and another country produces services that would produce relatively smaller amount. Per capita emission might be larger in the former and smaller in the latter. However, they use other country's goods and services through bilateral trading. This would then narrow the difference of GHG emissions per capita that have been input directly/indirectly into those goods and services. Therefore, it can be said that the entity to take responsibility is the consumer. In this regard, it is highly possible that the U.S., shown in Figure 1, is using more GHGs than the data from the perspective of consumers' responsibility because it is buying goods and services from developing countries.

The 20th century was the century of the American lifestyle, symbolized by mass production, mass consumption, and mass disposal. The Bonn Agreement without the U.S. indicates

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[19] See, for example, J. T. Roberts and P. E. Grimes, "Carbon Intensity and Economic Development 1962-91: A Brief Exploration of the Environmental Kuznets Curve," *World Development*, 25(2), 191-198, 1997 and Noriyuki Goto, "Empirical Examination of the Relationship between Carbon Emissions and Economic Development," *The Proceedings of the Department of Advanced Social and International Studies,*

that the Bush administration is not an administration of the 21st century, but is rather the last administration of the 20th century -- the America's century.

Graduate School of Arts and Sciences, *University of Tokyo*, pp.111-148, March, 2001.

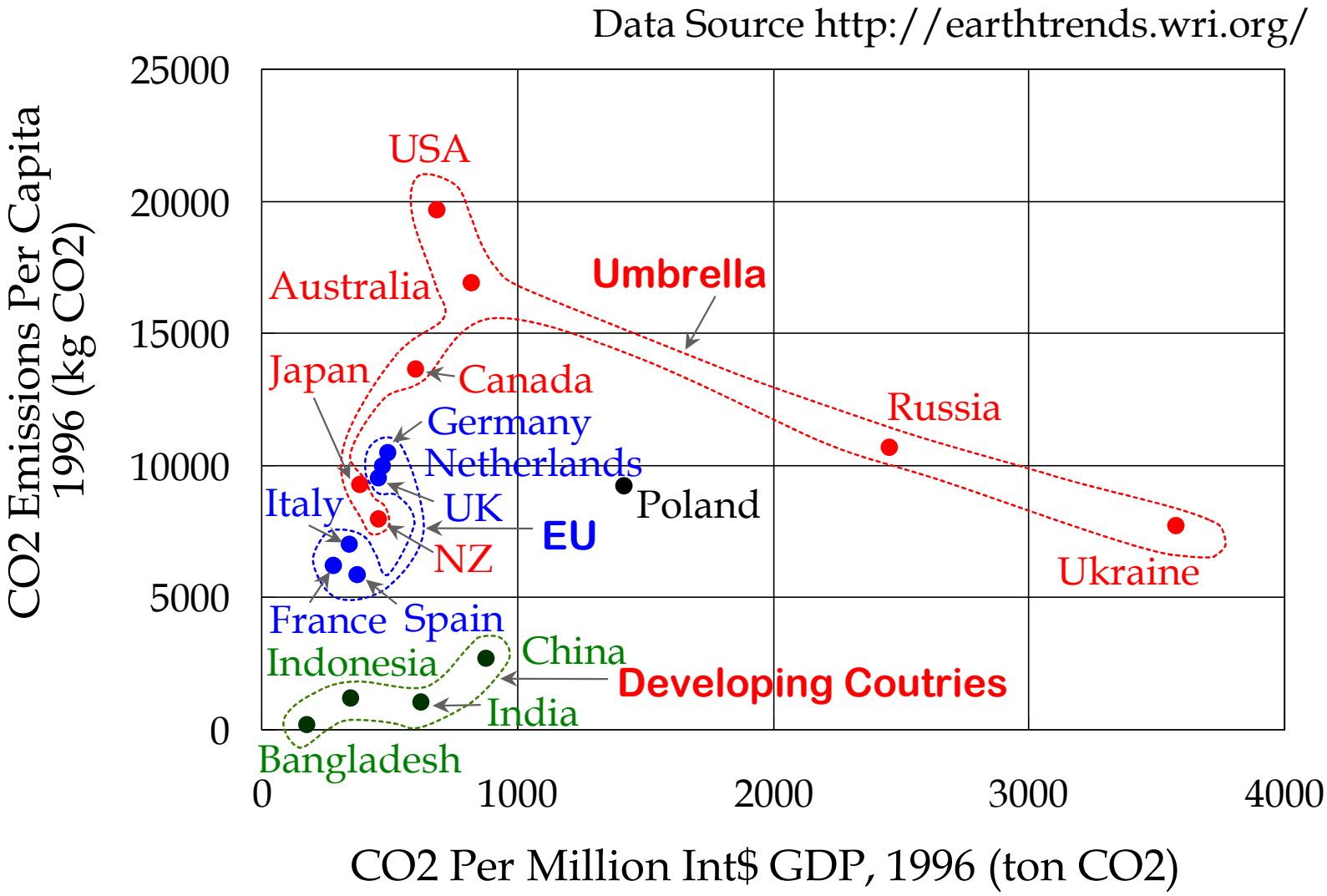

Figure 1. CO2 Emissions Per Capita and Per GDP

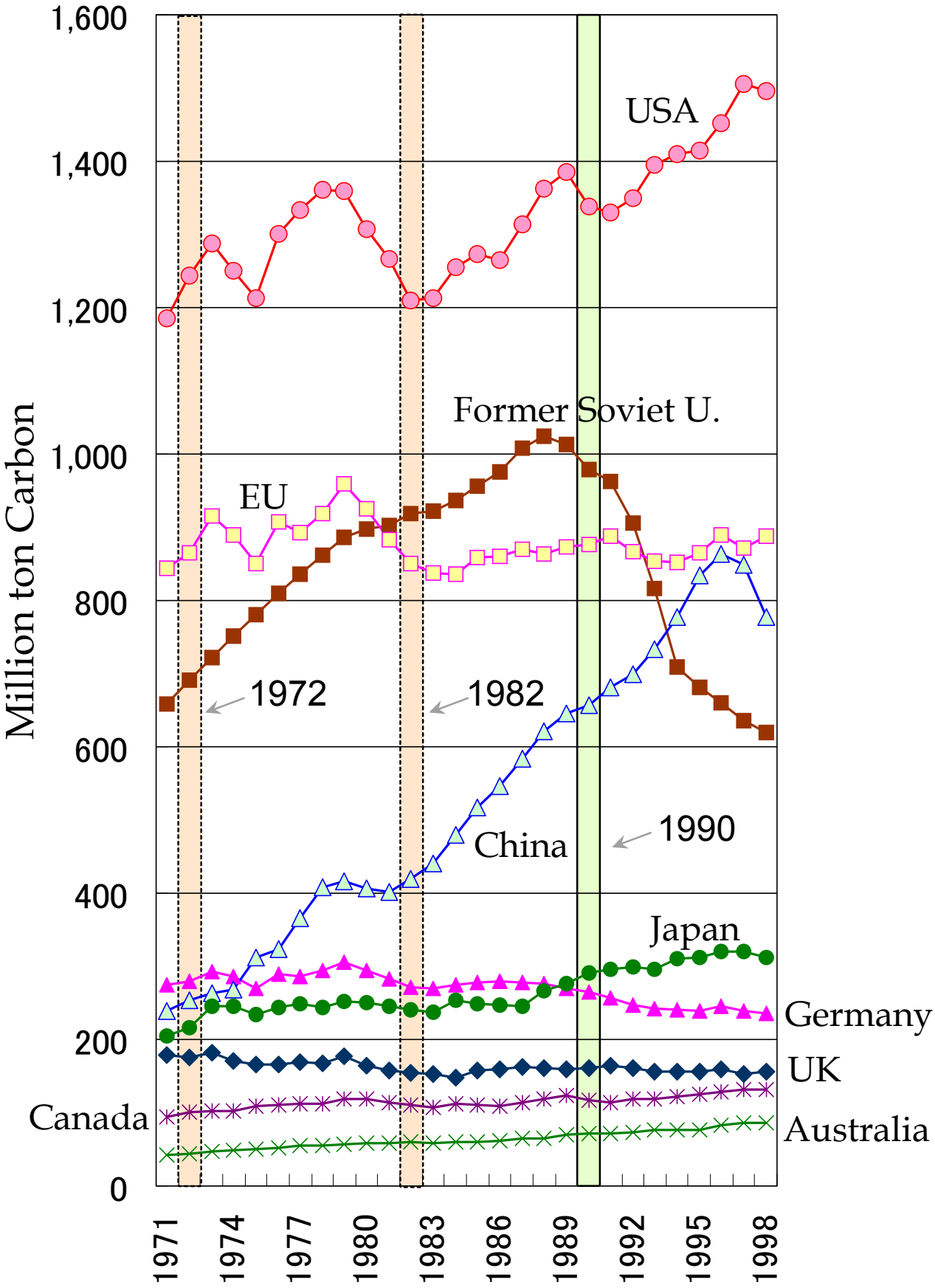

Figure 2. CO2 Emissions from 1971 to 98