Toward Sustainable Low-Carbon Society in Asia: From the Perspective of Development Economics

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Two Fundamental Issues

1. Free Riding

   -- Each country wants to let others build “low-carbon society” and enjoy the benefits arising from the reduced emission of greenhouse gases.

   -- How to induce cooperative behaviors?

2. Technology Solutions

   -- In order to avoid catastrophic results, we need technology solutions.

   -- How to create conditions conducive to the use of “carbon-saving” (or fossil energy-saving) cars, appliances, housing, and machines, and the development of “carbon-saving” technologies?

Assumptions that lead to free riding

- For simplicity, assume that there are two countries of equal size, Japan and Country OAC.
- If these two countries do no make any conscious efforts to reduce carbon emission, temperature will rise by 4℃. This is the worst-case scenario.
- If the two countries both reduce carbon emission by 50%, temperature will rise by 2℃. This is the best-case scenario.
- If only Japan reduces emission by 50%, temperature will rise by 3℃. *OAC is better-off than the best-scenario case, as it does not make any effort.*

Prisoners' Dilemma in Efforts to Reduce Greenhouse Gas Emission by Japan and OAC

		Japan	
		No reduction	50% reduction
OAC	No reduction	-10 -10	-12 -4
	50% reduction	-4 -12	-5 -5

Solution I: Commitment of 50% reduction by Japan and payment or technology transfer from Japan to OAC, if it also commits to 50% reduction

		Japan	
		No reduction	50% reduction
OAC	No reduction		-12 -4
	50% reduction		-5 -4 -5+4

Solution II: Larger Commitment of Japan and Smaller Requested Commitment of OAC

		Japan	
		No reduction	70% reduction
OAC	No reduction		-15 -2
	30% reduction		-9 -3?

Technology Solution

- Technology is not exogenously given but developed based on the consideration of profitability.
- What does “necessity is the mother of invention” mean?
- It means that “rising price of a good (e.g., oil) induces the development of technology capable of reducing its use.”

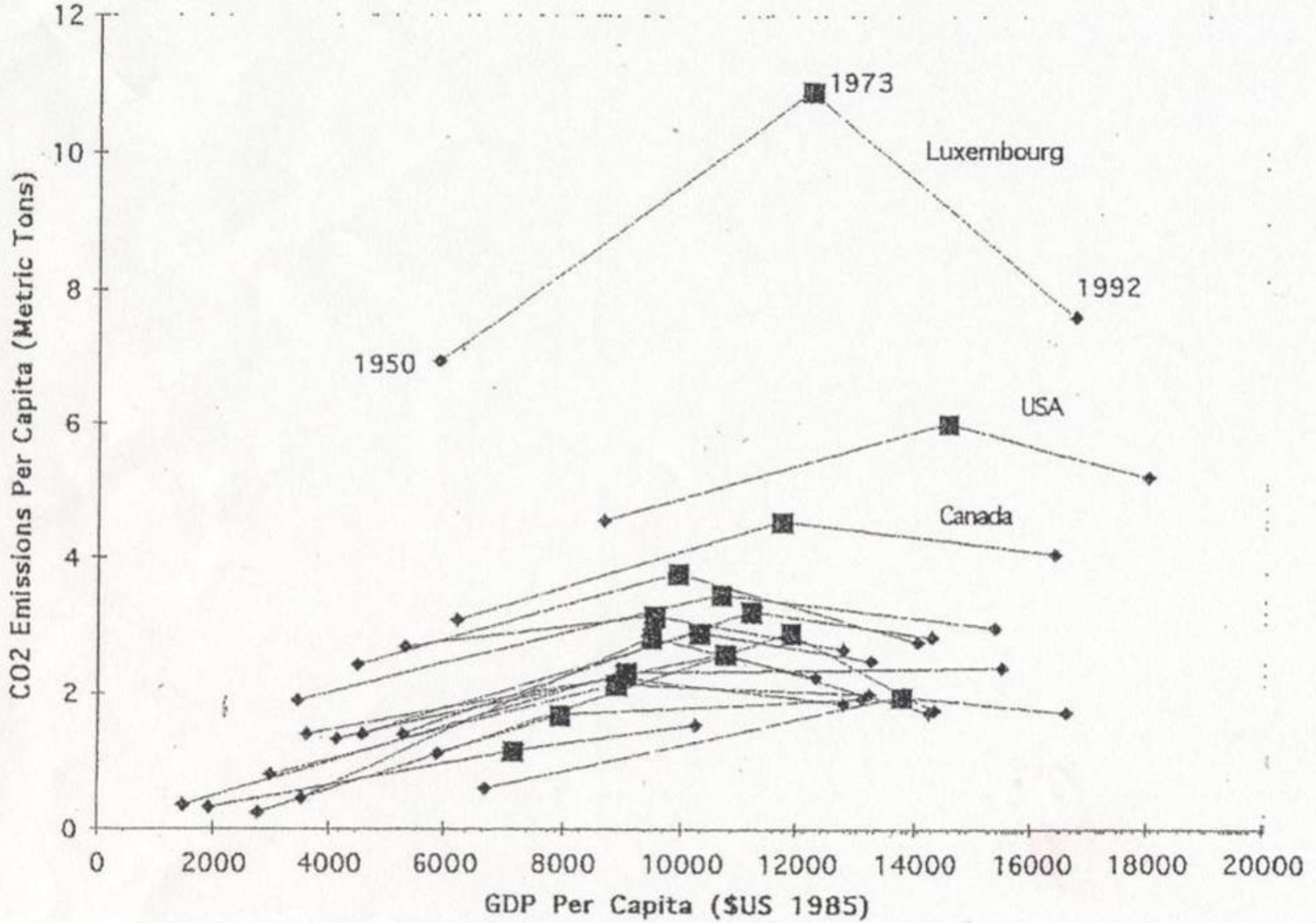
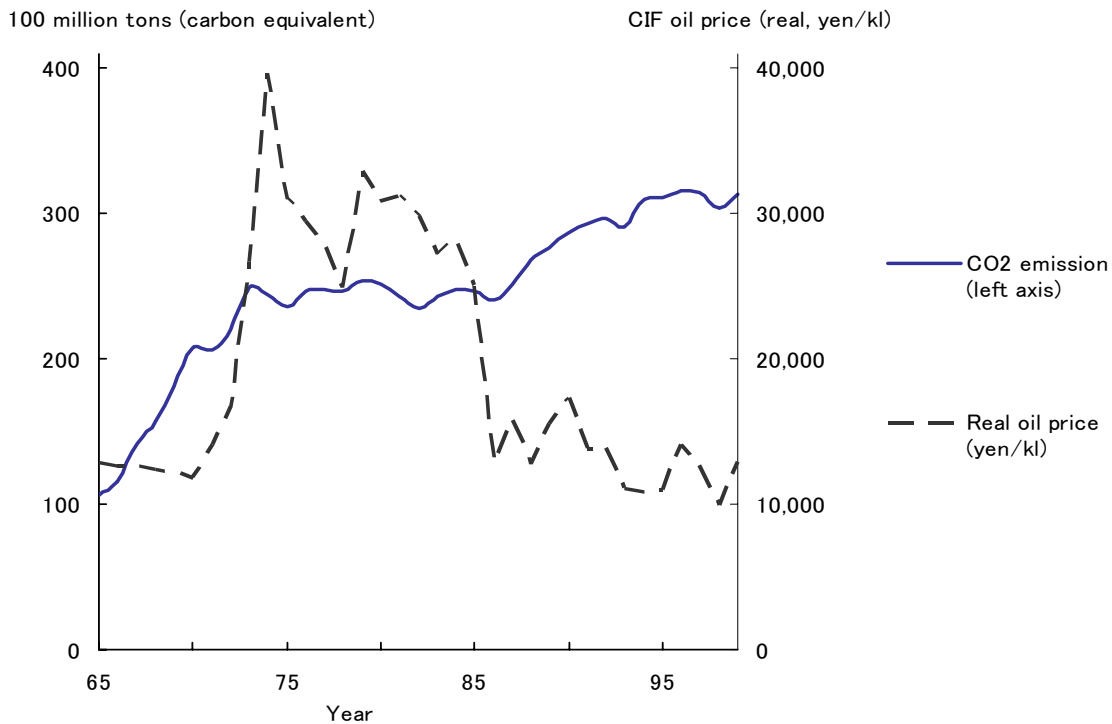


Figure 1. *Type 1 carbon transition countries*

Relationship between CO_2 emission (left-hand axis) and oil price (right-hand axis) in Japan, 1965-99



Sources: Institute of Energy Economics Japan ed. (2001), EDMC Handbook of Energy and Economic Statistics in Japan 2001, Tokyo: Energy Conservation Center.

Don’t Expect EKC to hold!

- U-shaped environmental Kuznets curve holds in the case of local environmental deterioration, e.g., emission of SO_2 and river contamination.
- The literature in the environmental economics has established that the relationship between income and CO_2 emission is positive, because there is no perceived local costs arising from CO_2 emission.

Conclusions

- If we REALLY want to build “low-carbon society in Asia,”

  (1) we should use Japan’s ODA judiciously so as to achieve consensus among Asian countries to reduce greenhouse gas emission substantially in the short run;

  (2) this leads to the forced reduction in the use of fossil energy and, hence, sharp increases in fossil energy prices, which will stimulate the adoption of carbon-saving or fossil energy-saving devices and the development and diffusion of fossil energy-saving technologies.