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The Size of the Carbon Market Study: Discussion¹

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The paper of Morozova and Stuart (2000) attempts to gauge the potential size of carbon market in the first commitment period under the Kyoto Protocol by means of examining recent studies. A reading of their paper suggests a number of issues for consideration in appropriately estimating the size of carbon markets. They include Annex 1 (industrialised) countries' baseline emissions; qualitative and quantitative assessments of the role of carbon sinks; and the difficulty from an economic and legal perspective of interpreting and inferring impacts in relation to specific provisions attached to each flexibility mechanism for regulating the extent of their use.

1. Baseline emissions in Annex 1 countries

Once the Kyoto Protocol enters into force, the greenhouse gas (GHG) emissions targets will become legally binding. Because emissions in Annex 1 countries are expected to continue to rise under the business-as-usual (BAU) scenario and because the emissions targets will not become binding until the first commitment period, the real reductions must thus be measured against their projected BAU or baseline emissions levels over the commitment period. Accordingly, the mandated reductions from projected baseline emissions levels represent the potential demand in the GHG offset market. In practice, how the needed reductions will take place will depend on the relative differential between the marginal cost of domestic abatement in Annex 1 countries and the international price of emissions permits. But, in theory, the needed emissions reductions reflect the maximum size of carbon market in physical terms. As potential demand is a starting point for any estimate of the size of carbon targets, the Stuart and Morozova paper should have provided readers a survey of existing estimates for baseline emissions in Annex 1 countries.

¹ This discussion is invited by the United Nations Conference on Trade and Development, Geneva. The views expressed here are those of the author. The author bears sole responsibility for any errors and omissions that may remain.

To a large extent, the baseline emissions determine the cost of meeting a given emissions target (Zhang, 1997). The larger the size of the gap between the baseline emissions and the Kyoto target, the higher the marginal abatement cost of meeting the target. When net emissions reductions required of the EU in 2010 rise from 27.9 million tons of carbon (MtC) in the case of the low official EU baseline projection to 234 MtC, the median value for the EU baseline emissions estimated by the four economic modelling studies, the autarkic marginal abatement cost in the EU sharply rises to US\$ 249.9 per ton of carbon from US\$ 9.1 per ton (Zhang, forthcoming). This sharp increase in emissions reductions required of the EU drives up the total Annex 1 countries' demand for permits and hence the market price of permits. Thus, there is a significant increase in demand for the certified CDM (clean development mechanism) credits. As a result, the size of the CDM market increases almost a half in the case of the high EU baseline in comparison with the case of the low official EU baseline projection. In the mean time, the value of the CDM market, that is, the product of the market price of permits and the supply of the certified CDM credits, increases almost one and a half as a result of the increase in both the price and the supply (see Table 1).

Table 1

The size and value of the CDM market and the shares of China and India in 2010 under the two trading scenarios under two alternative EU emissions baselines^a

	No limits	EU ceilings with the however clause
Size of the CDM market (MtC)	420.7 (292.1)	281.7 (195.4)
CDM market (million 1998 US\$)	6685.0 (2795.6)	2565.9 (1103.4)
Net CDM market (million 1998 US\$)	3831.5 (1565.0)	1433.2 (603.0)

^a The figures in parentheses are calculated based on the low official EU baseline projection.

Source: Zhang (forthcoming).

2. The role of sinks

During climate change negotiations at the COP-6 which ended in November 2000, the Americans were keen on the broadest and most generous definitions of sinks absorbing greenhouse gases in the atmosphere, while the Europeans wanted sharp curbs on the use of sinks. In the end, it had become clear that the two sides no longer disagreed on whether additional land use change and forestry activities in the first commitment period should be included, rather they disagreed over the extent of usage of sinks to meet their emissions targets. This fact alone may have profound implications for the size of the carbon market. On the one hand, allowing domestic sinks to meet targets could have the effect of reducing Annex 1 countries' demand for permits abroad because sinks provide them with less costly abatement options at home. On the other hand, inclusion of sinks under the CDM opens up the possibility in comparison with domestic actions of obtaining even less costly abatement options from the developing countries. Although it is very difficult to indicate which counter-effects will prevail because of a lack of cost data at a macro level, the Morozova and Stuart paper would have enriched the policy relevance at least if a qualitative discussion of implications of the inclusion of sinks had been done.

3. Implications of the supplementarity clause

Under the Kyoto Protocol, each of the Articles defining the three flexibility mechanisms carries wording to the effect that the use of the mechanism must be supplemental to domestic actions. Article 6 states that emission reduction units from joint implementation projects should be “supplemental to domestic actions” for the purpose of meeting quantified emission limitation or reduction commitments. Article 12 states that Annex I Parties may use the certified emission reductions from CDM projects to contribute to compliance with “part of their quantified emission limitation and reduction commitments”, while Article 17 states that emissions trading shall be “supplemental to domestic actions” for the purpose of meeting quantified emission limitation or reduction commitments. The absence of a precise definition of the meaning of supplementarity within the text of the Protocol has led to the existing differing interpretations of these provisions. At one extreme, the supplementarity clause could be interpreted simply to mean that domestic actions should provide the main means of meeting Annex 1 countries’ commitments, so that any action abroad would be additional to domestic actions. At the other extreme, the clause could be interpreted to mean that any action abroad will be supplemental to whatever domestic actions are taken. This implies that any one Annex 1 country could use the flexibility mechanisms as much as it wished in order to meet its Kyoto commitments. Whether the supplementarity clauses will be translated into a concrete ceiling, and if so, how should a concrete ceiling on the use of the three flexible mechanisms be defined remain to be determined. In my view, the supplementarity clause is of significant policy relevance to the ongoing negotiations on the overall issue of flexibility mechanisms. While Morozova and Stuart paper does cite results from Zhang (1999), the paper does not pay sufficient attention to this topic, As the topic is important in that different interpretations of clauses may affect the size of the carbon market considerably, it will be useful to elaborate on the subject further.

To date, there have been many proposals calling for a restriction on the use of flexibility mechanisms. The most representative is the EU proposal. Documented as the Community Strategy on Climate Change (European Union, 1999), the EU proposal calls for limits on both buying and selling countries.

Under the EU proposal, “however, the ceiling on net acquisitions and on net transfers can be increased to the extent that an Annex B Party achieves emission reductions larger than the relevant ceiling in the commitment period through domestic action undertaken after 1993, if demonstrated by the Party in a verifiable manner and subject to the expert review process to be developed under Article 8 of the Kyoto Protocol.” (European Union, 1999). This so-called “however” clause allows an importing (exporting) country to purchase (sell) more than the amount defined by the above alternatives if verifiable domestic abatement by that country can be demonstrated. Thus, the “however” clause effectively raises the importing ceiling and allows an importing country to purchase emission reductions from abroad up to 50% of the emission reduction requirement, provided that the country can verify a similar volume of domestic abatement undertaken after 1993.

Using the global model based on the marginal abatement costs of 12 regions, Zhang (1999, 2000, 2001) have analyzed the economic effects of the EU proposed concrete ceilings both on Annex 1 countries and on non-Annex 1 (developing) countries. These analyses have clearly shown that, although the US and Japan are firmly opposed to such a restriction, they tend to benefit more from it than the EU, which strongly advocates such ceilings (see Table 2). On the other hand, the EU

benefits much more with such a restriction than without it, whereas the US, Japan and the former Soviet Union are made worse off in comparison with the no limits case. Moreover, Zhang’s results have shown that the EU ceilings with the “however” clause have the less stringent effects on the US, Japan and the former Soviet Union than the EU ceilings without such a clause.

Table 2

The gains in 2010 under the three trading scenarios (%)^a

Scenarios	United States	Japan	European Union	Other OECD	OECD	Former Soviet Union
No limits	85.2	93.1	0.2	45.3	86.5	100.0
EU ceilings	63.7	71.9	39.2	70.8	66.0	23.5
However clause	79.8	76.5	16.3	63.9	78.4	41.3

^a The gains are measured relative to the total abatement costs in the absence of trading for the OECD countries or the total benefits under the no limits scenario for the former Soviet Union.

Sources: Zhang (1999, 2000, 2001).

Furthermore, given that the EU proposal restricts the total demand for permits and thus reduces the market price of permits, it should thus come as no surprise that such restrictions on the use of flexibility mechanisms are not beneficial to developing countries too because they restrict the total financial flows to developing countries under the CDM as a result of fewer permits sold and lower prices received (see Table 3). For the OECD as a whole the “however” clause is less restrictive than the EU ceilings, and thus allows a significant increase in demand for the certified CDM credits. As a result, the CDM flows under the “however” clause scenario are 1.4 times higher than under the EU ceilings scenario, although they are still less than half of that under the no limits scenario. With respect to the geographical distribution of the CDM flows, because of a great deal of low-cost abatement opportunities available in the energy sectors of China and India, as well as their sheer sizes of population, the two countries are expected to emerge as the dominant host countries of CDM projects. This is confirmed in Table 3, which shows that approximately 60% and 16% of the total CDM flows go to China and India, respectively.

However, it should be pointed out that the importance of the clause depends crucially on how well a verification procedure might work in real practice. The above cited work of Zhang simply assumes ideal conditions that the amount of domestic abatement to be verified could be demonstrated without costs. Consequently, the “however” clause relaxes the otherwise very restrictive limits on the use of flexibility mechanisms. However, in real practice, since the counterfactual baseline emissions are never actually observed, verifying any domestic abatement that reduces emissions below the counterfactual baseline emissions will be subject to technical and political disputes. This would thus increase transaction costs. It seems likely that the verification procedure in practice will fall short of the ideal and could limit the extent to which the “however” clause can bring down the cost of meeting the Kyoto commitments. In the worst case, it could even make the “however” clause’s promise of relief just illusive.

Table 3

The value of the CDM market and the shares of China and India in 2010 under the three trading scenarios

	No limits	EU ceilings without the however clause	EU ceilings with the however clause
CDM market (million 1998 US\$)	2795.6	456.9	1103.4
of which:			
China	60.3%	59.6%	60.0%
India	15.1%	15.9%	15.5%
Net CDM market (million 1998 US\$)	1565.0	244.6	603.0
of which:			
China	59.9%	59.2%	59.6%
India	15.5%	16.3%	16.0%

Sources: Zhang (1999, 2000, 2001).

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