SUSTRA Meeting

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Global public goods and trade :

conflicts, compatibility and complementarities

Climate change : a case for trading to protect a global public good

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It is commonplace to see a basic contradiction between trade and the procurement or management of public goods. The reason is rather clear. If we consider public goods as not-excludable goods, the basic conditions of private involvement on the marketplace and commercial trade cannot be met. Communities or public bodies then have to take care of providing sufficient public goods for the sake of the common good. Thus the discussion about public goods generally derives on issues of public or international finance.

This basic framework may be misleading to some extent by ignoring specific conditions of production of some public goods: they are produced by decentralised agents as a side-effect or a joint product of private activities, and not directly by public bodies; they include private goods as inputs in their production function. These features allow the possibility to consider a regulation of their production that fully captures the potential efficiency and institutional benefits of reckoning on markets and trade mechanisms.

It is typically the case of global warming and climate change. Global climate is a global public good: nobody can be excluded from its provision; and the global climate provided to my neighbour does not subtract anything from the climate I can enjoy. Climate is not the same for everybody on this planet but nobody can produce its own climate by its own effort, with the exception of very local actions on landscape and architecture in dwelling that can modulate local climate conditions regarding heat and comfort. Meanwhile, climate may be affected by human activities through the emission of greenhouse gases (GHG) such as carbon dioxide, methane and CFCs. Such emissions are the result of numerous and various activities, most of them being privately managed (driving cars and trucks, producing industrial commodities, raising cattle, cooking, heating, etc.). Climate as a public good is a side-effect of most economic activities, most importantly by using fossil fuels, and these activities are embedded in various market and not-market (social norms, community planning, traditions) regulations. The end-result, a certain state of climate, is indifferent to which place (which

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country, which type of source) emissions are coming from. There exists a general equivalence of impacts of emissions whatever their location. Moreover, climate is not directly affected by emission flows but by accumulated stock of trace-gases in the atmosphere. As far as the main GHG is concerned (CO_2), a long stay in the atmosphere has to be faced with (around a hundred years), which introduces a high level of inertia in the physical system but at the same time opens up opportunities of time flexibility for the design of mitigation strategies.

To resume, the physical features of the issue of climate change are the best conditions we can imagine to bet on market mechanisms to address the management of a global public good, with the least possible restrictions imposed by physical phenomena. This is a huge difference with ordinary local or regional pollution issues for which space and time matter a lot and imposes severe constraints to the use of flexible, economic instruments. It does not mean that there are no constraints in the climate game, but that hard constraints result from political, social and economic aspects, not from nature.

Since the Rio de Janeiro Earth Summit in 1992, international community rejected the price-based approach, the proponent of which was the European Union with its project of introducing harmonised national carbon and energy tax in all OECD countries. Consequently, it adopted a quantity-based approach to co-ordinate international action aiming at mitigating climate change mainly through emissions abatement goals. When national quantitative targets are determined for a whole set of countries, but not all (only industrialised ones committed themselves to such targets, first for year 2000 and secondly for the period 2008-2012), the most important step is made for introducing emissions trading scheme in order to give individual States new resources of adaptation to unforeseen events and evolutions, and to all of them a means to cut costs in achieving the overall target that was chosen. At the same time, a new problem is raised: how to tackle an international framing made of two zones with different rules of the game? By which means can we embark the LDCs zone into the global strategy of protection of the climate since that zone gathers countries that committed themselves to neither quantitative targets nor any alternative policies, with the exception of contributing to GHG inventories, whereas they would represent next around 50% of all GHG annual emissions, and later a significantly higher proportion?

In spite of huge benefits emissions trading faced strong political and ideological resistance: since the proposal originated from the US government, other Parties felt that it could only be a negative and immoral way to proceed; a fringe of eco-activist movements that think that the market is the very source of all environmental disruption and disasters, they are not intellectually ready to see it as bringing an efficient solution; market solutions need that a preliminary condition is met: a clarification of rights and an agreement on burden-sharing, which always is a very sensitive issue, since many Parties fear that others would profit more than themselves of the new regime; last, but not least, some countries are not considering so positively an international instrument that would abate cost of their economic competitors when they estimate to be able to reach their own objectives at a rather low rate of efforts.

Among issues that are given a tremendous importance by governments is the issue of industrial competitiveness. So the first section of this paper aims at looking at the potential impact of introducing emissions trading in an international regime based on quantitative commitments. A second issue is the fear that emissions trading with LDCs, specifically in the context of what was named at the Kyoto meeting the Clean Development Mechanism, will increase incentives to industrial delocation from North to South. This was one of the motives

put forward by the US government to refuse to ratify the Kyoto Protocol. To which extent is this fear justified? Meanwhile, can't we see emissions trading between the two zones as a means to resolve the issue of participation of LDCs without impairing their development objectives and without asking them to switch to national quantitative targets? This is what section 2 is about.

1. International emissions trading and the issue of economic harmonisation of national regimes

One of the key issue of international negotiations around a climate regime was and is the level of international harmonisation of policies and measures (PAMs) adopted by each country to meet its commitments. Europe wanted a rather high level of harmonisation and also asked for guarantees that an essential part of effort will be made by each country at home. On the opposite, the USA and other countries of the Umbrella, the coalition they formed to back a regime with minimum requirements, did not want to hear about harmonisation of PAMs or other ideas of ceiling on GHG trades, considering that national targets and emissions trading were all that was needed to have an efficient regime. For them, each government should decide for itself which strategy of commitment to adopt, including the relative share of domestic action and international action by buying credits and permits to other countries. In the view of Europe, co-ordinated PAMs were a means to counter-balance any concession about emissions trading and to ensure that trading will not generate major disequilibrium between parties.

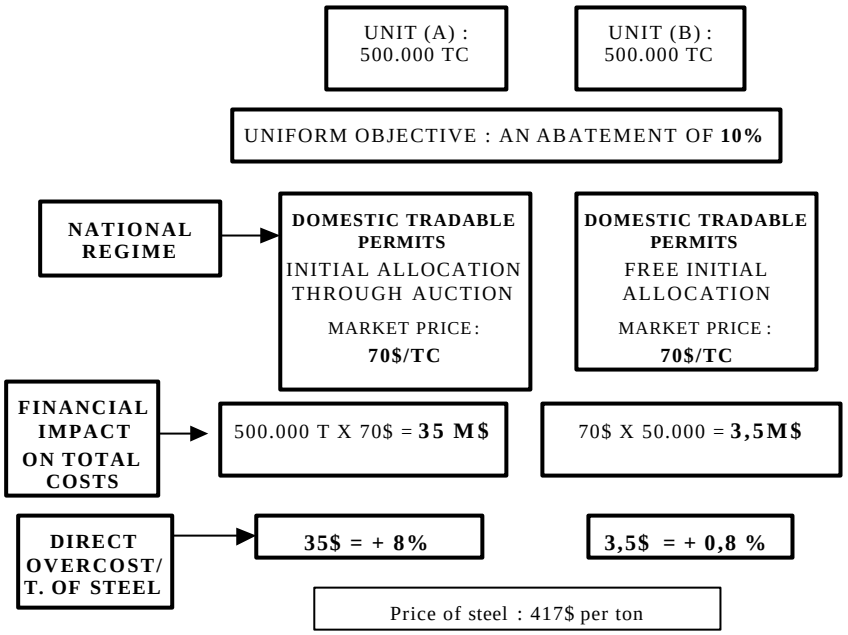
So it is useful to get an idea of the relative consequences for industrial competitiveness if different regimes, with and without harmonisation on policy instruments, with and without international GHG trading. It is the purpose of the following stylisation to give a rough outlook of the situation for a typical steelworks on two countries being part of the Kyoto protocol.

1.1. Free allocation versus auctioning

The first comparison is related to the financial impact of alternative ways to achieve the initial allocation of emission permits to industrial firms. The first one is a procedure of competitive auction, which implies that firms have to pay for emitting GHG right from the first ton. The equilibrium price of auction is supposed to reflect social marginal cost of abatement, given the stringency of the quantitative target chosen by the government. The second approach is a free allocation based on grandfathering, i.e. based on current emissions at the moment the new regime begins to run. Figure 1 shows the respective effects on the price of a ton of steel produced in the same unit, under the assumption that price is based on mean financial cost. Figures related to price of steel and carbon give a rather realistic feeling of order of magnitudes. The conclusion is self-evident: the financial impact of auctioning is an order of magnitude greater than that of grandfathering but, as a percentage of the commodity price for an energy-intensive business, we are talking of about a 10% increase of production price. The $70 assumption for the carbon price assumes that a market exists for carbon at the scale of zone 1 (countries in Annex 1 of the Kyoto protocol, including the USA), but no transactions with LDCs. Th question raised is to know if that business can bear a 10% increase of its

production price without losing either profits or market shares, since steel is internationally traded and many competitors belong to zone 2 without climate policies.

Figure 1 : free allocation or auction



This figure illustrates why the initial allocation may be a critical variable for the industrial competitiveness of energy-intensive business: steel being a rather standard commodity, auctioning would penalise steel industry of the country relative to both competitors in other zone 1 countries that prefer grandfathering and those in zone 2 without any constraint, even if the proceeds of auctions are given back to firms under a double dividend strategy aiming at cutting social security charges on low wages (steel business is capital intensive and there are not many low wage salaries who could benefit of social charges abatement). Knowing that, concerned governments would presumably avoid such an approach. An uncoordinated approach to the issue of initial allocation would impose in fact grandfathering as the only realistic solution. The only possible way to implement a strategy of double dividend based on auctioning permits is one in which all competing countries in zone 1 jointly decide to choose this approach and plan compensation mechanisms at the border for trade of commodities outside zone 1: border taxes on steel imports from zone 2 and border subsidies to steel exports. Such a policy could not be compatible with existing rules of the WTO and would be challenged by governments of zone 2.

1.2. Unharmonized domestic regimes based on different policy instruments

Let us take now the case of an international regimes with no harmonisation of domestic policies regarding industrial activities. Suppose one country prefers to introduce a carbon tax (it has been for long the declared preference of France before the Constitutional Court put an end to the first realistic project aiming at its introduction) and another one (for example the USA) a domestic tradable permits (TPs) scheme based on grandfathering. In fact recent developments could let us imagine reverse positions regarding tax and TPs, with the EU planning to introduce a EU TP scheme by 2005, and some US experts (Cooper, 2001) making pleas for using GHG taxes! Assume that international GHG trading is forbidden. Is it that sure that each government is protected from bad influence of others' policy choices if it does not want to penalise its own industry exposed to international competition?

In Figure 2, two countries France and the USA are choosing different instruments to meet their targets. France is introducing a carbon tax of $100 per ton of carbon[2], the proceeds of which are affected to a special fund to finance social security in compensation of a decrease of charges rates on low wages. It is assumed that energy intensive business receive a negligible compensation but are a major contributor to the payment of carbon tax, whereas other sectors (administrative services, housing and civil works) take advantage of this scheme. A distinction is introduced between two assumptions regarding the impact of the instrument on the supply of the commodity. The first one, H1, is the same as for Figure 1 and considers the direct financial impact based on mean cost pricing. The second one, H2, considers that for a firm, to use permits to match emissions resulting from production has a cost anyway and that this cost is included in production price: either the firm has to buy them on the market, or it has to renounce to the income procured by sales on the market if permits are allocated for free. H2 means that an allocation rule has no impact on operating marginal cost of output and on the supply on the market, whereas it has a significant impact on profits and long term competitiveness, to the extent the latter depends on capacities of self-financing of R & D and investment.

We see on Figure 2 that unharmonised domestic regimes entailed significant cost gap, strikingly with H1 (11%) but also to a lesser degree with H2 (4%). This gap cannot be attributed to international GHG trading since there is no such trading at all in the case under consideration. To a large extent, fears about GHG trading related to competitiveness have been misplaced; they should have arisen firstly in contemplating unharmonised domestic regimes. It may be useful to this regard to stress that the difference between H1 and H2 does not mainly reflect divergent theoretical frameworks about economic behaviour, but different institutional solutions at the allocation stage and/or different types of decision (current management of facilities or strategic decisions about new investment and relocation of facilities) and/or different time dimension of analysis. Several aspects do matter to explain the difference.

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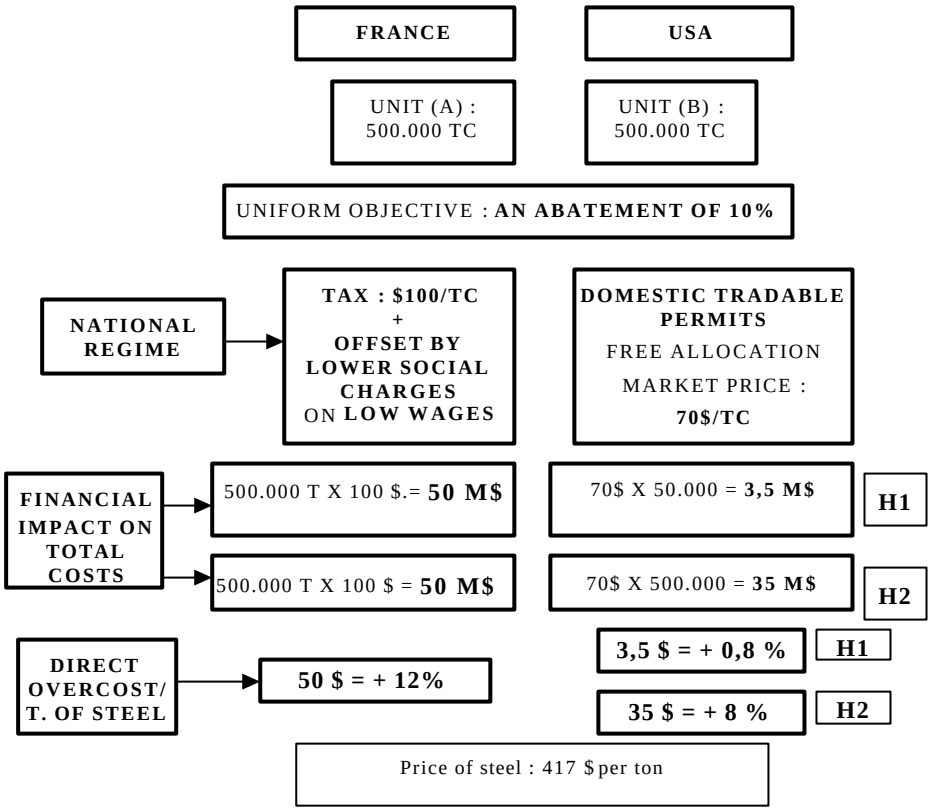
[2].- Note that an official commission of Commissariat général du Plan proposed that a value of 100 euros per ton of carbon is used since 2000 until 2010 in any evaluation of projects of public investment in transportation. See CGP (2001).

Figure 2 : domestic regimes based on different instruments



The first one is the conditions of use of permits. The key issue is the following: when permits are allocated for free, are they considered as quasi-property rights of the firm, i.e. does the firm have the right to keep them or sell them even if it stops running its business and shut its facility to relocate it in another country, or is there a conditionality stating that permits are given only to the extent that business is running and facilities are in activity, but that they will be lost if the business is closed? Governments may be tempted by the second solution (conditionality) in order to keep industry on the national territory. In that case they will in fact block the economic calculus based on opportunity costs for making strategic decisions, even if they still take account of an opportunity cost of using permits for management decisions related to both the level of output and carbon-efficiency of the technological process: stopping business would no more allow any additional income from the sale of the permits. Paradoxically, such an institutional rule is economically conservative; it artificially maintain low cost for existing facilities and gives an advantage to existing business against new comers. When this advantage is supplemented by the another huge one, i.e. when existing business has permits for free and new investment has to buy permits for all emissions, institutional rules play against modernisation in a protectionist way. With such rules, the final

gap on the commodity market between different allocation rules (free versus auctioned permits) is the greatest. Business in a country having chosen to auction would then suffer at the maximum rate. This analysis puts the light on variables often overlooked in the discussion about competitiveness. If some harmonisation is searched, it should consider not only or mainly the issue of auctioning versus free allocation, with all intermediate options, for existing business but the rules of use of the permits which, in empirical terms, may be half as important and conditions of access to new investment.

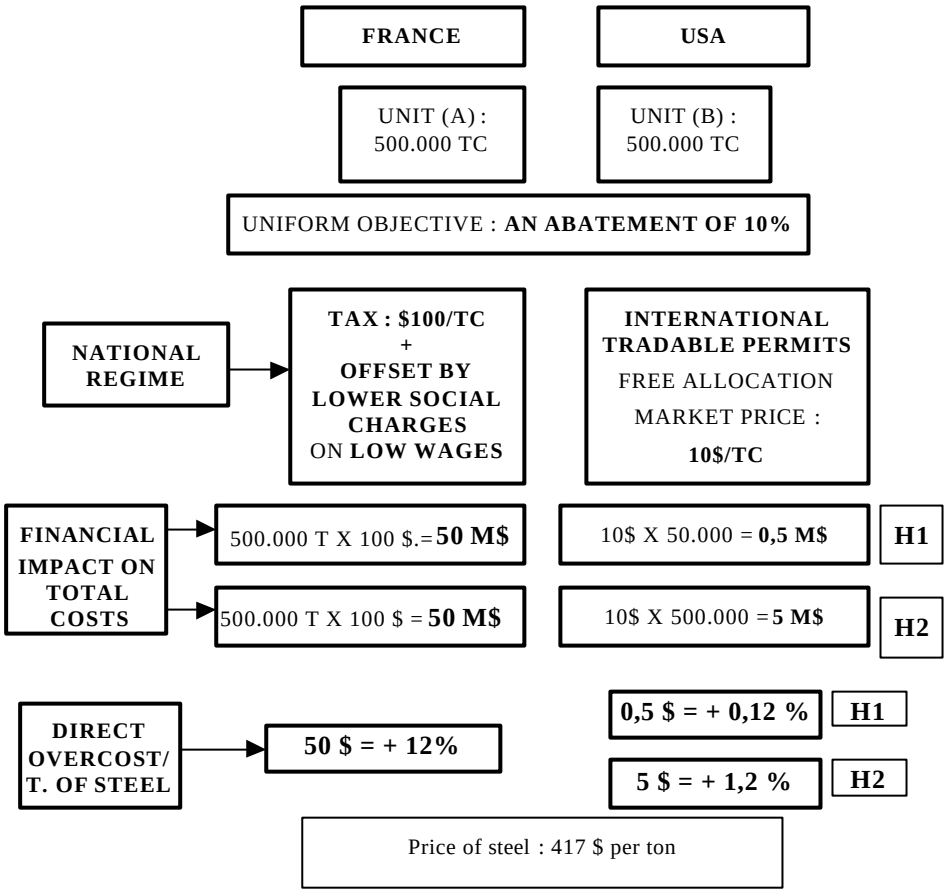
Let us have a broader look at all possible policy instruments, beyond tax and TPs. All unharmonised measures that do not take the form of tradable rights (heterogeneous regulations and standards, subsidies specifically allocated for given investments) generate the same type of gap as conditionality. Since their use has no opportunity costs, only direct costs, they do not enter in the production function of firms and do not contribute to restore an adequate pricing of commodities on international markets; they contribute to maintain an artificially low price for commodities even if they increase costs by requiring abatement efforts. To this regard they may be seen as potential unfair and unsustainable measures as well as dubious indirect state aids. Such consequences may explain why such instruments may be preferred by countries trying to get a competitive advantage through environmental policies. In doing so, they raise additional obstacles to strategies of double dividend in competing countries. Another conclusion is that well and fairly organised TPs, with no restriction on use, are among the instruments that generate the least economic distortions regarding global allocative efficiency.

1.3. The impact of international GHG trading on unharmonised domestic regimes

To which extent international trading is a source of additional difficulties regarding industrial competitiveness, when domestic regimes are not harmonised? The most important effect of international trading is to strongly reduce the market value of GHG permits since countries with high abatement costs may buy to those with low costs the permits they need to meet their commitments. This is shown on Figure 3. International trading gives access to new low cost opportunities for countries accepting an integration of domestic TPs and international trading. So the gap in costs with countries that have chosen a tax approach without allowing their industrial firms to participate to international trading is still increased by an order of magnitude. But what is striking is that this last effect is in absolute terms of second order. The same way, the controversy about the initial allocation rule (free or auctioned?) loses its practical importance: its impact is limited to a range of 0,12% to 1,2% increase of the price of the commodity.

This elementary assessment is helpful in identifying what really matters from the viewpoint of industrial competitiveness of developed countries within zone 1. The important issue is not to limit or not limit international trading, but to decide which level of harmonisation of domestic regimes is achievable in order to avoid significant distortions in international competition.

Figure 3 : uncoordinated domestic regimes with international emission trading



2. Comparing costs between zones, with and without CDM

One of the most potentially interesting instrument incorporated in the Kyoto Protocol is the Clean Development Mechanism. This device allows an investor from a zone 1 country to invest in projects in zone 2 so as to reduce GHG emissions on the basis of what would have been emissions without this investment and to get credits for that, credits the investor can use to meet obligations in zone 1. This mechanism is placed under a multilateral authority and will use third party certification to identify real and sustainable abatements. A part of credits will be taken to the investor to feed a special fund for adaptation of poorest LDCs to climate change. This instrument is controversial for many reasons. Northern environmentalists fear that it would represent an escape to abatement policies in developed countries and that massive 'tropical air' would result, i.e. abatement on the paper with no practical reality. Some parties in the South fear that CDM will be contradictory to their development goals, at least by diverting resources towards an aim which is not a priority: CDM projects would not

directly contribute to raise the level of satisfaction of basic needs of the population. Others in the South say that the North could too easily tap their low-cost reserves of abatement actions, letting to South economies the hard business when these countries would have one day to enter the global policy of abatement. All these criticisms converge into efforts to limit the influence and scale of CDM and to accumulate procedural requirements, with the consequence of dramatically increasing transaction costs and maintaining CDM as a very marginal instrument, which is to my view an historical mistake.

Among the reservations against CDM is one raised by people concerned by the future of energy-intensive industry in zone 1 countries. Most of them, producing standard commodities, are nowadays involved in global competition across the borders. This is typically the case of steel production. To this regard an important analytical question is to understand how CDM would change the conditions of industrial competition worldwide. This is the first topic being scrutinised thereafter.

Let T_k and T_j be two technologies that can be used in zone 2 (LDCs) such as :

- T_k is a carbon-efficient technology that implies an emission level a per output unit, with a mean direct output cost p_k

- and T_j, is a less efficient, less costly technology that implies a carbon emission level b, with $b > a$, and a mean direct output cost p_j , with $p_j < p_k$.

Let C_1 be the market price of a ton of carbon in zone 1 (DCs)

Let f be the percentage of abatement that can be credited back to zone 1 through CDM

Then, for a Northern investor, the unit opportunity cost of using T_j is : $f(b - a)C_1$

Assuming that firms in zone 1 do not forget the opportunity cost of using carbon emission permits, costs involved with and without CDM, when CDM triggers a switch of technologies $T_j \rightarrow T_k$ are written as :

	without CDM	with CDM
Zone 1	$\min \{ p_k + aC_1 ; p_j + bC_1 \}$	$\min \{ p_k + aC_1 ; p_j + bC_1 \}$
Zone 2	p_j	$p_k - f(b - a)C_1$
Gap (D)	$\min \{ p_k - p_j + aC_1 ; bC_1 \}$	$\min \{ aC_1 + f(b - a)C_1 ;$ $bC_1 + f(b - a)C_1 - (p_k - p_j) \}$

Let V be the variation of gap of costs between a situation with CDM, D_y , and a situation without CDM, D_n.

Since with CDM, T_k is preferred to T_j, it implies that :
$p_k - p_j < f(b - a)C_1 < (b - a)C_1$ (1).

Therefore : $p_k - p_j + aC_1 < bC_1$ and $D_n = p_k - p_j + aC_1$

The same way, we have : $aC_1 < bC_1 - (p_k - p_j)$. Then :

$aC_1 + f(b - a)C_1 < bC_1 + f(b - a)C_1 - (p_k - p_j)$ et $D_y = aC_1 + f(b - a)C_1$

Thus : $V = D_y - D_n = f(b - a)C_1 - (p_k - p_j)$ Because of (1), it implies that $V > 0$

The conclusion is that the difference in unit cost of production between the two zones has been increased by CDM. The economic attractiveness of zone 2 for international investment has grown as a result of the introduction of CDM. Such a result should be seen positively by most governments of LDCs and may-be negatively by those of DCs: viewed from the Northern side, CDM generates an additional incentive to industrial delocation from zone 1 to zone 2.

Those results can be said realistic in the short term when investment flows to zone 2 are still rather low and do not have impacts on economic fundamentals of the game. It would not be the case any more if CDM is routinised and largely diffused in zone 2 economies. Then market price of carbon permits would decrease in zone 1 as a result. Let C'_1 the new equilibrium market price of carbon in zone 1. The dynamic impact of CDM is less clear-cut. For an individual investor the choice of T_k is still made only if that technology still brings a least-cost premium. It means that: $p_k - p_j < f(b - a)C'_1$. Variation V' then writes :

$$V' = D'_y - D'_n = f(b - a)\, C'_1 - (p_k - p_j) - a(C_1 - C'_1)$$

We know that the expression A: $\{f(b - a)\, C'_1 - (p_k - p_j)\}$ is positive but the expression B: $\{- a(C_1 - C'_1)\}$ is negative, so that it is not possible to derive general conclusions. Meanwhile, take the case that the first expression is small, which means that the return in carbon credits for one unit of output is of the same order of magnitude as the unit overcost of the carbon efficient technology, while still being greater, then V' is clearly negative, which would mean that CDM would have dynamically reduced the gap in output cost between the two zones.

To see the practical meaning of this conclusion, take the following values:

b = 0.5 tC a = 0.3 tC f = 0.8 p_k = \$404 p_j = \$400 C_1 = \$70 C'_1 = \$30

We can check that the expression A is positive (0.8 X 0.2 X 30 – 4) and V' negative by a great margin.

These figures underline the fact that the unit cost of production could not increase a lot as a result of the choice of the carbon-efficient technology so as to remain compatible with the private incentives given to Northern investors. So to generate a significant reduction of the value of carbon in zone 1, physical gains of carbon should be important at rather low cost. There should be many CDM projects. This would not be the case if CDM is conceived as a marginal instrument and, due to huge transaction costs, cannot generate a sufficient mass of credits to decrease the market price of carbon in zone 1. If DCs want to keep their big energy-intensive industries at home, they should organise massive investment in carbon-efficiency in LDCs. This is the best solution in the longer run to limit opportunistic relocation of industries.

With this competitiveness issue in mind, variable f plays a key role, since it determines the rate of transformation of carbon abatement into transferable credits usable in zone 1. On one side, it may control the breakeven point of choosing the carbon-efficient technology : the greater f is, the higher is the probability to choose T_k instead of T_j. On the other side, the smaller f is, the more CDM reduces the cost gap between the two zones. f should be given the smaller value still able to provoke a technological switching towards the carbon-efficient technology T_k.

Our analysis has shown that the long term, massive effect of CDM can be strictly opposite to the short term, marginal one. In the beginnings and, after that, as long as CDM remains a marginal instrument, it increases the cost gap between zone 1 and zone 2 for a Northern

investor. On the contrary, if it becomes routinised and largely diffused to the extent of provoking a decrease of market value of carbon in zone 1, it works to reduce the cost gap generated between the two zones by the structure of the Rio Convention and the basic asymmetry established between a zone submitted to quantitative targets and another one which is not. As a matter of fact, two other ways out exist. One has been chosen by the government of the USA, by retiring from the international effort to mitigate climate change: its industry will not suffer from asymmetric charges. The other is to obtain that main South countries enter a regime of national quantitative targets, be they binding or non-binding[3], and take part on a regular basis to an international market of carbon.

Let us consider broader issues for concluding remarks. First CDM opens the way to the rise of an opportunity cost of carbon emissions in LDCs' economies on spite of the fact they remain outside of zone 1 of the Kyoto Protocol. This could have a critical importance in the power generation sector and other commodity business. So it would contribute to place these countries on the right track in a phase they build and fix their productive infrastructure and face with choices about their development patterns.

It is sometimes said that CDM is unfair to these countries or that it comes back to some form of neo-colonialism, since DCs would impose their priorities and make use of cheap resources of LDCs. This could be the case if MDP projects would capture resource (soils, agricultural production) essential for the satisfaction of basic needs of local populations and provoke huge change of land use against local interests (loss of lands dedicated to rice crops for example). But there is no particular reason why such unwanted projects should be selected under MDP. Host governments and the multilateral control can provide guarantees, control and clear guidelines to this regard. Remind that MDP has been instituted by the Kyoto Protocol with two goals : sustainable development in LDCs and helping DCs to abate costs to meet their commitments. In LDCs, carbon-efficiency would also produce positive side effects: abatement of other local or regional pollutants (SO_2) and a lesser pressure on financial needs for oil or coal imports, or on forest resources, where wood is used for energy needs. And the full investment cost of the required technological switch will be paid by foreign investors in exchange of credits. Finally such investments in industrial activities would impulse huge transfers of technology beneficial for the formation of local skilled human capital.

Let me introduce a final comment. North-South controversies and negotiations often focus on the demand of the South for additional transfer of financial resources to feed big financial machines such as the GEF. Such funds may be useful for financing specific project of public infrastructures in urban areas, or for transportation, that would have a key role to shape the future demand of energy-consuming activities. But such mechanisms have proven in the past to be rather difficult to preserve from corruption, bureaucracy and final collapse, due to lack of appropriate governance at various levels. To the largest extent, it should be preferred to use instruments like TPs to give to numerous economic agents the appropriate incentives so as to shape a new economy of carbon. Funds and financial mechanisms have no incentive effects on the projects that are not selected! So they do not help much to diffuse an opportunity cost

[3] C. Philibert and J. Pershing (2001), from IEA, made a plea for non-binding targets for LDCs : they could take part to international emissions trading if they meet their target, but receive no penalties if they do not meet it. In the latter case, they lose the right to participate to emissions trading, while still being allowed to greet CDM projects.

of carbon emissions in the economy. The international community should watch to concentrate its efforts on the right issues and priorities in relation to its declared objectives. The important issue is to find ways to attach financial transfers to appropriate economic incentives.

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