Cutting the Climate-Development Gordian Knot - Economic options in a politically constrained world

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Combating climate change cannot but be a cooperative venture amongst nations. Together with the problem posed by the withdrawal of the US from the Kyoto Protocol, the key challenge for winning the battle is the involvement of developing countries in efforts to alter their GHGs emissions trends. This involvement is necessary technically but also politically to bring the largest emitter of the planet back on the battle field.

Climate policies materialize the contradiction, recognized at Stockholm (1972) when the Unep was created, which impinges on environmental policies: the participation of developing countries is necessary but these countries will not cooperate as long as they perceive environmental issues as a new form of Malthusianism and not as a positive opportunity for a sounder development. But, after Rio (1992) and despite repeated references to sustainable development, the diplomatic reflex of negotiating teams lead typically to disconnect the setting of climate regimes from debates about development, thus tying up a new Gordian Knot through a succession of misunderstandings.

This mistake was all the more grave as the timing of the climate change issue was inopportune. The recognition of the climate change phenomenon coincides with a period in which many developing countries are set for rapid economic growth and in which global power equations are changing (military power, globalization of world markets and control over natural resources). No sword of a new Alexander can cut this knot tied by history. The aim of this paper is to delineate the threads which when pulled would untie the knot. Developments in recent months show some strategic shift in the attitude of the developed countries as articulated in the G8

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declaration :*"We will act with resolve and urgency now to meet our shared and multiple objectives of reducing greenhouse gas emissions, improving the global environment, enhancing energy security and cutting air pollution in conjunction with our vigorous efforts to reduce poverty"* (G8 declaration, July 2005).

In the first section we draw on history to outline the intellectual underpinning of North/South divide around climate affairs. In the second section we show the economic basis for a leverage effect between development and climate policies. The third section ventures to propose some guidance to develop a viable climate regime strong enough to support an ambitious effort to decarbonize economies and we show that the Kyoto framework, once re-interpreted and amended is not so far from this working drawing.

1. 1988 – 2005: Intellectual sources of North-South misunderstandings

Beyond the 'only one earth' mantra, it is apt to recollect how the G7 was paradoxically hasty, three years after the first predictions of global warming by the tri-dimensional climate models, in setting on the diplomatic agenda an affair for which its members bear a large historical responsibility. This cannot be explained apart from a broader geopolitical context which included the implications of a petroleum game likely to be reshaped by the emergence of large developing countries as major consumers in the 21th century (Schlessinger, 1989).

How the diplomatic momentum lead from this context to a cap and trade architecture does not result from the deployment of an ex-ante fully fletched vision of any actor; it rather appears as the outcome of a succession of compromises and diplomatic *faits accomplis* (Bodanski 2001) such as the adoption of a quantity based approach to coordination. But this somewhat erratic process would not have produced the idea of an incentive system embracing all countries and sectors without an intellectual ambience marked by the economic principle of a single price of carbon worldwide in order a) to minimize costs of meeting a global target b) to prevent distortion in international competition. After 1992, the unpopularity of carbon taxes made the cap and trade system the only possible candidate for such an objective since political wisdom had eliminated the cumbersome international coordination of dozens of policies and measures. Despite the reluctance of some quarters in the EU (who wanted caps with limits to trade) this system was advocated as reconciling cost-efficiency and environmentalist political will, universal participation and flexible exercise of national sovereignty, with no apparent contradiction with other global environmental treaties or with national development objectives.

On the North/South division line, this system has, as suggested by Grubb in *negotiating targets* (1989) the advantage of organizing North-South transfers large enough to spur the South to take significant commitments in a foreseeable future. This advantage could not fully materialize immediately since, to translate the principle of "common but differentiated responsibilities", it was decided at Berlin (1994) that only developed countries would adopt binding commitments in a first period. But the perspective was supposed attractive enough for developing countries to adhere the system in a second step. In fact this posture was illusory and had the perverse effect of treating the Third World as a pure spectator of intra Annex B debates

(target setting, supplementarity quarrel) as if it should be content with the absence of commitments, with the avoided damages due to the efforts of rich countries and with the future transfers from carbon trading. The climate affair was *de facto* disconnected from other world governance issues (energy, world trade, innovation), which was at odds with its historical origin and generated suspicion.

Due warnings from two opposite directions signaled however that the cap & trade option could not be an open sesame:

- the United States Senate (Byrd-Hagel resolution 1997) demanded that developing countries face "new specific scheduled commitments to limit or reduce greenhouse gas emissions." This translated the refusal of asymmetric carbon constraints on economies and the demand of respecting the "no votation without participation principle" (Bodansky, 2001), namely the fact that countries can discuss the rules of a system only if they are willing to be part of it.

- the penultimate day of COP 3, the G77 plus China stated that: "Until the question of emission rights and entitlements is addressed equitably, it [will] not be possible to have emission trading." (G77&China 1997). This reflected concerns about possibly unfair quotas allocation in future and the political will of participating to an emerging component of the world economy.

The fact that these warnings were incapable to move the diplomatic momentum and that political teams supportive of the Kyoto Protocol failed during three years both to settle the technicalities necessary to its enforcement before the US elections and to make a credible offer to developing countries confirms both the prevalence an intellectual framing rooted in basic economic wisdom and the fact that it could not deliver a viable solution

1.1. The traps of the tabula rasa myth behind the "cap and trade architecture"

The fate of economic science may be travel an uneasy way between neglect, distrust, misuses and abuses. There was seemingly the case when, during the discussions about emissions trading, economists missed to recalling that optimal tools in a first best world may deteriorate the situation if applied in a second best world (Hourcade-Baron 1993). Too many expertises forgot indeed that the real world is not the homogenous *tabula rasa* of the metaphors of the first year courses in economic sciences, but a world full of imperfections.

It would have been all the more legitimate to question the capacity of a cap and trade system to deliver a Pareto improving outcome when extended to developing countries in conditions of underdevelopment, the hallmark of which is the existence of incomplete and fragmented markets (multiple discount rates, unequal marginal costs across sectors & regions), weak policy regime (with disjoints and distortions) and poor governance (quality, reach), under protected property rights (land, technology, IPRs), dual economy in perpetual reformation. Moreover, carbon price signals will have to operate in countries experiencing multiple rapid transitions (informal/formal, rural/urban, demographic profile) and mobilizing very heterogeneous technology vintages. Cap and trade may thus be swamped by high noise from other signals and in some cases produce perverse results as illustrated below.

1.1.1. Weak influence of market signals on informal/traditional activities

The share of traditional and non-commercial energy is declining in developing countries, though whether their decrease in absolute value is uncertain**.** For instance in India, the share of non-commercial biomass in total energy declined from more than half in 1950 to 20% now. However, in absolute terms its use continued to rise till late. Only in the recent decade this form of energy use has stagnated – due to supply-side constraints from deforestation and other land-use changes. The emergence of a carbon price may have the perverse effects of both increasing carbon emissions through the use of priceless and inefficient energy resources (Sagar 2005) and negatively impact the development of the traditional sector (for example through initially reducing electricity access in rural areas). This is not only a matter of relative ratio price/service of both forms of energy. Rural markets have informal lending mechanisms which provide credit to small enterprises and households with high interest rates in a context of low labor rates in absence of firm wage contracts. The benefits associated with formal energies therefore vanish. Decentralized, climate-favoring projects would materialize only if development processes would alter the baseline parameters like interest rates and wages, which are not modified by the climate centric mechanisms.

1.1.2. The dual uncertainties of gains from carbon trading:

The first reason why transfers from carbon trading may not be considered by developing countries as a credible offer is the uncertainty of their amount. The potential excess emissions quotas given to Russia and Ukraine at Kyoto are a tangible proof of a problem which cannot be viewed as accidental because such a 'hot air' can be given at each expansion of the Annex B (Lecocq and Crassous, 2003). Moreover net transfers are conditional upon quota allocation rules and it is doubtful if Annex B countries would accept rules generating new sources of large external transfers. This reluctance was explicit in the US position and the supplementarity condition insisting on domestic abatements, advocated by the EU, is its indirect form, although motivated by the political virtue of a demonstration effect.

On the basis of 12 world models[3], the likelihood space of the cost of carbon for a full implementation of Kyoto was about [76 ; 322]$/tC in the US and [169; 504] in Europe with no carbon trading; it felt to [39; 204]$/tC with full trade [4] but at the expense of [4; 26]G$ and [8; 22]G$ carbon imports, 90% of which from Russia and Ukraine. This confirms that most of the revenues will not accrue to developing countries and suggest that carbon importers may adopt policies at a higher marginal cost than the carbon price to control their trade balance [5] (which is common practice in the energy sector).

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[3] Results quoted in this paper are derived from SAP 12 (Ghersi & Hourcade, 2002), which allows for comparative exercises through reduced forms of the cost curves of world models reviewed by the EMF (Weyant 1999) and the IPCC.

[4] Incorporating 15% of the developing countries potential to account for transaction costs on CDM.

[5] With the G-Cubed model, Mac Kibbin warned such capital flows under the Kyoto Protocol could be unsustainable (2000).

A second less obvious but fundamental reason why inflows from carbon trading may not be automatically welcome is their uncertainty in terms of development benefit. In most CGE models the world carbon price is minimized and any inflow of funds in a country allows for a higher per capita income, but this is not systematically the case in a world with structural unemployment and with pre-existing fiscal or market distortions. Ghersi et al. (2003) show a scenario in which, despite 22 G$ of carbon exports, India suffers from a 2% loss of per capita income from the 2030 baseline. The underlying mechanism is as follows:

- to generate the carbon allowances corresponding to the 43$ world carbon price India has to increase its domestic energy price by 36%, against 8,6% in Europe and 16% in the US
- by unit of households income this 43$ represents seven times more in India than in the EU and given the decarbonisation elasticity retained in this exercise (derived from POLES), the income effect of the new set of relative price is drastic,
- this income effect is not compensated by the carbon revenues and the purchasing power of a unit of income decreases. The slowing down of economic growth is exacerbated by a crowding effect between carbon saving technical change and other types of technical change.

This analysis starts from the unrealistic assumption that the Indian government transfers its quotas to agents who make carbon enter the economy and does not regulate consequences of their behavior. In practice, it should export only the potential consistent with a pareto-improving policy in which the adverse effect of higher energy prices are compensated and the carbon import revenues used to foster general productivity. But this has two main policy implications: a) revenues from carbon trading contribute to development only if they are efficiently recycled and if accompanying measures are adopted b) the availability of 'cheap' carbon form developing countries may be significantly lower than conventionally expected.

1.1.3. No tangible short term benefit: uncertain gains of CDM and no funds for P&Ms

The last minute 'Kyoto' surprise, the CDM, can be perceived as a pure semantic substitute to the notion of Joint Implementation; but due attention has not be given to the fact that its definition (article 12) operates an inversion of priorities by placing the support to sustainable development at the first rank and the facilitation of the fulfillment of their commitment by Annex B countries at the last. Rather the CDM was trapped in never ending debates about three forms of additionality to assess micro-decisions in rapidly transforming counterfactual worlds: environmentalists wanted to secure an environmental outcome additional to the baseline, international organizations wanted to avoid the embezzlement of overseas funds towards environment (financial additionality), and host countries asked for developmental additionality.

The environmental additionality condition lead to so high level guarantees of measurement that it leaves out very important projects for which it is impossible to ascertain abatement with a good level of precision, in particular the projects generating "avoided" emissions for example in the transport sector, and which matter for development (see the small number of projects approved after two years). The financial additionality implies that a project eligible to the CDM has to be non profitable in the reference scenario, which leaves out any no regret potentials.

This set of restrictions contributed to the scepticism of DCs vis-à-vis the 'offer' of Annex B countries and all the more so as these countries never went beyond rhetorics about the support to accompanying 'Policies and Measures'; they gave no follow up to any proposal likely to result in tangible short term benefits such as the Brazilian proposal about compliance fund or the extension of the share of the proceeds on mechanisms. The benefits of climate policies could thus be caricatured into an empty promise for after tomorrow for countries under a today stress.

1.2. Fairness of the Burden Sharing: an impossible accord on normative equity principles

The equity issues surrounding the climate affair was obvious from the outset; this is the main reason why the article 3.1 of the UNFCCC annunciated the principle of "common but differentiated responsibilities'. However its only practical translation was the absence of commitments for the non-Annex B countries at Kyoto, which left unresolved question of the allocation of emissions quotas for further periods and raised more distrusts than a blunt and open confrontation. It is remarkable that economists remained rather silent about the theoretical framing of the equity issues underlying this question[6] and restricted themselves to studying the outcomes of competing ethical intuitions.

The most provocative (or challenging) was the equal per capita distribution of emissions rights (Agarwal & Narain 1991). Arguably, this may be inequitable to apply to individuals living in very different conditions like ambient climate, spatial constraints and energy access (Godard 2000, Neumayer 2002); but the rhetorical proximity between the notions of equity and equality, and its perception as a hedge against the *"new environmental colonialism"* embedded in its polar alternative the grandfathering principle, transformed this principle into a political icon strong enough to be retained at Kyoto (1997).

The alternative grandfathering principle widely accepted as the basis of international agreements such as multilateral fishing quotas (Sterner 2002), milk quotas in Europe (Burton 1985) or SO2 regime in the US (Joskow et al. 1999) rests on alternate ethical ground : any new environmental regulation is a renegotiation of the social contract and it is fair to account for prevailing interests vested during the existing contract. In the same way the Brazilian formula to translate the principle of historical responsibilities (den Elzen et al. 1999) confronts the difficulty of applying the responsibility argument in an intergenerational setting (Claussen et al. 1998) in which retroactive responsibility is unfair since Annex B citizens of the 19th and 20th centuries were not informed of the consequences of their behaviors.

Given these two irreconcilable principles, a logical response was to search for rules starting from the inevitable grandfathering and supporting various forms of contraction and convergence process (Meyer, 2002) with per capita emissions in the long run declining to zero: multicriteria and multisector rules (tryptich approach (Phylipsen et al. 1998), Groenenberg et al. 2000, Jansen et al. 2001, proposals from Norway (1996), Australia (1997) and Island (1997) at the AGBM); capacity

[6] About the few exceptions see Chichilisky & Heal (2000).

to pay paradigm implicit in Jacoby et al. (1999) fixing abatement rate (in %) in proportion with the difference between the per capita income and threshold below which a country takes no commitment.

The underlying rationale of such pragmatic approaches is that a) every Party will judge the fairness of the rules as function of its own expectations and value judgments about its consequences; b) this consequentialism will facilitate an agreement. Aiming at a consensus around explicit equity principles may exacerbate ideological tensions while the uncertainty of economic outcomes and the diversity of value judgments generate an opportune "veil of ignorance": because of the general equilibrium mechanisms and the diversity of contexts there is no direct link between welfare variation and a carbon price or a quantity of carbon imports or exports (but this bet is risky because of the orders of magnitude of uncertainty at play). The resulting set of acceptable contracts may be fuzzy enough to be consistent with at least one pragmatic rule. But Lecocq and Crassous (2003) show, in a systematic of five quota allocation rules (including an entry threshold) for 23 baseline scenarios available in literature why this bet is risky:

- some countries have strong preferences, robust to uncertainty, for the polar (but contradictory) rules when they look at the second budget period only (rules given a high weight to per capita for developing countries, to grandfathering for the US); but when passing to rules more likely to reach a compromise, these preferences become totally unstable and very conditional upon baselines assumptions;
- the preferred rules of countries may be totally different if they consider a one century time horizon instead of the second budget period only. For instance, China and Europe, starting from different situations reject rules with a high weights to convergence in the century time but accept it if they consider the immediate post 2012 only.

One could argue that this reasoning is at odds with the fact that targets are set every short time periods like five-years. But there are first two limits to drastic revisions of the allocation rules: the political costs of reversing any diplomatic *fait accompli* and the risk of undermining the dynamic efficiency of the system (structural uncertainty and possibility for countries to lower their abatement efforts in order to renegotiate laxer targets for future periods (Helioui 2002). Second, baseline uncertainty is very significant over the ten years delay between the setting of targets and the end of the commitment period (15 years for Kyoto). International Energy Agency projections (2002) for horizon 2010 forecasts for China CO_2 emissions are 22% lower than in the 2000 outlook, itself 20% higher than 1993 estimates. Fast growing countries have experienced, since the eighties, highly volatile growth of the GDP. Chinese per capita growth rate was 2% in 1990 and nearly 13% in 1992, for India the rate of growth of the per capita GDP has remained between 0 and 6% during the last 25 years, and Argentina has known extremely diverse growth configurations (-8% in 1989 and 9% in 1991). Whether fast growing countries continue experiencing a 8% growth rate on a five year period or 'only' a 6% one makes a 10% difference over a five years time period for a given carbon intensity of the GDP.

On top of these difficulties two core obstacles emerge when one accounts for the diverse realities of every country. First governments face the task of finding trade-offs between various

assessment criteria: looking at the costs for the low income classes, for the average citizen or maximizing the inflow from carbon trading may indeed not lead to the same vision of the 'burden'. Second, equity contradiction arises in cross country comparison of equity: poor citizen of a rich country do contribute far less to global warming than rich citizen of developing countries.

It may thus be impossible, to find any explicit formula capable to solve equity issues if these are framed in terms of fairness of the burden sharing. If true, this 'problematique' becomes self-defeating and reinforces suspicion: a 'fair' burden being a burden, an additional constraint which can be supported without compromising development agenda. Political acumen would have made this obvious but the vulgate of Kantian ethics used in international meetings created a hypnosis overshadowing the Machiavelli's saying that 'States are cold monsters' meant to defend the selfish interest of their constituents. The priority should rather be given to Pareto improving policies in a first step and this makes both concepts of burden sharing and property rights entitlement' no longer relevant[7]. Emissions quotas are not rights but transitory allowances and the question is under what conditions they can promote the desired leverage effect. This does not eliminate debates about equity and responsibility; rather starting for the real balance of interests in a policy context aimed at moving the overall set of constraints avoids the trap of a *regressum ad infinitum* of controversies.

2. Aligning Development Pathways and Long term Climate Change Policies

The interplay between normative rhetoric and an economic vulgate giving poor attention to the heterogeneity of the real world fueled a North-South misunderstanding since it signaled that climate would cap development. The challenge is now to demonstrate that postulating the existence of win-win options is not the n^{th} wishful thinking conciliation of contradictory interests. A due analysis of the reality of the climate-development nexus allows nevertheless to understand why this is not the case.

2.1. An intellectual discipline: starting from the suboptimal and uncertain baselines

Common practice is to consider development baselines to which environment impose new constraints. Moreover, high growth rates are postulated for developing countries in part because political correctness prohibits envisaging "crisis scenarios", and partly because of the very limits of current models: partial equilibrium models take economic growth rates as granted and general equilibrium models incorporate a growth engine leading to "golden age" equilibria.

More appropriate would be to start not from these virtual baselines but from those which may result from the many obstacles to an optimal exploitation of the growth potential of these countries. This intellectual outlook prevailed at Stockholm (1972) where the attention to disruptions of local environments reinforced the diagnosis[8] about possible perverse effects of

[7] Note that little progress has been made so far on rights over the global commons and that negotiations on forest (and related biodiversity) have reinforced national sovereignty over natural resources.

[8] The vital lead of Myrdal's 'Asian Drama', Sen's early contributions, R. Dumont's 'Afrique Noire est mal partie', the Unctad group (R. Prebisch) was to raise questions both about the trickling down of the Western

dominant growth patterns (distorted choices of techniques, structural unemployment, unfulfilled basic needs, drift from the land). These need to be revisited in evolving contexts of:

- evolving links between capital scarcity, infrastructure requirements and social dualism: developing countries still experience difficulty to fill the gap between their domestic saving capacities (including the barriers to their adequate allocation) and their capital needs. Cumulative energy investments between 2001 and 2030 should reach 2.2 T$ in China, 2.1 T$ in the rest of Asia and 1.3 T$ in Latin America (IEA, 2003). M. Fay and T. Yepes (2003) estimate that, from 2005 to 2010, 6.7% of the GDP in the Asia-Pacific region and 5.5% in Africa will have to be invested in energy, transportation, water distribution and sanitation infrastructures. Considering that between 40% to 60% of the savings are devoted to building in any country, the constraint is already very tight in Africa with a saving rate at 8% of the GDP; it may also turn very strong in China and India despite their current 35% and 20% saving rate if their funding requirements for infrastructures continue growing more rapidly than their GDP in a context of inversion of their age pyramid. This inversion may take place between 2020 and 2030 in China causing savings ratio decreasing to 16% in 2030 and 8% in 2050 (INGENUE, 2002, 2005) thus blocking infrastructure investments or reinforcing the risks of debt trap such as in Brazil in the late seventies where the energy sector represented one third of the foreign debt of the country.

- uncertain configurations of linkages between economic globalisation and endogenous development: the Seattle syndrome conveys the concern that development issues will not be resolved by trade liberalization : failure in attracting private investors on infrastructure investments, in maintaining local food production even though export oriented agricultures is successful, weakened capacity of political powers to protect their constituents in a system perceived as dominated by western interests and transnational companies, destructuring of the immense domain of activities not aligned to global world markets. But on the other hand, concerns emerge in the South about the emergence of a new protectionism in the North. Meeting these two opposite concerns is all the more problematic as developing countries are in very diverse stages vis-à-vis effects of trade liberalization.

- renewed tensions about energy security: as early as the end of the seventies, the World Energy Conference (1979) warned that one of the major world tensions beyond 2000 would likely be due to the emergence of developing countries as major oil and gas consumers; this diagnosis was overly re-iterated at the WEC of Montréal by James Schlessinger ten years later (1989). Recent trends at the beginning of this century confirm vividly these warnings and controversies about the timing of the peak oil production should not mask the consensus that conventional oil reserves will be increasingly concentrated in politically sensitive regions. In a sustainable development perspective the issue is, beyond the geopolitical implication of these tensions, to what extent these tensions and future shocks in oil prices will be strong enough to threaten the economic growth of oil importing countries.

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economic growth to developing countries (Rostow) and about the replication in these countries of the socialist primitive capital accumulation.

The question is thus to what extent policies apt to tackle these issues may also contribute to tackle global warming and, symmetrically measures facilitating a leap-frogging to low carbon intensive growth patterns may contribute to objectives such as food and energy security, enhanced use of local resources to allow for a spatially balanced development, reoriented technical choices, removing direct subsidies and indirect incentives to non sustainable consumption patterns, preventing health problems due to air pollution, water purification and waste disposals, soil protection and enhancement of the carbon sinks (forestation or new land-use patterns and agricultural techniques)?

2.2. Channels for a leverage effect between climate and development policies

Let us start from a conventional representation of the aggregated income *f(I)* in function of the total level of investment *I* in an economy under given technical and institutional constraints. In this representation, individual investments are ranked by decreasing profitability order and the slope of the curve represents the profitability of each marginal project. No additional investment is made when the slope of *f* equates the discount rate of this country. A higher level of income can thus be generated either through an upward move of *f(I)* due to access to a new production frontier (Fig. 1) or through lowering the discount rate *i*.

Let us assume that a government adopts policies that remove domestic institutional constraints and market imperfections potentials. This triggers an upward move of $f_S(I)$ and, at constant discount rate, of the level of investment to $I_S^{P\&M}$. In this context any inflow of foreign investment has potentially two related impacts: (a) it relaxes the capital constraint, lowers the domestic discount rate if the interest rate demanded by the foreign investor[9] (including a risk premium) is $i_N < i^*_S$; the volume of investment increases until $r(I)=i_N$ and the output until $I'_N > I_S^{P\&M}$; (b) by providing more efficient technologies through technology transfer, the production frontier moves up from $f_S^{P\&M}(I)$ to $f_N(I)$ which allows for a new level of investment at I_N. The challenge of a climate regime is thus to trigger this upward move of the production frontier through the value of carbon. This can be made through two interrelated channels: (a) the creation and sharing of a carbon benefit inflates the profitability of some foreign investments and moves up the curve to f^{MDP} (b) this additional benefit provides an incentive to public authorities for confronting the transaction costs of Pareto improving policies since, it yields revenues to compensate the losers of such policies.

[9] Note that the suffix N (for North) is chosen for clarity and simplicity of notation. Actually the discount rate is comprised between the domestic foreign discount rate and the southern country discount rate.

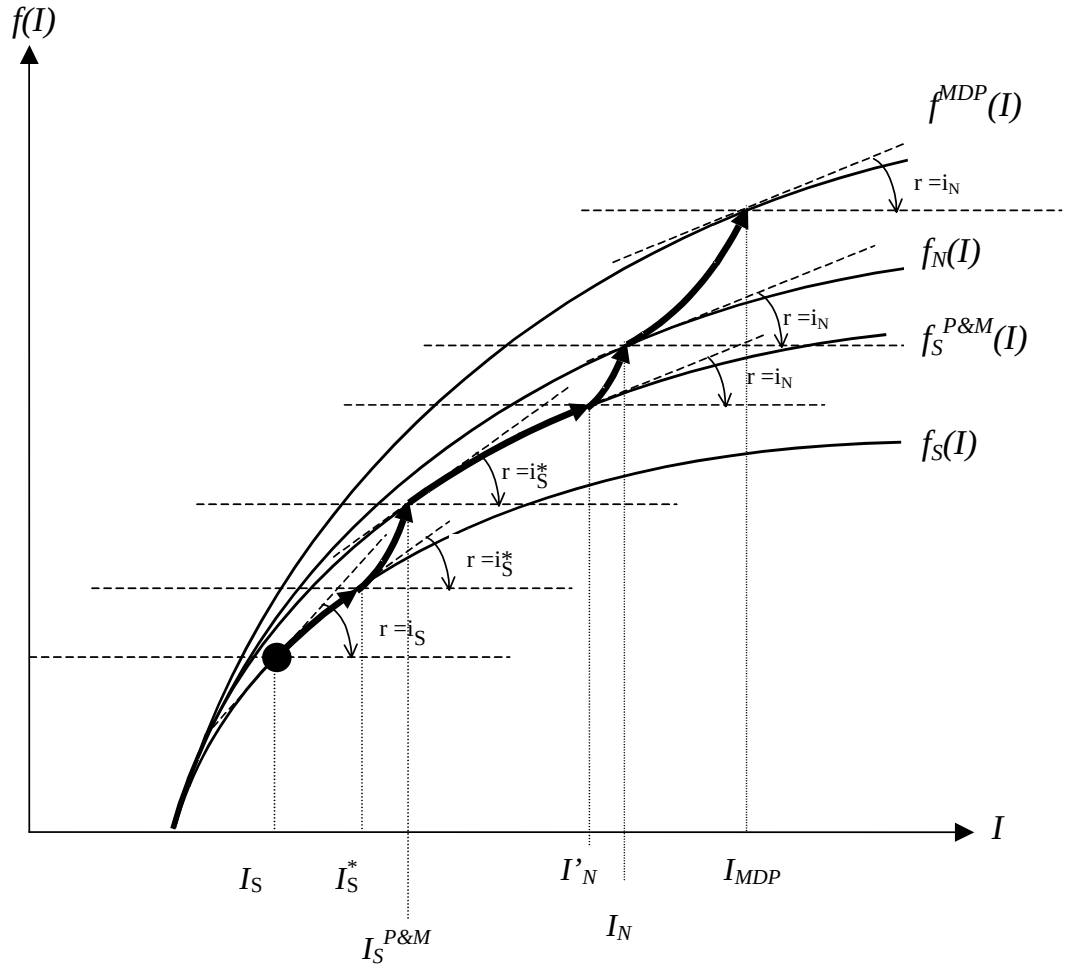


Figure 1: Income generated by cumulated investments ranked by decreasing profitability

Through this mechanism, climate policies can trigger development potentials that might otherwise remain frozen due to the existence of transaction and political costs of reforms. This re-opens the old debate about no-regret policies enhancing both environment quality and economic income. But this debate has to be reframed; the usual counterargument is indeed that, if an economy is below its production frontier (i.e. the maximum of environmental quality E for a given amount of economic output Q) and if governments trigger a move towards this frontier, they can choose to maximize the GDP at cost of a lower environmental quality (Ipcc SAR). In fact, the issue at stake here is more dynamic in nature; its lies in the many obstacles that make the real production frontier at t+n below the expected one. If climate policies help reducing this gap between *ex ante* expectations and *ex post* achievements they are strictly speaking no-regret. The question remains of why not reduce this gap through other channels and in another direction than decarbonization. The response relates to a broader political analysis carried out in section 3, but part of it relies also in demonstrating how climate policies offer a large potential for overcoming the Pareto improving policies paradox (Stiglitz 1998).

2.3. Detecting the diversity of synergistic configurations in the Indian Case

This section illustrates that the mechanism described in the previous section is not a pure intellectual construct. It uses a seemingly heterogeneous set of examples; but all articulate a common understanding that the debate of possible synergies between climate and development is ultimately about how to change the development baseline and is not isomorphic to the discussion about no-regret options in the nineties (Stavins 1994).

2.3.1. Conjoint Market for Local and Greenhouse Gas Emissions

Major developing countries are in transit through a stage of urbanization and industrialization when local air pollution reaches its zenith. This major problem for health and human development is linked with climate change since local air pollutants and GHGs are emitted conjointly during fossil energy use. In India the electricity sector consumes 70 % coal (CMIE, Energy 2003) and emits most sulfur dioxide (SO_2). In the year 2000, two-thirds of India's CO_2 and SO_2 came from 500 large point sources of which seventy percent by the 82 coal based power plants, most of the rest by transport, steel and cement manufacturing (Shukla et al., 2004).

Since the electric sector in India lack efficient emissions control, opportunities exist for creating conjoint emissions control mechanisms. Interestingly though the relationship between sulfur and carbon control is asymmetric (Shukla et. al, 2002; Pandey and Shukla, 2003; Garg et al 2003). Whereas cost-effective carbon mitigation measures like better combustion efficiency and fuel-switch from coal to gas reduce sulfur emissions to greater extent than carbon emissions, the cost-effective sulfur control measures like use of clean coal technologies or low sulfur diesel have little impact on carbon emissions. But local pollution received earlier attention of national policy makers than climate change, and this sequencing of SO_2 and CO_2 markets is sub-optimal since the singular measures to control local pollution fail to net the co-benefits of concurrent SO_2 and CO_2 mitigation. There is thus a scope for a policy designed to align both markets and optimize co-benefits. Even at a low \$20/tCO_2 the aggregate mitigation cost in the next 25 years in the conjoint system would be lower by \$400 million compared to under the two separately operating markets. Besides, the conjoint system would deliver 520 Mt of additional CO_2 mitigation and thereby add \$2.6 billion to the carbon benefits (Menon-Choudhary et al., 2004). Correcting this asymmetry and incongruence actions typically demand institutional financial arrangements at the national level that should benefit from a climate regime.

2.3.2 Electricity market reforms; what synergy with revenues from carbon trading?

After India's electricity sector reforms in early 1990's the sector became more dependent on domestic coal, as hydropower was confronting high capital costs, anti-large dams movements and interstate water disputes. Barriers to hydro and bottlenecks in coal supplies made the electricity supply to shift to gas market where the combined cycle gas technology offered advantages of low investment, short gestation and low local emissions. Despite this shift the carbon content of electricity raised as hydro share continued its secular decline, even though, it would have increased even more under the business-as-usual, by about 5% (Shukla et al., 2004).

Globally the reforms remain fossil fuel oriented. However "India Vision 2020" (Planning Commission, 2002) envisions an alternative "Best Case Scenario (BCS)" that could bifurcate the sector's development towards alternative pathway through modernizing existing plants, early adoption of advanced technologies, improved T&D efficiency, energy conservation, regional energy co-operation and higher shares of hydro and renewable energy. Carbon emissions in 2020, under BCS, would be 81 MtC less than the BAU (822 MtC cumulated up to 2020).

The questions are how a climate regime would enable India's electricity sector to develop along this vision and will it enhance or slowdown development? We thus assessed a sector based agreement through which the carbon abatements in this sector could be sold on the world carbon market[10]. The implementation of selected BCS type policies (including fossil fuel taxation and subsidies to renewable technologies) is conducted under an international carbon price of 10$/tC.

BCS policies have three conjoint effects: a) they lower the profitability of coal plants (from ρ_0 in the reference scenario to ρ_{BCS}) and with the carbon value V of 10$/tC increase the profitability of carbon saving technologies (gas and renewables) $\rho(V)$; b) because of these changes in relative profitability and of the alleviation of barriers, foreign investors substitute a part λ of reference investments in the power sector realised in the reference scenario by Indian investors I_0^S.; c) this part λ of domestic financing potential is released, reoriented towards other sectors (OS) and invested at a uniform internal rate of return ρ_{OS}. In total, the additional income Π generated by the mechanism is equal to the difference between the reference income from domestic investments in the power sector $R_0(I_0^S,\rho_0)$ and BCS total income which is composed by the income from foreign investments $R_{Elec}^N(\lambda I_0^S,\rho(V))$, the income from the report of domestic investments in other sectors $R_{OS}^S(\lambda I_0^S,\rho_{OS})$, and the income $R_{Elec}^S((1-\lambda)I_0^S,\rho_{BCS})$ from remaining domestic investments in the power sector (1-λ) I_0^S:

$$\Pi = \left(R_{Elec}^S((1-\lambda)I_0^S,\rho_{BCS}) + R_{Elec}^N(\lambda I_0^S,\rho(V)) + R_{OS}^S(\lambda I_0^S,\rho_{OS}) \right) - R_0(I_0^S,\rho_0)$$

$$= \left[\frac{(1-\lambda)}{\sum_t \frac{1}{(1+\rho_{BCS})^t}} + \frac{\lambda}{\sum_t \frac{1}{(1+\rho(V))^t}} + \frac{\lambda}{\sum_t \frac{1}{(1+\rho_{OS})^t}} - \frac{1}{\sum_t \frac{1}{(1+\rho_0)^t}} \right] . I_0$$

The leverage effect *l* of the mechanism is defined as the additional income generated by a unit of carbon reduction ($l = \frac{\Pi}{V.C}$ with V.C the total value of carbon reduction).

This literal expression shows the factors influencing the multiplier effect of credits regardless of the tax recycling and of the lower public expenditures to compensate pre-existing local externalities:

[10] For a detailed description of the methodology refer to Mathy et al. (2001).

- the gap between social marginal profitability of investments with or without BCS policies including taxation on coal (gap between ρ_0 and ρ_{BCS});

- λ the foreign share of total investments needed to meet the demand: λ has a negative effect on the income derived from domestic investments in the power sector because, assuming a constant demand. This is compensated for by positive variation of foreign investments, and by the transfer of domestic investments to other sectors;

- V the value of carbon: the higher V is, the higher the foreign investor's internal return rate and accordingly the bigger the income generated.

With a value of 10$/tC and a linear increasing tax level reaching 30% of coal prices in 2035, the mechanism generates an additional income of 1.6 to 7 $ for each dollar of carbon credit depending upon assumptions on the marginal productivity in the power sector and in the rest of the economy.

2.3.3. Climate Regime and the Co-benefits from Regional Co-operation

Regional cooperation exhorted in the principle 9 of Rio declaration on Environment is supported by obvious compelling arguments; at the same time countries are so diverse in terms of institutional capacities and political structure that deploying their complementarities is hard to achieve. South-Asia region[11] provides an excellent example of such a situation (Nair et al., 2003; Heller and Shukla, 2004). The countries have diverse endowments in energy resources- with coal in India, gas in Bangladesh, hydro potential in Himalayan nations of Bhutan and Nepal and strategic location of Pakistan as the transit routes linking South-Asia with the vast gas and oil resources of Central Asia and the Middle East- but there is little energy and electricity trade in the region.

Analysing the regional cooperation, Heller and Shukla (2004) show that the energy trade would yield direct economic benefits due to energy savings from improved fuel and technology choices and would lower investments in energy supply. The benefits are valued at US$319 billion from 2010 to 2030. The economic growth of the region would increase by 1% each year benefiting overwhelming number of world's poor. Very appealing for climate policies is that besides this, cooperation would in addition deliver a cumulative carbon saving of 1.4 GT of carbon for the period 2010-30, or 70% of the global mitigation target for the Kyoto Protocol, including the USA. The energy changes would also reduce loads of SO_2 in region by nearly 30%. In addition, balanced hydro development would yield spill-over benefits that are synergistic with adaptation needs among which are enhanced water supply, flood control and resilience to increasing incidence of hurricanes.

2.3.4. Infrastructure, Development and Climate Vulnerability

[11] This region comprising of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka holds quarter of world population

Though infrastructures are designed to withstand variability of current climate, their long-life renders them vulnerable to climate change. The recently constructed Konkan Railway is a typical example of such long-life assets exposed to increasing climate extremes.

Konkan is a coastal strip of land bounded by the Sahayadri hills and Arabian Sea on the western coast of India. The Konkan Railway, covers a distance of 760 km; it costed US$745 million and commenced operations in 1998. It passes through mountainous region and has 179 major bridges, 1819 minor bridges and nine tunnels exceeding 2.2 km (KRCL, 1999). The key climate parameter causing impacts is the rainfall threshold for landslides, parameterized as "more than 200 mm precipitation in 24 hours" (Nagrajan et al., 2000). Future projections for the area (Mitra et al, 2002) show increase in mean and variability of the distribution of "days with more than 200 mm precipitation" in a season. Besides rainfall, the development pattern affecting the geology, soil structure, and vegetation cover in the region also has key influence on landslides.

The operating experience shows that each year during the monsoon the train schedules are disrupted due to water logging and landslides with 140 reported incidences in year 2000 (Kapshe et al., 2003). The railway company spends 6% of revenue on repair and maintenance and 20% of this expenditure is for minimizing climate related impacts. The future impacts could only be larger due to compounded effects of climate change and the aging of railway infrastructure. It would be prudent to protect this infrastructure as it would accrue vital development benefits to future generations. But adaptation measures like improving climate predictions, reinforcing the vulnerable points and making operational and maintenance regimes more efficient would require committing public expenditure, which cannot be fully recovered by taxes in India. This is a typical case where a climate regime should deliver new forms of assistance.

3. The Kyoto architecture re-interpreted, amended, completed

The climate – development nexus relates to so intricate and controversial issues, as discussed in section one, and to so diverse configurations as demonstrated in section 2

That the reflex may be to expect a solution from a self organizing process what Jacoby metaphorically calls a *favela* regime (Jacoby, 2005) of self-organizing processes instead of the hopeless pursuit of a fully-fledged Grand Architecture (Bodanski, 2003). But favelas historically turned into either in an innovative urban style or into a self-reproducing pocket of violence, slavery and poverty and architectures exists which are modest and flexible.

In fact it should not be forgotten that the main reason for a common architecture is that the key sectors concerned by climate policies are very capital intensive with investments spanning over decades and with very high inertia. The key challenge is that actors of these sectors receive credible signals so that they can form their expectations early enough to avoid lock-ins in carbon intensive systems. Credibility cannot be decreed; it implies the feeling that the process of institutional innovation will converge on some viable system, backed by a strong political momentum implicit within which is some form of 'fairness'.

The flaws of Kyoto have been extensively pointed out by other critics (Victor, 2001) and we share many of them as demonstrated in section 1. However, there are two reasons why this

framework remains the only feasible architecture of a viable climate regime "for lack of anything better". The first is political : it is diplomatically discomforting to write off a treaty ratified by all countries but two; this treaty has passed a legitimacy threshold and is now part of the geopolitical game. The second is economic: no possible substitute provides the same potential to untie the development-environment Gordian Knot.

An internationally coordinated carbon tax (Cooper 1998 , Nordhaus 1994) confronts the same equity issues as a cap and trade system (the marginal welfare loss for a given price of carbon is higher for low income individuals) while not providing ways to compensate through a more generous allocation of quotas (Chichilnisky and Heal, 2000). Middle classes represent in developing countries a low share of population compared with low income classes and, under the present state of their fiscal systems, very optimistic assumptions are needed about the mechanism yielding a double-dividend of domestic tax reforms, to expect a full compensation in the absence of net foreign inflows. Whether such inflows can be brought by overseas aid at the similar order of magnitude as the transfers from carbon trading is questionable. In such a system, every country acts in disjoint, in the absence of any real assistance from the coordination regime.

An acceleration of R&D efforts, as suggested by the US government, is necessary to the ultimate success of climate policies, but there are only a few technologies in their proposed basket which can be deployed in the absence of any economic signal, amongst which, but not solely, price signals. A "technological push only" model works for large scientific ventures such as space exploration or fusion (ITER) or for centralized public funded programs with industrial outlet such as the civil uses of atom; it is not effective when innovation has to be deployed in hundreds of end-use services, in very diverse contexts and under large controversies about the most promising and environmentally sound technology cluster on the supply side. Moreover this option provides no guarantee to developing countries that these advanced technologies will not be used as a source of economic and political power, and that decarbonization oriented R&D will really internalize their specific priorities. The recent six country initiative "Asia-Pacific Partnership for Clean Development and Climate" proposes cooperation for development, deployment and transfer of clean technologies which may minimize this risk since it rests on voluntary actions and offers countries to make choices that suit own national dynamics and development objectives such as for air pollution and energy security. The question remains however whether such technological cooperation could deliver its full potential in the absence of any economic signal.

The question is thus what reinterpretation and modification of the Kyoto framework would alleviate its current flaws and facilitate the exploitation of the environment-development synergies. As argued in section 1, there is no positive answer unless putting the cap and trade system in a new paradigm of climate negotiations.

3.1. Shifting the bargaining paradigm, shifting the status of the climate regime

In the reordering of the world since Kyoto, far reaching structural transitions are witnessed in major developing countries. The formation of regional trade blocks in developing regions and

their rising participation in global trade are altering the dynamics of the new round of trade negotiations. The shifting world economic order since pre-Kyoto period is shifting bargaining context and positions and the content of this shift is critical.

Their global economic successes notwithstanding, advanced developing countries are increasingly conscious that their enrichment creates grounds for demanding from them acceptance of emissions limitations. Their response will depend upon whether they will consider that investing in back-bone infrastructures may lock them into unsound development pattern, and how they will grasp its implications for environmental and energy security concerns. In this case they will not ask for postponing climate action but for aligning development goals and climate objectives (Heller and Shukla, 2003). Symptomatically, the 'initial national communication' to the UNFCCC of many developing countries suggest such an alignment and, however rhetorical it may be, their governments have multiple declarations in that direction: Millennium Declaration at the UN Millennium Summit (2000), the Johannesburg Declaration at the World Summit on Sustainable Development (2002) and the Delhi Declaration on Sustainable Development and Climate Change at the Eighth Conference of Parties (2003).

In other words, in discussions about how to unlock current and prevent future obstacles to their development, some quarters of developing countries are increasingly less reluctant to incorporate the management of long term global public goods and are open to examine seriously whether the 'offers' made by the North under this umbrella can really help them to move upward their production frontier over the short and medium term.

What could be such offers is thus critical but, beyond formal declarations, the situation is probably more difficult than in 1992 and 1997 because of an inconvenient timing. Indeed, significant transfers to embark developing countries in climate action have to be accepted in a context in which large emerging economies are perceived by public opinions as dangerously threatening jobs. This is why developed countries have to be serious about why they want climate policies : is it solely for environmental reasons? Or because of the political instability that climate change could cause in low adaptative capacity areas? Or is it a part of the geopolitics of energy? Or since it is a factor in global security?

The recent declarations of the G8 about climate change and poverty alleviation indicates the acceptance of broadening the negotiation paradigm. Climate policies would be thus one element of efforts to transform economic globalization into a mutually benefiting process instead of a harsh competition amongst nations. Beyond the security arguments (energy, climate refugees and political instability) the North will make serious offers only if it perceives the accession of new countries to development and climate policies in the South as a way to enhance its own growth potential. The demand for infrastructures in developing countries offers 'a moment of opportunity' (G8 2005) and the Marshall Plan metaphor which underpinned world reports in the seventies (Carter et al. 1976, Tinbergen 1976, Brandt 1980) is an appealing to understand the opportunities to be seized. This universal solidarity is not (necessarily) a matter of benevolence and altruism but a realization of well-informed perceptions of selfish-interests. It is remarkable that, as demonstrated by Lecocq and Hourcade (2004) in a two period model 'à la Sandler et

Smith' (1976), negotiation mandates translating this attitude have far higher chances to lead to compromises and to ambitious climate targets than negotiation mandates that prevailed so far.

In this new bargaining paradigm, based on the recognition of issue linkages, climate policy baselines are themselves implicitly part of the negotiations since they will be altered by decisions and compromises in other domains of the world governance: WTO and voluntary agreements to limit exports, reforms of the multilateral funding mechanisms, oil and gas markets, labor regulations and environmental norms, biodiversity convention. This has dramatic implications on the specific role of goal of climate negotiations and of the climate regime:

a) this regime cannot pretend to dictate many of the core decisions contributing to the decarbonization of the economy since these decisions will be inevitably made on the occasion of (or together with tackling) other international and domestic issues. Its role can only be to spur selection from amongst possible pareto-improving policies that contribute to combat global warming. What is vital though is to facilitate bottom-up operational approaches aligned to long term signals regarding the social value of carbon abatements;

b) its architecture has to stay "minimal" in the sense that it has to crystallize initiatives instead of dictating uniform solutions, to work under extant and future international agreements and to be flexible enough to account for the asperities of the real world while guaranteeing the predictability of economic signals. It has to support any form of regional or sector-based cooperation capable to tap real potentials in a way that avoids risks of fragmentation and ultimate collapse of a "favella type" approach,

c) its political credibility and efficacy entails it to be perceived as supporting and not constraining domestic policies. This is why it matters to clarify the notion of legally binding commitments. On one hand no economic signal will emerge without some forms of commitment; on the other, many countries will not accept a system limiting the sovereignty of their legislative institutions; as the case for the US, but also for the major developing countries. The European experience of sovereignty transfers is too specific to be extended quickly in other contexts. In practice, international affairs will likely remain a matter of pledges and review. Even though any agreement is expressed in legal terms, what really would secure its enforcement is both the gains for any government to respect its pledge and the costs of economic and political retaliations against those who defect.

3.2. Basic principles for a 'Minimal Architecture' in a moving world

Such architecture can be build with a few amendments to the Kyoto framework but this minimalism should not be misinterpreted. What is proposed incorporates the critiques of the cap and trade approach and, for some of the advocates of the KP, it may imply a real departure from past intellectual penchant by placing the will to untie the environment-development Gordian knot at the main objective of the system rather that pursuing a virtual environmental integrity.

3.2.1. Carbon prices: an attractor, not the unique driver of climate friendly policies

It is impossible to count on the sole carbon prices to achieve decarbonisation. Even placed under the general equilibrium conception, most of existing analysis remain partial in the sense that, they do not recognize that carbon prices will operate within a wide set of signals: capital costs, insurance premiums, certification of alternative technologies, structure of the tax systems, regulation of the labor market, price of land and price of real estates (which govern in part the mobility needs), road pricing and other transport regulations, local environment regulations, will have a role possibly of the same order of magnitude. The problematique has to be turned upside down: long term carbon prices are signals against which climate benefits of any form of bottom-up initiative to change these parameters will be measured.

The first important implication is to stop interpreting the cap and trade as if decarbonization was a pure matter of mobilizing GHGs abatement 'factories' to achieve a given decarbonization demand. The second one is to avoid refusing, for the sake of environmental integrity, any 'reward' for every ton of abated carbon which cannot be duly measured; we saw for example how upgrading regional cooperation in the South Asia may yield huge environmental benefits; but, if it is allowed, by adopting this virtuous baseline as the basis for quotas allocation, to grant with carbon revenues only the 'additional' carbon abatement coming from pure climatic centric measures in this context, the bulk of the incentive is lost.

This means that the cap and trade tool is one keystone of any credible architecture, but not its alpha and omega. In practice, only a small part of the decarbonization activities will be directly exchanged on the international carbon market. The tons saved by a speed limit will never be exchanged on such a market simply because they cannot be measured. But they will contribute indirectly to the dynamics of this market by reducing the carbon imports or augmenting the carbon exports of the country which adopts this measure. Governments remain the key actors of the system because they control not only the targets but also the number of sectors to which emissions allowances are redistributed and their degree of intervention on the international market. In this view the system preserves totally the autonomy of the governments; to minimize the role of market powers and the strategic use of carbon trading by governments, the only, but important addition to the provisions of the Marrakech accord would be to impose that all imports and exports amongst governments take place through transparent auctioning on a state regulated clearinghouse.

3.2.2. Terms of the negotiation: diversified pledges aligned on long term price signals

The pre-condition for making a cap and trade approach acceptable to developing countries is to abandon the Malthusianism tinted idea of commitments to emissions constraints. This can be done through diversifying the menu of pledges. Binding global commitments for Annex B (and for countries reaching an agreed threshold level of a per capita income) would co-exist with:

- non binding global quotas (Philibert and Pershing, 2002) whereby countries would have access to the international carbon markets if they meet their targets but would not be penalized in case of overshoot,

- non binding sector based targets allowing countries to participate the global system only through sectors for which this participation could bring development benefits,

- forms of clean development mechanisms extended to programs in order to support action in countries and sectors not mature enough to adopt any pledge in terms of emissions limits.

A second rationale for abandoning the idea of a global carbon trading system including all countries, sectors and GHGs is to minimize the risks of regularly deflating the economic value of abatement investments through repeated waves of hot air or through insufficient progress in measuring and monitoring non-CO_2 GHGs and carbon sequestration. Sector based targets allow for organizing in a more progressive and controllable manner the entry in the system.

The fact that non binding commitments render unknown the final level of emissions is not the real weakness of the system since the alternative is developing countries not even considering to curb down their emissions. The risk is rather that these countries will be prompted to negotiate very lax quotas that Annex B countries may concede to have them on board. The obvious consequence would be a depreciation of the value of decarbonisation efforts. But this intrinsic problem of any negotiation on emissions quotas can be reduced through three ways:

- in the absence of economic penalty for missing the targets, countries should be more inclined to a good faith dialogue; both Annex B countries and the applicant countries are indeed interested in regulating the expansion of the system so that the carbon value does not deflate, the first to secure the profitability of their past investments the second the gains of their entry.

- setting targets based on performance criteria rather than absolute caps would allow to use observable information[12] and limit the risks of hot air by annulling the dramatic uncertainty of economic growth rates. It would also contribute to disconnect emissions targets from the notions of cap on development and of rights endowment.

- a floor price of carbon can provide an additional hedge against deflated carbon prices. In a system allowing for many forms of pledges the issue of the uneven impact of a unique carbon price loses its aptness since governments are not forced to increase all their domestic prices accordingly; they will expose to this price only those sectors from which they expect gains from carbon-trading high enough to offset the adverse effects of higher energy prices.

3.2.3. Linking good faith commitments of Annex B, incitation and assistance to DC

For countries with binding commitments the main risk is the huge uncertainty about compliance costs, leading good faith governments to commit themselves only for lax targets. To overcome this difficulty a price cap was proposed in 1997 (Kopp, Morgenstern and Pizer 2000); this cap would operate as a safety valve and facilitate an international accord on ambitious targets. A price-cap allows indeed for a pragmatic compromise between pessimists and optimists

[12] Most of the works on allocation rules reported in section one would bring here very valuable information

regarding abatement costs: the most reluctant to take on stringent targets will be protected against bad surprises about costs; and the proponents of ambitious climate action should not be concerned since, if abatement costs are low, the safety valve will not be triggered.

The main critics against this idea point out that the Parties may then not fulfill their objectives without being submitted to sanctions. But this is a misperception which results again from confusions about the notion of 'legally binding'. Military actions set aside, the only effective sanction in these affairs can ultimately come only from economic and political reprisals against those who do not respect their pledges; this explain why existing compliance provisions in the Marrakech accord cannot de facto go beyond allowing to accumulate an environmental debt (Ghersi, Hourcade 2002)

A price-cap adds some economic 'teeth' to the system since the missing abatements are pre-paid; it can also upgrade its environmental efficacy if the collected funds are used to restore part of missing abatements. These advantages can be enlarged if these funds are managed by an international restoration fund selecting abatement projects through auctioning. Since a major part of these projects would occur in developing countries (or in parts of their economy) not covered by the cap and trade system these additional transfers will be primarily in direction of the least developed economies which may be marginalized by the international carbon trade. Politically, this system would confirm to the Brazilian proposal of Compliance Fund ( ) and incite, through its consequences on external balance of payments, government of Annex B countries to adopt serious non carbon price domestic policies.

In pure economic terms, the interest of a price-cap is to form, together with a floor price, a system 'à la Roberts et Spence' (1976) namely an hybrid system in which information about the price – quantity relationship becomes increasingly rich thus guiding long term expectations in a credible manner and allowing for regulating the extension of the system.

3.2.4. Disconnecting the treatment of energy intensive industries exposed to international competition from the rest of the emitting sectors

When passing from general declarations to the implementation of real policies, the key obstacle will be, in any country, the implicit veto of companies working in carbon intensive exposed industry to objectives which could appear as introducing asymmetric constraints in international competition. These risks are often overstated at the level of the products market since the likely impact of carbon prices on production costs are one order of magnitude lower than the large oscillations in exchange rates experienced since three decades (Quirion and Hourcade 2004). The risk is higher concerning equity values; allocating for free a minor share of quotas copes with a good part of this risk (Goulder 2004) but this no longer is the case if some government allocate generous quotas for free and auction the others.

Even though these risks will be in part mitigated if real policies are conducted in the transportation sector, since the localization of these heavy products is sensitive to transportation costs, the problem is real; no government is in position to resist the pressure to protect jobs. The way out is to take stock of the fact that, ultimately, carbon trading occurs mainly amongst

governments which internally operate a differentiation of targets and of domestic carbon prices to households and industry (as they do for energy prices). Carbon prices do not need (in fact should not because of their impact on the distribution of real incomes) to be equated across all sectors and countries; the only necessary price equalisation at the international level is for energy intensive industry exposed to international competition. The question of quota allocation rules in this context remains to be resolved. The potential for conflicts at the WTO is large in this domain and this is why it matters to incorporate the possibility of international sector based agreements on quota allocation principles in the few concerned industry. With national policies respecting these agreements and a single world carbon price, most of the concerns about international competition could be addressed.

3.3. Supporting national and regional policy platforms to achieve long term goals under the pressure of urgency

Aligning multiform initiatives on credible price corridors constitutes the keystone of a continuously self-organizing climate regime. But this process may be blocked, politically and economically, because of the pressure of urgency (financial constraints, risks of social outburst) if benefits of participating a climate regime are not immediately tangible. Given the long lags between development benefits of decarbonisation[13] and avoided damages benefits, other incentives have to be found over the short term, and all the more so as, despite the recent debt cancellation for poorest countries, we are in a context of decreasing overseas public aid. Beyond this issue of political credibility another reason for giving tangible benefits over the short term is that, if the removal of some obstacles to development contributes to decarbonisation, other components of development policies generate a need for more carbon intensive technologies (substituting public transports for bicycling or animal traction, deforestation to increase food production). It matters then to put in place over the short term the alternatives of expanding the menu of technical choices to avoid future carbon intensive lock-ins.

3.3.1. Climate policy tools in a changing context for overseas aid and funding.

This is why the sensitive question of the articulation of climate policies with the reforms of overseas aid and multilateral financing, so far trapped in the "crowding out" debate cannot be eluded. Technically this debate could be closed by additional sources of financing linked to the climate regime; but addressing the "crowding out" phenomena arising from the fear of a constraint of climate policies on development can be done with sources of additional funds like a compliance fund, an enhanced share of proceeds of carbon trading, a tax on bunkers or a tax on international aviation. But how to raise money is far less difficult than to guarantee that it will be spend in an efficient manner to address development and climate objectives.

[13] In Ghersi et al a scenario incorporating some realism regarding carbon trading (only a share of total potential is traded, existence of shadow prices of imports) leads to $55 billions North/South transfers in 2030 which corresponds to about the double of a 2030 FDI (with constant share of the GDP). This order of magnitude is significant but takes place only in 2030;

Part of the persisting decrease in levels of development aid, which may render Millennium Goals unreachable, is indeed due to rising demands for improved controls and monitoring of activities. More broadly, the context of developing countries evolves very quickly, and in some respects in diverging directions, and it forces to revisit the Consensus of Washington.

Rapidly emerging countries like China, India or Brazil ask for different forms of aid and less for project financing support, as they are now main recipients of international private investments. But these funds are very volatile flows and may not meet the quantum and quality of investment requirements needed to respond to both energy demand and decarbonization objectives. Public flows may thus play a critical role of technical and institutional facilitation (support in structural reforms, support to partnerships between private sector, multilateral agencies, banks, credit exportation agencies) in a context of public-private partnerships. These could for instance take the shape of third party financing fund for financing of energy conservation investments which removes upfront financial constraints (Hourcade & Shanker, 1990), in countries with significant no regret potential.

On the contrary, Less Developed Countries (LDCs) are still highly dependent on ODA for the construction of infrastructures and for enlarging access to basic needs. In these countries, impacts of mitigation investments in terms of volumes of emissions reduction potentials are quite limited and limited funds of ODA would better address financing of adaptation measures and capacity building.

3.3.2. "Good quality money" and "upgraded monitoring and assessment"

Climate policies and associated voluntary monitoring of carbon reductions amounts offer the opportunity of adding new dimensions for evaluation of ODA efficiency. This presumes institutional innovations in order to discipline both the investor and the host country and to assure "good quality money" related to climate policy tools.

Private investments are highly correlated to the stabilization of anticipation. Climate friendly investments like investments in infrastructures are subject to diverse kinds of risks (exchange rate risk, risk on demand) which explain their volatility. Development Finance Institutions can provide risk mitigation instruments, e.g. contract risk insurance or policy risk mitigation. In the case of the PLANTAR project (project of sustainable fuelwood under the PCF), no currency-risk insurance was available beyond 2 years in Minas Gerais (Brazil) for this type of projects, but with carbon finance revenues ($- or €- denominated) placed on offshore escrow account, an OECD commercial bank agreed to lend for 5 years and the loan amortization is structured to match expected payments for CERs.

So insurance packages (under the control of the World Bank for instance) could be dedicated to climate friendly initiatives to bring funds prior to project completion like it is the case of Emission Reduction Purchase Agreements (ERPA) which generate high quality cash-flow which can avoid currency risk, and thus overcome barriers to investment (e.g., absence of currency insurance on the market, cheaper capital) and induces lenders to provide upfront cash flow.

Conclusion

In a context in which discussions for the post-2012 period of climate policies risk to be trapped in a framing leading to endless rhetoric opposition between a 'Grand Architecture' and any form of alternative proposal *de facto* resulting in a favella approach, this text starts from the evident urgency of considering seriously the environment – development Gordian knot to delineate a thin pathway out of this trap.

The first step is to correct an intellectual bias which led since 1992 to envisage the climate policies as an isolated item of the international agenda and to neglect the most important opportunities of embarking developing countries in a pro-active attitude. Typical of this bias is to envisage the cap and trade system as a unique architecture encompassing all gases, sectors, economic actors and governments, and to stand on a static view of environmental integrity. Doing so one focuses on securing that any traded ton of carbon have been precisely measured while the core challenge is to avoid future emissions from quickly expanding infrastructures very hard to measure in a precise manner; second one misses that margins of freedom for conciliating climate and development rely primarily in the content of these new infrastructures, third one polarizes debates about how to share the burden sharing of carbon abatement thus confirming the concern that the cap and trade system be a constraint on development.

A second step is to understand the mechanisms through which climate policies may exert a leverage effect on development policies. These mechanisms necessitate a mix of price signals, capital inflows and technological transfers which can be generated by carbon trading systems, but the crux of the matter is an institutional design in which revenues of from carbon trading are directed to removing obstacles to development. This demands an articulation with development policies and the diversity of configurations for such an articulation shows the absolute necessity of bottom-up structures facilitating actors to coordinate diverse initiatives and organize cost-effective and welfare maximizing actions for gaining co-benefits vis-à-vis different development objectives.

A third step is to recognize that, although the nature of problem makes it neither politically feasible nor economically prudent to start from a fully-fledged "grand architecture", to rely only on a self organizing processes such as the Victor's 'Madisonian approach' (Victor et al. 2005) setting ambitious but non-binding goals 'will not generate the credible policy signals that are required to secure carbon saving investment on infrastructures and may result in a very instable fragmented regime.

The way out current deadlocks is not to abandon a Protocol ratified by all countries but to re-interpret it by turning upside down the climate centric view which prevailed over the past decade. The technical tools for its adaptation are the diversification of pledges, non binding commitments, safety-valves against uncertainty, voluntary agreements in some key sectors of the world industry, re-design of the CDM in direction to investment programs and infrastructures. All these tools can be used to secure that a diversity of initiatives will not result in a costly atomization of efforts. But the key is to recognize the diversity of issue linkages (with energy security, local environment issues, preventing debt traps or social dualism, reshaping of international funding and

overseas aid). This makes the climate regime part and parcel of attempts to master economic globalization and to narrow the North-South divide.

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