

Climate policy architecture for the Cancun's paradigm shift: Building upon the lessons from history (proposed for publication in a special issue of International Environmental Agreements; comments welcome)

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Abstract:

The economics of climate policy after Rio led to a climate centric paradigm which represents a departure from the original UNFCCC's cooperative framework for setting climate policies in the perspective of sustainable development. This resulted in a pure cap-and-trade approach through which the adverse effect on development of high energy prices should be mitigated through a "fair burden sharing". This paradigm could not but fail to untie the development-climate Gordian knot and make possible a global agreement to abate significantly GHGs emissions. The real challenge is to align development and climate objectives considering the changing context since the nineties with both a re-equilibrium of the world economic balances and the adverse context created by the current financial crisis. It shows out how redirecting the world savings towards low carbon investments provides a lever for a sustainable economic recovery out of the financial crisis which could be more inclusive and more inward oriented thus calming down some of the current tensions and risks of economic globalization. It proposes a general framework of the upgrading of carbon finance within a general reform of financial systems which could be supported by the adoption of a carbon value as an agreed notional price to trigger a wave of low carbon investments in the world.

1 Introduction

In the succession of Conferences of the Parties (COP) since Copenhagen, the Cancun's conference (COP-16) marked, on paper, a turning point. It called indeed for "...a paradigm shift towards building a low-carbon society that offers substantial opportunities and ensures continued high growth and sustainable development" (paragraph 10). It introduced a notion

of 'equitable access to sustainable development'¹ (EASD) "in the context of "shared vision for long-term cooperative action" and 'global peaking of GHG emissions". This perspective extended the concept of equity beyond "burden sharing" and shifts in principle the negotiations away from being an adversarial competitive game among nations for deciding who shall be allocated "how much" of the remainder of the emissions budget? It thus offers a basis for a cooperative exercise to address the climate problem together with other global and national development issues (Hourcade et. al., 2008) under the constraints of the diverse political, social, economic and environmental agendas.

However, after Cancun, Doha (COP18) and Warsaw (COP19), the Cancun's paradigm shift remains an unfinished business. Certainly, the Cancun Agreement established a Green Climate Fund for financing mitigation in developing countries, and this is pre-requisite for overcoming the distrust cumulated overtime in climate negotiations. However this fund is at risk of becoming a new source of misunderstanding. Quantitatively, the context of the financial crisis, pressures on public budgets and deleveraging in the banking system is not conducive to generous North-South transfers in the immediate term. Qualitatively it might be perceived as inadequate to deliver the claims for equity in responses to global warming unless it is built in the perspective of an EADS. But the EADS is still seen as too fuzzy a notion to ground the new climate policy architecture.

Without pretending to build, by 2015, a full-fledged climate policy architecture, this paper aims at defining how a tangible outcome in the near-term could launch a self-reinforcing confidence circle and help the international community to discover the narrow pathway to navigate towards an equitable access to a low carbon intensity development.

The paper first points out the misunderstandings that are at the root of the Kyoto Protocol (KP) in order to detect which of them may entrap any approach to enforce the Cancun's paradigm shift. Second, it discusses the rationale for an international climate regime in a context where the Nationally Appropriate Mitigation Actions (NAMAs), which are domestic in nature, are considered as the primary tool of GHGs abatement². Third, it lays out the founding principles of a climate regime articulated

¹UNFCCC Decision 1/CP.16, para. 1.6, <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2> (Accessed on November 22, 2013)

²Bali Action Plan, UNFCCC COP13, <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf> (Accessed on November 22, 2013)

around a new instrument for upgrading climate finance through the emission of carbon assets by the Central Banks of volunteer Parties.

2 Cancun's vs. Kyoto paradigm: clearing the misunderstandings

Linking these two sensitive issues, climate regime and reforms of climate finance, may appear to be a diplomatic non-starter. But ignoring that “social and economic development and poverty eradication are the first and overriding priorities of developing countries and that a low-carbon development strategy is indispensable to sustainable development” (paragraph 6) is also a diplomatic non-starter. After all, if it is possible to find a way to both reinforce the resilience of the banking system, and reorient part of the world's savings toward low-carbon energy, transportation and housing infrastructure and trigger a wave of sustainable growth (UNEP 2009) that is less exposed to financial ups and downs, then this link is worth examining.

Grubb (1990) in *Negotiating Targets* initiated the idea that affordable transfers of emissions permits of developed countries would be a real incentive for developing countries to bend their GHGs emissions trend. But this notion was clouded by a misreading of the Kyoto Protocol. In the KP, emissions allowances are allocated to nation states which are allowed to trade them (Art. 17 bis) to minimize their compliance costs. The KP thus follows *stricto sensu* subsidiarity principle: a) countries select domestic policies to meet their emissions caps given their national development objectives, and b) an international carbon market instituted amongst governments facilitate them to meet their commitments cost-effectively. This inter-countries market would generate a world carbon price, but domestic carbon prices could differ. A country meeting its GHGs emissions targets without carbon prices but through traffic regulation (e.g. speed limit), housing programs or subsidies to low carbon electricity could nevertheless participate in international carbon trading.

In the immediate aftermath of the Kyoto conference, the KP was mistakenly understood as implying a world carbon market generating the same carbon price imposed on all the carbon emitters. This understanding was validated by the fact that most modeling exercises assume carbon markets as mechanisms connecting ‘technical abatement cost curves’ all over the world as if decarbonization was operated by “GHGs abatement factories” selected in a descending merit order³. This allows for the vision described by modeling exercises which assume long term balanced growth pathways and, as stated by the IPCC, “*use a global least cost approach to mitigation portfolios and with universal*

³Many sources of the wedges between technical, social and macroeconomic cost curves have been underlined as early as the IPCC SAR (1996, chapter 8), and encompasses a rich array of literature about the double dividend hypothesis which assumes that fiscal reforms can lower the social cost of environmental policies and can even turn into a gain. For a short synthesis see Ghersi and Hourcade (2009)

*emissions trading, assuming **transparent markets, no transaction cost, and thus perfect implementation** of mitigation measures throughout the 21st century” (IPCC AR4 WGIII SPM Box 3, 2007).*

But the “abatement factories” metaphor is misleading. It implies as though an Indian peasant was selling permits to the French tourist flying to the Seychelles. But the transaction effects are not so simple. First, this Indian peasant is poorer. Second the carbon price, e.g. 50€/t, directly impacts the fuel for irrigation, with a possible direct non-linear negative effect on his earnings. Third, he will be affected by the propagation of higher energy prices throughout the entire Indian economy, the so-called general equilibrium effect. Finally, there might be a full set of intermediaries diverting the money flows before it reaches peasant’s pocket.

The comparative exercises carried out over the past years show that models which consider an economy with unemployment, imperfect foresight and inertia of capital stocks find far higher GDP losses than models with balanced growth and perfect expectations, at least in a transitory period. This is particularly true in developing countries (Edenhofer et al. 2009, Luderer et al. 2012).

These adverse impacts of real world imperfections vanish in an overoptimistic Planglossian view of Cap and Trade which assumes perfect market and where the French tax payer accepts to pay whatever compensation for the Indian peasant including those resulting from the general equilibrium effects.

Fundamentally, the abatement factory metaphor ignores the *wedge* between technical costs, GDP variations and welfare variations caused by: i) incomplete and fragmented markets (not only energy markets but also other markets, e.g. real estate markets which govern urban forms or a dual economy in perpetual restructuring), ii) structural unemployment, iii) absence of compensation mechanisms for the adverse distributional effects of policies, iv) distorting fiscal systems, v) weak policy regimes, vi) under-protected property rights, and vii) investments risks in unpredictable business environment⁴.

It is the role of accompanying national policies and measures to mitigate the implications of the wedge between technical costs and welfare variations including through differentiated increase of energy prices and tax reforms (Waisman et al., 2012). Such policies are possible under the real KP-Cap and Trade, with intergovernmental carbon trading, and a possible wedge between a world carbon price and

⁴ Here lays the fundamental reason why a carbon-price-only framework hardly offers an acceptable deal for emerging and developing countries. This should not be a surprise for economists who, a very long time ago, warned that recommendations – here a carbon price- valid in a 1st best world are not necessarily valid in a 2nd best one (Lipsey and Landcaster, 1956; Guesnerie, 1980).

domestic carbon pricing. The most important point is that, whatever the system, there is no mechanical link between “burden sharing” and “target setting” since the “burden” felt by a country is ultimately conditional upon domestic policies and how they are facilitated or blocked by the international context.

3. International Climate Policies and NAMAS: a case of Pareto-improving policy paradox

This section revisits, if not the letter but at least the wisdom of the Kyoto Protocol Cap and Trade, namely an international architecture able to mobilize a broad set of domestic policies, together with some form of carbon pricing and any complementary policy apt to align climate and development policies. In UN climate negotiations these domestic policies, which are referred to as Nationally Appropriate Mitigation Actions⁵, encompass a wide array of measures aiming at e.g.: i) removing of institutional and market failures which prevent from tapping the technological potentials including those at “negative costs”, ii) internalizing the domestic co-benefits of low carbon technologies in terms of local environment, iii) upgrading of the human capacity and technical skills, including public support to R&D to accelerate technical change beyond the pace that can be reached through the incentive of carbon prices, iv) redirecting infrastructure policies and v) use macroeconomic (fiscal and financial) policies to lower the wedges between technical, macroeconomic and social costs.

The NAMAs target to deliver efficient decarbonization, but their primary focus is on national development objectives. Hourcade and Shukla (2013) demonstrate how the bifurcation between Brown and Green development depends not only on the existence of climate specific measures, but also on the content of policy choices made for pure development objectives. For example, transport infrastructure policies, critical to control the road based mobility, is primarily adopted to lower the commuters’ energy vulnerability in the suburbs and the gentrification of downtown areas. Carbon taxes cannot be isolated from the objective of reconciling the funding needs of the welfare systems and the competitiveness constraints in opened economies. Promoting international cooperation around the use of hydropower and the development of long distance transmission lines to lower the use of fossil electricity will be primarily aimed at increasing the cost efficiency and, secondarily, the geopolitical stability.

In this perspective the usual notion of co-benefits of climate policies is turned upside-down: climate mitigation becomes a side-benefit of specific development policies. Failures in the energy and

⁵ Bali Action Plan, https://unfccc.int/key_steps/bali_road_map/items/6072.php (Accessed on November 23, 2013)

knowledge markets are surrounded by failures in other markets such as real estate, labor, land, capital and technology. Many combinations of reform measures in these areas are desirable as regards to broad social objectives (Fischer and Newell 2008). The issue is to select those which are aligned with decarbonization objectives.

In such a framing, it is unconceivable to negotiate targets on a “fair burden sharing” basis. Indeed, the “burden” is function not of observable “technical cost curves” but rather of the efficacy of policies conducted to offset the adverse impacts of increased energy prices and of the content of development policies resulting into higher or lower carbon emissions. The “burden” can even turn into a gain if climate and development policies work synergistically.

This is the perspective acknowledged by the Cancun’s paradigm of *equitable access to sustainable development*. But this paradigm faces two problems. The first is that the burden sharing paradigm is misguidedly simple (to share a cake in portions decided by a given rule) whereas the equitable access to sustainable development is multidimensional in nature and difficult to translate into negotiable indicators. The second is that any claim for a “win-win” strategy is suspected to raise the false hope of a “free lunch”.

Objection can be raised about the national policies yielding both development benefits and carbon abatement: if such policies exist they should be adopted anyway and there is no need for an international climate regime except for launching reputational effects to incite the insouciant governments to catch the low hanging fruits at hand.

This objection is however in part out-of place in a context where the core of the matter is that emerging and low developed countries which are building their infrastructure can still bifurcate toward development pathways with very different carbon content (Heller and Shukla, 2003, Shukla and Dhar, 2011). It is not primarily a matter of low hanging fruit, but of redirection of investments and public policies. Though country specific it might be, conducting this redirection cannot be disconnected from the opportunities and constraints of the international setting.

The first reason is the inevitable existence of losers of this redirection, at least in a transition phase, and of transaction costs which would incite opposition to “Pareto-improving” policies (Stiglitz, 1998). This is classically the role of overseas assistance and of development banks to help countries to face these costs thanks to tangible monetary inflows. The challenge though is to organize these inflows so that amongst the various “Pareto-improving policies” governments are impelled to select the low carbon ones.

The second reason is that part of the current international economic setting and institutions constitute an obstacle to adopt low-carbon development policies: access to capital, trade regulations, and property rights on technology. The recent dispute between the EU and China about the extension of the EU cap and trade to international aviation shows why climate policies cannot be negotiated regardless of the other dimensions of world governance.

This is why Gupta (2007) recommends a "mainstreaming" of climate policy to other international policy issue including trade, investment and development assistance. But this in turn raises another issue since the climate negotiation process has no legitimacy to address the other issues. If it engages to do so, it will be trapped in an endless labyrinth of controversial debates.

The sole way out is to focus on the content of an agreement which is legitimately in the realm of competence of climate policies and prioritize the search of a regime that:

- i) Acts as a lever to align domestic development policies and climate policies given the heterogeneity of development challenges all over the world;
- ii) Works synergistically with advances along the other dimensions of the world governance;
- iii) Yields tangible and short term environmental and development benefits even in the absence of such advances, and;
- iv) Minimizes the risk that the support to NAMAs generates economic conditions for windfall profits and rent seeking by private interests.

4. A self-reinforcing architecture to align climate policies and development

To sum up, in line with the very insightful "*Climate favela*" metaphor (Jacoby 2007) "*the international climate change policy regime is moving away from the dream of elegant, comprehensive top-down architecture, akin to a gothic cathedral*". But the *alternative bottom up decentralized architecture*, like the favelas can either evolve in charming barrios or be locked into a world of social fragmentation. This is why the challenge is to find the cornerstone and the scaffold of a system which can support a diversity of bottom-up initiatives, secure their compatibility and their convergence towards an ever more efficient and fair way of containing global warming.

The first obstacle in taking up this challenge, especially in a context of vocal or mute doubts in many quarters about the very intent of climate policies, arises from the endless controversies which has swamped the negotiations so far. These controversies cannot be ignored because they translate concerns of actors (from the government to the civil society) whose receptiveness is vital. Our view in this section is that a climate policy architecture will be viable only if it is built upon the "facets of truth"

these controversies convey about the economic and political realities, so that the usual divisive lines observed in the past climate policy debates can be overcome.

4.1. **Overcoming the usual divisive lines, addressing their motives**

The first divisive issue opposes the pros and cons of temperature targets and GHGs emissions reductions timetable corresponding to a desired climate stabilization target. As we pointed out, confusing the allocation of emission reduction timetables with burden sharing leads to putting all the diplomatic energy into repeated disputes and to lose sight of the benefits of cooperation. The risk then is that the enlarging gap (UNEP, 2013) between real trends and political claims about a 2°C target might undermine people's trust in the diplomatic momentum around climate policies⁶. But, the credibility of climate architecture with only bottom-up pledges and reviews evolving over time⁷ could also be undermined by the feeling that it will never achieve a significant level of control on global warming, letting the future COPs becoming a political scene of no practical consequence.

The second divisive issue is the "*carbon price*" versus "*policies and measures (P&Ms)*" controversy. A first argument in favor of carbon prices is that they avoid the risk of enforcing P&Ms with very different marginal technical costs of carbon abatement. The second is that welfare costs of climate policies will be minimized or even turned into a gain if the revenues from carbon pricing are duly recycled. But it is also true that carbon prices cannot, alone, redirect investment decisions in many activities, e.g. transportation infrastructures and redesigning of urban form. Both prices and P&Ms are thus needed to mitigate distributional consequences of higher energy prices. Daily prices give necessary information about costs and scarcities, unless markets are distorted, but industrial decisions and public policies in infrastructure sectors are driven by a large set of expectations of which future carbon prices are an important but not unique component.

The last divisive line is between *political commitments* and *legally-binding obligations* (Bodansky, 2011). The search for credible political signals leads indeed spontaneously to demand for international legal sanctions. But in practice the Parties to the UNFCCC never adopted an amendment, provisioned in Article 18 of the KP, to make the decisions of the Compliance Committee legally-binding although the

⁶The risk of distrust will not be avoided by arguments in favor of utopian geo-engineering devices. Most people concerned by climate change consider these as a dangerous experiment with our planet.

⁷A discussion can be found in the contributions of C. Carraro, J. Jacoby, D., Morgenstern and D. Victor to the collective work coordinated by Aldy and Stavins (2007)

penalty adopted at COP6 was rather benign⁸. In international affairs, stable agreements rely on 'tit-for-tat' processes rather than on the threat of legally binding sanctions which are anyway not accepted by the legislative bodies of most countries⁹.

One way of defining the task assigned to climate change diplomats is the search for the narrow pathway between two polar extremes: a) an *aspirational* regime (targets, domestic P&M, large transfers between Annex I and non-Annex I, legally binding commitments) and b) a *least common denominator* regime (no quantitative target, country specific carbon prices signals, limited international transfers and political commitments). But at time of the KP, with carbon markets as a flexibility tool, the global diplomatic process missed finding such a pathway between these two extremes. This failure has fueled the feeling that only a *least common denominator* regime has a chance of passing a political acceptability test. Many of the arguments of this paper show that there are economic rationales for this feeling. However, it can be readily argued that a *least common denominator regime* will also fail to pass the acceptability test because of the lack of credibility of its environmental effectiveness.

Actually, any subtle equilibrium between these two regimes is bound to be knife-edged. The only way out is to redefine the diplomats' mandate and the mental map behind what is so far considered as an *aspirational regime*. This mental map remains infused with the Montreal Protocol as a prototype of a climate policy regime. This map is misleading. In the CFCs' case¹⁰ the objective was to coordinate the shift of a few producers towards well identified products and techniques in sectors representing a marginal share of the economy and with no macroeconomic and geopolitical implications. In the case of global warming the challenge is to coordinate billions of actors in almost all human activities and to shift the energy and land-use systems which are strategic sectors with critical development impacts and with no obvious, cheap and uncontroversial substitute to fossil fuels.

A novel mental map is needed to help determining the cornerstone and the scaffold of a future architecture. Its definitive shape cannot be fully determined today but its outline is necessary for launching immediate action, yielding tangible short term benefits, opening self-reinforcing synergies

⁸Article 18 of the Kyoto Protocol (1997) states: "The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the cause, type, degree and frequency of non-compliance. Any procedures and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol"

⁹One significant exception is the European Union where after a long process of building an economic community, member states accept to transfer some of their legislative competencies and the principle of penalties for non-compliance. However, the experience demonstrates that these penalties can often be renegotiated when they lead to serious political crisis.

¹⁰Historically to see in the Montreal Protocol a prototype of the Climate Regime was a natural reflex but a misleading one. This was in particular pointed out by (Hourcade et al., 1989, Toman et al., 1999)

between bottom-up initiatives and generating a strong sense of obligation. This architecture will necessarily incorporate the “facets of truth” from past controversies; with climate finance and international transfers as its cornerstone and the targets and flexibility mechanisms (carbon price signals, supports to P&M) forming the scaffold to incite Parties to comply with their commitments. Combining these diverse components has to be made not for reasons of idle ecumenism but, tangibly, to better address the heterogeneity of the real world and the motives of the innumerable stakeholders of climate policies.

4.2. A confidence circle through scaled-up climate finance

Climate finance is one of the only possible short term tangible benefits of an international regime, but, as noted in the introduction to this paper, the Green Climate Fund is at risk of becoming a new myth. This risk is obvious if this fund is viewed as a new form of aid with some “carbon conditionality”; it will then provoke the reluctance from taxpayers in a period of constricted public budgets and of deleveraging in the banking systems. The view changes once it is recognized that the world economy does not lack savings; the problem is the misdirection of these savings, which in the absence of safe productive investment avenues, are diverted to fuel speculative investments. The fundamental issue then is to redirect these savings towards investments in low carbon projects (LCPs) by lowering the risk profile of LCPs without imposing high burden on the taxpayers in economies already encumbered with unprecedented amount of debt.

No massive redirection of saving toward LCPs will happen unless the international community recognizes that abating GHGs emissions is “something of value”. A way to do so is for the COP 21 in 2015 in Paris to attach a monetary value of the social cost of one ton of emitted carbon (SCC) increasing over time e.g. 20€ today and 100€ in 2050¹¹. Obviously this SCC varies across countries as a function of their level of development, their assessment of climate change damages and the net development benefits expected from accelerating low carbon investments in their countries. But what makes an agreement on this value easier than on a global cap and trade system is that it is a notional value used to redirect investment decisions towards long term low carbon infrastructure projects and not a carbon price with adverse effects on industry and vulnerable populations. This is also why the scientific uncertainty about the real value of avoided damages is an issue but not a decisive obstacle.

¹¹This is not the place to underline this point here. But it matters to point out that this value is meant to increase overtime which helps the system to counterbalance the rule of the discount rate in discouraging investment in long lived equipment (Hourcade et al. 2012).

The choice of the SCC will thus ultimately be political in nature and reflect a will to set up cooperative mechanisms for abating GHGs emissions. More difficult is the question of designing mechanisms apt to use the SCC to lower investment risks of low carbon projects and to increase dramatically the volume of climate finance. The diagnosis of this paper is that surmounting both the public budget constraints and the vulnerability of the banking systems would be feasible, using a form of carbon based monetary instrument (Aglietta and Hourcade, 2012). The link between a SCC and the monetary instrument can be contrived from five basic principles¹²:

i) Each participating government commits, on a voluntary basis, to back **carbon assets** issued by the central bank of its country, i.e. a quantity of carbon abatements valued at the SCC;

ii) Based on this guarantee, Central Banks open '**drawing rights**' for investment and development banks which can use these carbon assets to issue **carbon certificates** to fund LCPs. This would enhance the risk-adjusted profitability of these LCPs;

iii) The carbon certificates to be issued are a function of the emission reductions expected from the LCPs they fund;

iv) Once the expected emissions reductions are verified, there is a guarantee that "something of value" has been created. The carbon assets are then really issued. They can be transformed into legal reserves of the Central Banks, or the investment banks or of the investors;

v) The banks can in parallel create **climate-friendly financial products** to attract savings from households and institutional investors looking for safe and sustainable investments.

The environmental effectiveness of this mechanism presupposes an independent international Supervisory Body, under the UNFCCC, like the CDM Executive Board. This body is needed to: i) determine eligible mitigation projects and their expected "avoided emissions" ii) confirm ex-post the emission reductions achieved based on verification reports by accredited independent entities. This raises questions which have to be addressed in future negotiations for any project funding mechanism. Important in this paper is to note the necessity, to link it to the NAMA framework and its pledge and review process. The executive board would thus engage with the designated national authority of each country to prioritize, along the lines of their development priorities, the sectors and projects eligible for carbon certificates. This process is similar to the manner in which the funds of the Marshall Plan were managed post World War II (Schelling 1997). Since the outcomes are based on mutually agreed actions, the process would not be suspected to impose a carbon additionally to aid.

¹²This link is also evoked in DeGouvello and Zelenko (2010), Brendenkamp and Patillo (2010), UNEP (2010, a,b), AGF 2010

We refer to Aglietta et al. in this issue for the discussion of the non-climate related motivations of governments for such a system. These include the macroeconomic interest of redirecting savings into productive and infrastructure activities and the geopolitical interest of alleviating tensions in the economic globalization by fueling a long term wave of growth with a re-equilibrium between the endogenous development of countries and export-led activities. We rather show in the sections below how such an instrument could be used as the cornerstone of a robust climate policy regime.

4.3.A hybrid regime with a financial spring back

To activate the paradigm shift in climate negotiations, the *new aspirational regime* has to respect three principles: a) keep targets and timetables with a controlled degree of “when” and “where” flexibility (COP3, 1997) while leaving all latitude to Parties to conduct their domestic policies, b) to enforce the article 3.1 of the UNFCCC about “common but differentiated responsibilities (CBDR)”, and c) to motivate countries to respect announced emissions pledges, while narrowing the gap between these pledges and a normative emissions trajectory compatible with the 2°C target.

The operational elements of the proposed regime are to be built on the observable variables and not on counterfactual baselines¹³. The regime shall respect the autonomy of each government to decide own policy objectives and to circumvent apprehension of environmental colonialism. Moreover, given the implausibility of a consensus on the non-compliance penalties, the system has to be based on the denial of benefits of the system to a country refusing to comply with its rules of the game. This is in line with Carraro and Siniscalco's argument (1998) that technological cooperation can be a lever to create self-reinforcing coalition. The system has also to be renegotiable, as needed, without creating instability of the signals (Hourcade et al., 1993)

The success of the system rests on motivating countries to narrow the gap between their real emissions, their announced emissions pledges and agreed upon normative emissions. Panel A, B, C show how a “spring-back” force could be organized to motivate nations, around a social value of carbon, based on three pillars: i) an emissions trajectory for each country based on a normative formula for allocating global emissions budget in an equitable manner which will operate as a strong anchor securing that the 2°C target will remain the ultimate objective; ii) the emissions pledges announced by each country for, say every five year period; and iii) a financial “spring-back” force

¹³ Whereas the scenarios and related baseline projections are important instruments to assess the alternate policies, the counterfactual baselines are contentious benchmarks to operationalize the policies.

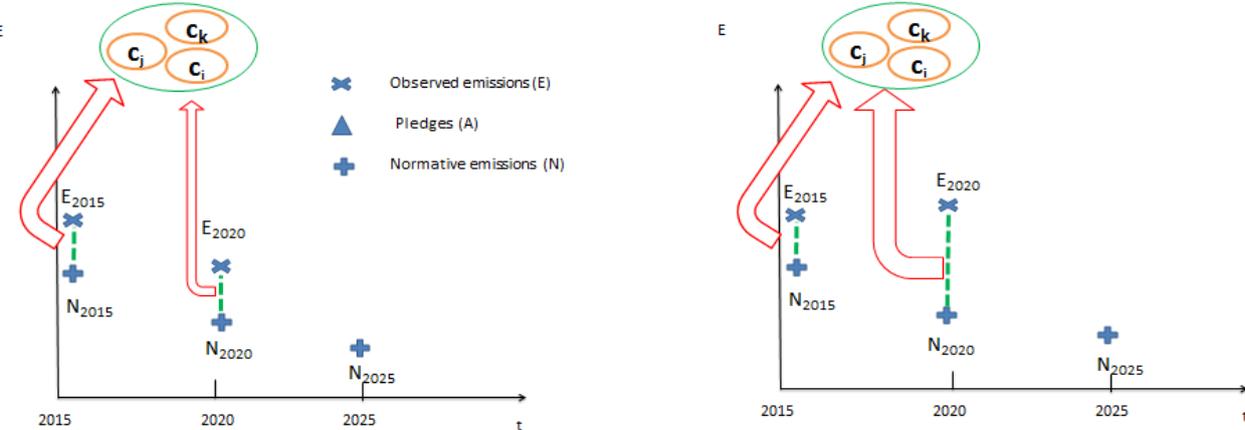
organizing a long term process of convergence between the normative, announced and real emissions trajectories.

We are aware of the fact that collectively agreeing on a normative trajectory for each country is highly controversial. The convergence towards an equal per capita emission by 2100 will be a strong candidate to narrow the differences, notwithstanding the legitimate criticisms (Godard, 2012) it raises, because it is the most apparent and transparent translation of the CBDR principle. What would make it acceptable¹⁴ is that it does not need to begin with a global cap and trade system with increasing carbon prices with very unequal impacts for households and industry. Rather, it will serve as the basis to calculate the carbon assets countries would pledge¹⁵ to shift investment decisions using the SCC simply as a notional value.

¹⁴A lot of mixed formula incorporating per capita convergence in a broader system based on historical trends have been put forward (Agarwal and Narain, 1991; Jacoby et al., 1999; Colombier, 1998; Frankel, 2007, Bossetti and Frankel, 2011)

¹⁵actually in a first drawing rights latter transformed in carbon assets.

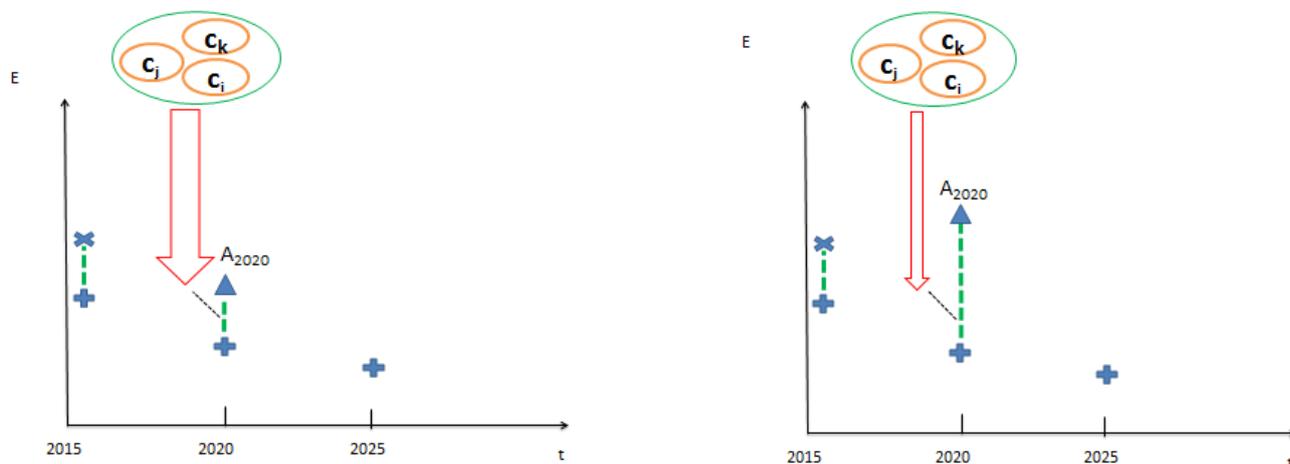
Contributions to the pool are function of achieved emissions reductions (Panel A)



Starting from a same issuance commitment (panel A), a country can either see its issuance commitment decreasing (arrow 1 panel A left) or increasing (arrow 2 panel A right), in function of how in 2020 the distance in $E_{2020}-N_{2020}$ evolves compared with $E_{2015}-N_{2015}$. The announced pledges constitute a “when flexibility” which enables countries to determine the timing of the use of their carbon budget. These pledges could deviate from the normative time table worked out to stick to the normative 2°C emission trajectory. But, to motivate countries to make earnest announcements, the slacker the pledges announced by a country, the lesser it would have access to financial supports, e.g. for its low carbon infrastructure policies¹⁶.

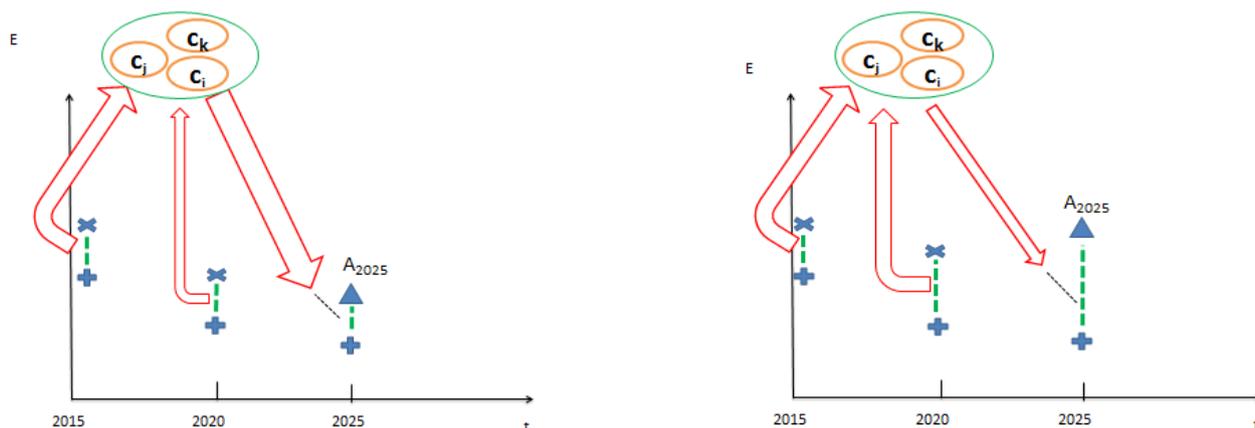
¹⁶ This is not the place to discuss a mathematical formula to do so here; it has to be as simple as possible to minimize risks of strategic manipulations.

Withdrawal rights are function of pledge ambition (Panel B)



In panel B left, the country announces tight pledge and can receive a lot of the carbon certificates to fund domestic low carbon projects, be these carbon certificates backed by carbon assets issued by own country or by another country. On the contrary, in panel B right, the country announces a lax pledge and would receive less carbon certificates to fund domestic low carbon projects, be these carbon certificates backed through carbon assets issued by own country or by another country.

The spring back force mechanism (Panel C)



Panel C describes a financial spring-back force. The country which makes a lot of efforts (panel C left) is committed to emit less carbon assets and progressively receives generous access to the carbon certificates. On the contrary, in panel C right, the country which does little mitigation efforts, hence is

committed to emit more carbon assets and is progressively deprived of a generous access to the carbon certificates.

Obviously, for a country, the tradeoff between these two behaviors is conditional upon its assessment of the economic benefits to the country from the use of the carbon based credits to fund its own transition or to devote them to low interest loans in non-Annex I countries to support cooperative ventures.

Actually, with the progress of time, all countries will be discouraged to make lax emissions pledges since their drawing rights on the pool will be reduced. The rationale of the expected virtuous behavior will be as follows: the development benefit of the mechanism will be tangible to those issuing and receiving countries which will make the system increasingly attractive for all countries. In this system, as explained in Aglietta et al (this issue) the net capital flows will go from the North to the South, even though very quickly large emerging economies like China, Mexico and Brazil might also contribute.

For this system to work, a global body has to be set up to register the emissions of carbon assets and administer the access to the resulting financial support. This is critical to create a credible information basis to facilitate the renegotiations of the pledges every five years.

5. CONCLUSION

We proposed the key features of an *aspirational regime* which does not prescribe the content of the climate architecture three decades ahead but launches a learning process following principles robust enough to secure the convergence of this process. We designed the cornerstone and the scaffold of a building but there is a large room for innovating in the design of its walls, windows and furnishing. Given the past experiences of the climate change agreement, three domains are critical for such innovations.

The first is the link with the Green Climate Fund. As designed above, the architecture supports a system of bilateral initiatives between the issuers and the beneficiaries of the carbon assets. It is meant to attract private funds but does not respond to the legitimate claims of a strong multilateral system. The judgment about the right balance between bilateral and multilateral systems is political in nature but there is no contradiction between both. Indeed, since the proposed system links the issuance of carbon assets to past responsibility of Annex 1 countries, a share of these assets could contribute to provide capital outlay of the Green Climate Fund.

The second is the capacity of the system to support sector specific international agreements for energy intensive industry exposed to global competition and activities like shipping and aviation. There is a political economy argument for such agreements. Sectors like cement, steel, nonferrous metals and basic chemicals represent only a few percent of the value added in each country but are capable to veto any agreement under the argument of distortions of international competitiveness and of shocks on local economies. Another argument, more ethical in nature, is that the responsibility of emissions from these sectors is actually as much attributable to the countries where they are located as to the countries where they are consumed (Peters et al., 2010, Sato 2012). Since calculating the normative emissions trajectories on the basis of consumer's responsibility is a scientific challenge which cannot be resolved in a consensual manner at short notice, it is legitimate to help such industry in coordinating their decarbonization efforts whatever their location.

The third is the specific mechanisms and instruments to be framed to encourage initiatives taken by cities and local authorities. Part of the critical decisions for bifurcating either towards a carbon intensive pathway or a low carbon one are indeed taken at this level. Even though climate control is not the primary objective of these authorities there is an increasing momentum whereby these authorities detect the synergies between climate policies and other development priorities at a local scale. This is primarily a problem of financial engineering, but it has to be considered very soon in the design of a system build around the principles we just proposed because it concerns public-private partnerships, the power over which might raise politically sensitive issues.

Finally the success of the system will be to trigger a confidence circle thanks first to its capacity to support any bottom-up initiatives, including carbon trading mechanisms, to stabilize the "business context" and to contribute to "equitable access to development" by supporting "full incremental costs" of NAMAs by a real financial inflow. Second it respects the CBDR principles through rules *that can be progressively extended* to the most advanced emerging economies. Finally, it will also convince the 'non-climate' concerned decision-makers that climate policies can contribute to address the short term economic and political challenges posed by a still unstable world economy

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