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POSTFACE

The challenges of the post-COP21 regime: interpreting CBDR in the INDC context

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Abbreviations

CBDR	Common but differentiated responsibilities
GCF	Global climate fund
GHG	Greenhouse gas
INDC	Intended nationally determined contributions
IPCC	Intergovernmental panel on climate change
LDCs	Least developed countries
MNCs	Multinational corporations
RC	Respective capabilities
R&D	Research and development
UNFCCC	United Nations framework convention on climate change

1 Introduction

All countries should prepare intended nationally determined contributions (INDC) and publish them ahead of COP21. However, fundamental questions such as how to establish long-term targets beyond 2020, how to enforce the common but differentiated responsibilities (CBDR), and respective capabilities (RC) principle remain unanswered. Even a precise definition of the notion of INDCs remains unsettled; these might be the source of protracted misunderstanding between Parties. The papers in this Special Issue provide very useful and innovative material about how the notion of equitable access to development enables the provision of credible responses to these questions. In this article, we add some additional

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insights showing how framing these challenge in terms of bifurcations towards innovative development allows for defining the CBDR principle as a precondition and the key driver of a cooperative process beneficial for all Parties in terms of the sustainability of their development, as well as in terms of avoiding the social costs of climate change impacts.

2 'Equitable access to low-carbon development paths' or 'sharing the pie'?

The United Nations Framework Convention on Climate Change (UNFCCC) process aims to manage the climate as a public good that is available for all humans through a global governance regime. It has to do so in the absence of a supranational institution beyond sovereign states and, unlike domestic governance, no legitimate coercive power at the international level to manage it. This makes the notion of legally binding commitments inadequate and a counterproductive distraction of the real stakes involved.

What can be functional is a global climate governance regime that is constantly enhanced by multilateral, plurilateral, and bilateral negotiations and consultations through which each party shares its own values and visions of development and sets up credible cooperative mechanisms that each partner is invited to respect while not depriving it of its benefits. No progress can be made towards such a regime without clarifying the notion of international responsibility which lies at its core.

Under a cap and trade approach, this notion refers to a process of allocating the remaining carbon budget among parties under the CBDR and RC principle. As anticipated in the Kyoto framework, this allocation cannot be set once and for all. But even in an ever-adjusting process, this approach confronts large uncertainties and controversies, including regarding aggregate emission control targets. Since the seventies, forecasting studies no longer search for an illusory prediction of the future state of the world, but rather explore uncertainty and possible bifurcations in development pathways. The 900 mitigation scenarios considered in the Intergovernmental Panel on Climate Change (IPCC) AR5 database provide 'corridors' of values. However, this corridor is too large to guide decisions which might have direct consequences over the short term.

Indeed, most developing countries are still 'taking off' and undergo significant socio-economic transitions exposing policy-makers as well as investors in these countries to greater uncertainties than their equivalents in the developed countries. It is thus unreasonable to require them to make precise commitments regarding mid- and long-term emission trajectories to be reached over a certain period. If the negotiation is designed to determine precise future emission reduction targets for countries, then decision-makers in developing countries will hesitate in making any commitment, as a result of their concerns that this may restrict their development space due to these uncertainties.

The experience of Kyoto should not be forgotten. Forcing countries to commit to long-term targets brings the negotiation process down to a 'blame game' with the risks of insincere over-commitments accepted formally around the negotiating table but never really enforced for fear of excessive costs (Hourcade and Ghersi 2002). This can lead to deadlocks in the negotiations; not least because as shown in Méjean et al. (2015), in this Special Issue, country baselines are far more uncertain than the global baselines. Even in a fully fledged global carbon trade system, there will be no real winners and developing countries will not recover, as the gains of carbon trading will be less than the development space they lose through accepting carbon constraints.

To get out of the impasse of the 'sharing the pie' problem, there needs to be real content given to the notion of 'equitable access to low-carbon development'. As exemplified in Hourcade et al.'s (2015) proposal in this Special Issue, this refers to a sequential decision-making approach where target setting regarding long-term aggregate emissions for the globe will be aspirational, indicative and directional, and linked with restoring mechanisms that may help them to narrow the gap between these targets and real emissions trajectories.

The rationale of this paradigm shift implies that, as demonstrated in Winkler et al. in this Special Issue, global climate governance is more than a mere environmental issue: there can be no climate policy without sustainable development, and climate governance cannot be detached from global development governance within the United Nations process and in other arenas. Figure 1 shows the search for a new development path and enhances the capacity of countries to invent development paths that avoid undesirable bifurcations towards high-carbon-intensive pathways.

This helps to operationalize the definition of 'equitable access to low-carbon development' and to reframe the CBDR principle in a manner which encompasses both historical and future responsibilities. Figure 1 shows that countries in different development stages need to explore options of low development paths that suit their own development stage. In line with the Durban platform, this demands connecting mitigation objectives tightly with development issues and with financial, technological, institutional mechanisms to operationalize this connection. The global climate governance regime should send a clear signal to investors and consumers in every country and provide international institutional support for the global and national economy, transforming the course of human development.

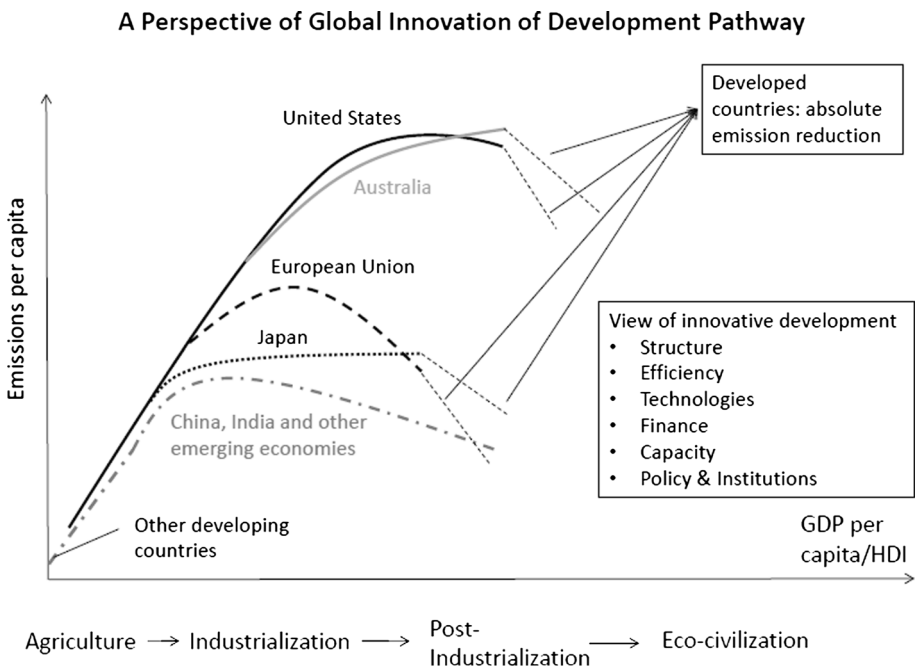

Fig. 1 Bifurcations and invention of development paths. *Source*: own diagram

The CBDR principle has thus two dimensions in this context: the differentiation of actions to be taken by countries under different development stages and institutional contexts, and the responsibility of each country in the process of building a cooperative framework, with sound economic and financial incentives, to help countries to redirect their development towards low-carbon pathways.

3 Equitable access to low-carbon development in a heterogeneous world

3.1 The continued north–south dichotomy under the Durban platform

A rethinking of the principle of CBDR is needed two decades after its formulation at Rio (1992). However, developing countries are concerned that developed countries are tempted to use the link between CBDR and the discussions about INDCs to blur the conventional dichotomy between Annex 1 and non-Annex 1 countries. This is viewed as the search for an escape route, and it is still the crux of the 2015 agreement to implement the CBDR in full recognition of the continued relevance of this dichotomy, despite the significant shifts in the global economic power sharing relationships since 1992.

Actually, the 'bifurcations and innovations in development paths' framework provides a novel perspective, adapted to current times, for the application of CBDR in comparison with the sharing the pie approach. It confirms the rationality of differentiating between developed and developing countries because of their drastic differences in development stages and presents two advantages: first, it permits the recognition of the differences between the developing countries, and second, it enlarges the notion of CBDR beyond target setting to development needs, to both historical and future responsibilities given the current and evolving capabilities in terms of finance, technology, and institutions.

3.1.1 Developed and developing countries face different development agendas

With both industrialization and urbanization completed, developed countries are now in the post-industrial stage and share common characteristics: being on top of the global value chain, the increase in factor efficiency contributes more to their economic growth than the increase in factor input; emission trajectories have passed the peak value and should now be in the right half of, or the decreasing stage, of the so-called environment Kuznets curve; the domestic economy is dominated by non-energy-intensive industry and services; most greenhouse gas (GHG) emissions come from consumption activities such as building and transportation; most infrastructure has been already built, and the pace of 'decarbonization' is constrained only by the pace of the low-carbon retrofitting of these infrastructures, given technical and social inertia in systems transformation.

The picture is very different in developing countries: most of them are still in, or have not even started the process of industrialization and urbanization, thus situated on the left half of the environment Kuznets curve; even in emerging economies, of which China is an example, the future needs for infrastructure investment will remain high, with heavy industries dominating domestic economy for rather a long time; the urban sprawl is very dynamic together with impressive increasing demand for modern transportation which will replace animal and human traction. Moreover, even in emerging economies, the need for more energy will come from the necessity of fulfilling the basic needs (food, clean water, light, health services, telecommunication, and transport) of a large part (often dominant) of the population.

The challenge for developing countries therefore is not the retrofitting of existing infrastructures and productive capital but the deployment of infrastructures and productive capital which avoids a bifurcation towards high-carbon-intensive pathways.

3.1.2 Developed and developing countries bear different historical responsibilities in terms of cumulative emissions

Although emissions from developing countries have been surging in recent years, the bulk of cumulated anthropogenic greenhouse gas emissions caused still come from developed countries. From 1751 to 2010, energy-related CO_2 emissions from Annex I countries contributed about 70 % to world's total cumulative emissions. The world's average energy-related CO2 cumulative emissions per capita from 1751 to 2010 is 187 tons CO_2 per person, while that of Annex I countries is 706 tons, 3.8 times more than the world's average, and 10 times more than the 68 tons (one-third of the world's average) for developing countries (CDIAC 2013). It can be argued that the cumulative gap narrows when considering CO_2 releases from forestry and other land-use changes, but it can be counter-argued that the evaluation of these releases presents large margins of uncertainty, and that the gap between north and south is higher when considering the carbon content of carbon emissions incorporated in goods imported by developed countries.

These controversies about a precise quantification of cumulative emissions actually matter less for the implementation of the CBDR principle in climate policies than the responsibilities of developed countries in the creation and dissemination of carbon-intensive development paths worldwide, including in developing countries. First movers in the industrialization process, developed countries exerted a strong demonstration effect on the development paths and market demand in developing countries. They did so through their preponderant influence on international rules, overseas investment, trade connections, control of the most profitable segments in the global value chain, and diffusion of their consumption styles in the upper and middle classes of developing countries. This is an indirect consequence of their soft power.

3.1.3 Developed and developing countries bear different responsibilities in terms of different finance, technology capability, and soft power

According to World Bank statistics (The World Bank 2014) in 2012, the GDP per capita (in 2010 value) of developed countries is still nine times more than that of developing countries, with an increasing gap in absolute terms when compared with the 1990 level. With most core technologies still controlled by multinational corporations (MNCs) and national laboratories from developed countries, developing countries are still in the middle and downstream of the global value chain, a disadvantageous position for income distribution. According to UNCTAD statistics (2008), there were approximately 82,000 MNCs and 820,000 of their branches in 2008, most of which are from developed countries. Among the world's top 100 MNCs, 73 of them come from developed countries; 92 % of the world's top 5000 MNCs are from developed countries and take up 90.9 % of the total revenue (UNCTAD 2009). Enterprises from developed countries still occupy the high value-added segment of the global value chain, keeping high-value additions at home while shifting production segments with high emissions and low value added to developing countries.

In addition to conventional advantages in capabilities, developed countries also exert a soft power given their influence on technology and knowledge innovations, on the process

of designing and implementing international rules among which primarily the monetary and financial intermediation systems (Rajan 2010) and to remove those rules which cause obstacle for other countries in the deployment of their INDCs.

3.2 The emerging diversity among developing countries

The concept of bifurcations and inventions in development paths also takes into consideration the differentiations within developing countries, while making clear that they cannot replace the differentiation between developed and developing countries. Figure 1 shows that emerging economies such as China are now in the left upward section of the curve as they are faced with the strong need for industrialization and urbanization; their recent emissions are on the rise at a very rapid rate and will continue to rise in the future for a certain period of time. On the other hand, other developing countries such as the least developed countries (LDCs) and small island countries are still at the starting point of the curve with a very low level of development and emissions, some of which may have at present no demand for industrialization or urbanization.

Hence, in the 2015 agreement, in addition to the dichotomy between developed and developing countries, subdivisions within developing countries are essential. This would translate into different types of emission pledges and different responsibilities in the cooperation for an equitable access to low-carbon development. A first vital example is the access to basic needs and transition to novel pathways of rural development in LDCs which have influence, even greater than current emerging economies, to control the pace of the urban sprawl. Flip-side examples are some oil and gas-exporting countries which are currently concerned about a possible 'growth without development' pathway. Their economies are heavily dependent on the revenues of oil and gas exports, the lack of diversified productive sector and their industry is still at the bottom of global value chain.

3.3 CBDR and bifurcations towards low-carbon development

Developed countries, emerging economies, and other developing countries thus face different challenges in terms of innovations of low-carbon development transitions and need different types of support from international cooperation. The response cannot be mechanically derived from the assessment of past contributions to the climate change problem and using this as the measure of differentiated responsibilities to be incorporated in the design the post-2020 international mitigation mechanism. The analysis in the previous section argues for framing the CBDR principle as an objective to avoid undesirable bifurcations in the development path of developing economies. This helps to determine the respective responsibilities of different countries in these bifurcations and to assess the mutual gains, in terms of development, of the cooperation in climate change mitigation policies.

The primary task of developed countries in this context would be to take the lead in demonstrating the feasibility of a low-carbon development path by reducing their own GHG emissions. Historically, the demonstration effect of developed countries was of crucial importance: this was part of their soft power and included their influence in terms of technical capacity, ideology, and values. Through its overseas investment and trade connections, technical specifications, designs, business models, and consumption patterns, developed countries have a profound impact on the development path of developing countries. This leads to path replication and dependence; where developed countries

themselves use high-carbon pathways, the replication can lock developing countries into high-carbon development paths.

It would be unfair and impractical if developed countries urge developing countries to operate domestic changes to avoid this lock-in without experimenting domestically new technological and consumption styles and without reforming the way they use their 'soft power'.

This is obviously a matter of technological cooperation, but times have changed since the seventies, and this technological cooperation is no longer deployed along a north–south axis. South–south cooperation is developing rapidly and includes fostering locally appropriate innovations. The core issue is institutional and financial in nature. As pointed out by Aglietta et al. (2015) in this Special Issue, since the primary challenge is to quickly redirect global savings towards low-carbon investments, this cannot be done at the required scale if developed countries do not use their dominant role in global governance to propose strong reforms in financial institutions. This would compensate for their responsibility in triggering the world financial crisis which has had negative side effects in many world regions (Rajan 2010; Krugman 2009).

This does not mean that emerging economies will take a wait-and-watch approach or claim compensation from developed countries. Whatever development path they choose, e.g. high-development, high-emission or high-development, low-emission trajectory or a low-carbon development path fundamentally different from the growth patterns of developed countries, they will exert great influence not only on their own sustainable development, but also on global efforts to address climate change and on the overall world economy. Considering their late-start advantages and the constraints arising from global emissions budget, domestic resources, and other environmental constraints, it is in the interest of these emerging economies to skip the conventional development model and bifurcate towards an innovative low-carbon development path.

Emerging countries can then be proactive because this bifurcation would help them to fulfil their own development objectives (e.g. local air pollution and energy security) rather than climate-centric policies which result in a new form of technological dependence. This is also the case for oil and gas-exporting countries since their exports will continue to yield significant rents in the coming decades even if lower than in the absence of climate policies. The new climate regime should promote the investment of such rents to diversify their economy and elevate these countries to the top of the industrial value chains. This calls for financial instruments and cannot be isolated from the conduct of sound geopolitical policies in developed countries.

Being restricted by domestic capabilities and weak interfaces with the global governance system (e.g. in the areas of finance and trade), the emerging economies are interested in overcoming the path dependence which constrains their development choices through both domestic policies and an active search for a cooperative framework with the developed countries.

These same constraints are also pertinent to other developing countries, the small island states, and LDCs, although their priorities differ. They are not pressured to adopt short- or midterm mitigation obligations, and their major task is to achieve sustainable development. Their immediate interest lies in enhancing their capacity to address the adverse impacts of climate change and to develop, in due time, capabilities to embark on low-carbon development pathways when their development arrives at the take-off stage.

4 China's example: post-2020 contribution plan based on the invention of a low-carbon development path

As an emerging and large developing country with more than one-fourth of the world's emissions, China cannot but exert great influence on the definition, success, and enforcement of the new agreement to ensure an equitable and effective post-2020 international climate regime.

Its ambition and responsibility, as the largest developing country, is to modify its growth pattern by reducing its dependence on carbon-based energy systems and aligning this with its development priorities., Like other developing countries, its first priority is poverty eradication to ensure safety, dignity, and human development of its huge population. Other priorities are developing a robust industrial structure, higher resource efficiency, lower air and water pollution, smart urbanization, and equitable spatial development based on sustainable agriculture and energy security.

To move along this innovative development path while maintaining adequate economic growth rate after 2020, China will need to rely more on improving the efficiency of fossil fuels among others, using a low-carbon energy mix, enhancing energy efficiency and enabling carbon capture and storage. According to the International Energy Agency (IEA 2014), these four measures will contribute by 2050 to China's low-carbon development objectives by 35–40, 20–25, 20–25, and 10–15 %, respectively.

Within the context of the China–US joint announcement issued in November 2014, China has already stated its post-2020 target to achieve its CO_2 emissions peak around 2030 and to increase the non-fossil fuel share of primary energy demand to around 20 % by 2030 (Xinhua News Agency 2014).

For China, this overall peaking target is indicative and can be broken down into detailed indicators that aim at transformation and invention of the alternative development path which reduces emission and energy intensity per unit of GDP, sectoral efficiency targets, a low-carbon energy mix target, or HFC control target, etc. That the overall peaking target is indicative does not mean that it is purely rhetorical. The huge uncertainty on the baseline scenarios, the cost of low-carbon techniques, and the overall economic context (including oil prices) make commitments on an absolute peaking level unrealistic. But the urgency of not being trapped into high-carbon pathways, and of increasing resource efficiency and environmental quality will lead China to internalize these objectives in its 5-year planning process to change its current development mode.

In this context, China will require that the post-2020 regime develop international support especially coming from developed countries to enable developing countries to adopt appropriate technologies, financing, institutional and policy arrangements. Within such a regime, aspirational targets can be accepted if they are adaptive and linked to economic and financial tools to facilitate a modified pathway of development, and hopefully reach sooner and lower peaking values of GHGs emissions.

5 Conclusion: practical suggestions for building the post-2020 international climate regime

The language of the current UNFCCC negotiation process is articulated around two major concepts, target setting and the INDCs. Our arguments here, which continue the line of thought of this Special Issue, can be primarily viewed as an alert against the risk of using

these two concepts to transform the negotiation into a blaming game by pinpointing the distance between the announced pledges and the long-term 2° objective. Our essay clarifies how to use these notions to enter instead into a cooperative, mutually beneficial process.

A distinction has first to be made between (a) aggregate economy-wide quantitative emission reduction targets, which include long-term targets and control targets based on specific years, (b) disaggregated quantitative transformation targets related to specific drivers including energy intensity, energy mix, specific sectorial targets (e.g. energy efficiency, diffusion rate of advanced technologies in certain industries,) and carbon sinks (including targets regarding land-use change and non-CO_2 greenhouse gases).

A second distinction has to be made between two possible uses of these targets in the climate regime. They can be used as indicators in a periodic assessment of the implementation of mitigation policies in order to enhance the understanding of the contributions and ambition by each party to aspirational long-term objectives. They can also be used as pillars of supporting mechanisms providing financial, technical, and capacity support to countries in implementing their low-carbon transition, including qualitative policy and measures.

This is based on the argument that emerging economies can accept long-term quantitative targets (economy-wide or disaggregated) only if they are 'indicative quantitative targets of the overall transition progress (e.g. peaking level) plus a more precise quantitative target regarding drivers in the transition process'. They can also accept more short-term and medium-term targets only if they are supported by international mechanisms providing financial and technological assistance to INDCs aiming at providing clear guidance to public decision-makers, enterprises, investors, and consumers. These short-term targets should even have a legal force since any such mechanism, like the one developed in this Special Issue, requires respecting the rules and guidelines in order to benefit from related assistance.

This is also based on the argument that developed countries should commit to economy-wide absolute quantitative mitigation targets at a level that takes their historical contributions into account. This is important in terms of the demonstration effect, all the more so if these economy-wide targets are translated into sectoral and technology-specific targets and supported by commitments on policies and measures, including Research and Development (R&D) or any form of carbon pricing. But, given the impossibility of legally binding commitments enforced by a credible coercive power, the credibility of the Paris agreement will depend upon the level and pace of their commitments on 'means,' i.e. economic tools, financial support to low-carbon investments, capacity building, R&D, and technological standards support. This concerns both the means of their domestic policies and the means set up to assist the INDCs of developing countries.

Ultimately, the best translation of the CBDR principle revisited in the framework of bifurcations towards innovative low-carbon development paths is the capacity of each country, at its development stage and given its national circumstances, to contribute to a self-reinforcing collaborative process yielding both climate benefits and development benefits for all. This virtuous cycle will not be created unless Annex 1 countries implement their Copenhagen commitment to finance the Global Climate Fund (GCF). The upgrading of the GCF through public funds will be limited by the level of public debt and the 'fatigue' of taxpayers in developed countries, and so Annex 1 countries have to demonstrate their will of taking the lead, as explored in this Special Issue, in the reforms of financial intermediation to redirect savings towards low-carbon investments. This is major way of assuming their responsibility both in the climate problem and in the financial crisis, at a time when the emerging economies have demonstrated their will of taking their own

responsibility through the creation of the New Development Bank (initiated by BRICS nations) and the Asian Infrastructure Investment Bank.

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