DOCUMENTS DE TRAVAIL / WORKING PAPERS

N° 2017-60

Social Value of Mitigation Activities and forms of Carbon Pricing

Emilio La Rovere (UFRJ), Jean-Charles Hourcade (CIRED), Shukla Priyadarshi (IIMA), Etienne Espagne (CEPII), , Baptiste Perrissin-Fabert (France Stratégie)

Date : March 2017

Superseding the paradigm of a 'burden sharing' at the margin of a given development pathway to promote an *'equitable access to low carbon development'* is illusory without assuming the possibility of changing the direction of development through an early shift of savings. The obstacle does not come from global financial constraints in a world awash of liquidities [1]. It lies in the difficulty of a massive redirection of investments in the presence of a gap between the carbon prices apt to trigger deep behavioral changes and those really implementable. Complementary policies are needed to compensate for this gap but at risks of political arbitrariness and economic inefficiencies.

This paper explores how to create a self-fulfilling mechanism anchored in a Social Value of Mitigation Activities (SVMA) [2] (article 108 of the decision of the Paris Agreement) could hedge against these risks through carbon pricing devices at a level high enough to generate a 'new possibility space' and avoid both a bifurcation of developing countries towards high carbon intensive pathways and a remanent lock-in of developed countries in such pathways. After reviewing the sources of the 'carbon price gap' it explains how a SVMA can be used as a reference value to bridge it and facilitate the world convergence of carbon pricing policies.

1. The roots of the carbon price gap

The direct distributive impacts of carbon prices are one main cause of the carbon price gap. The utility of one $ is invert correlated with the level of income and the same $/Tco2 hurts more populations with a high share of energy in their budget and countries in an industrialisation phase.An ***indirect but important impact is the depreciation of classes of assets*** based on carbon intensive capital stocks. This depreciation can alter the stability of the financial and social systems (e.g. the assets held by pension funds and insurance companies) as well as the industrial fabric of some regions.

Another cause of the carbon price gap is that ***techniques are not on a shelf, ranked in increasing order of their levelized costs*** and that switching carbon prices might be higher than those needed to change this merit order. Low carbon investments (LCIs) with ***high capex and long payback periods*** might not adopted because of ***their risks in a context of uncertainty*** about the duration and costs of their construction phase and about their future revenus. In case of 'bad surprise' firms, economic agents can see their operating account deficits reaching a 'danger line' they refrain from crossing. The existence of this implicit danger line explains households' demand for very short payback periods for

[1] Additional investment needs may amount at the global level from 3 to 5% of productive investments. FSB TCFD (2016) estimate annual additional investments needs in the US up to US$ 220 billions between 2020 and 2030. According to the the French Treasury, €14 billions extra annual investments is needed by 2018 in France to comply with the objectives of the national low-carbon strategy.

[2] About the theoretical links between the SVMA, the social cost of carbon, the shadow price of carbon and carbon prices see : Priyadarshi Shukla et al. : *Revisiting the Carbon Pricing Challenge after COP21 and COP22* Working Paper CIRED n°2017-59 Paris, March 2017.

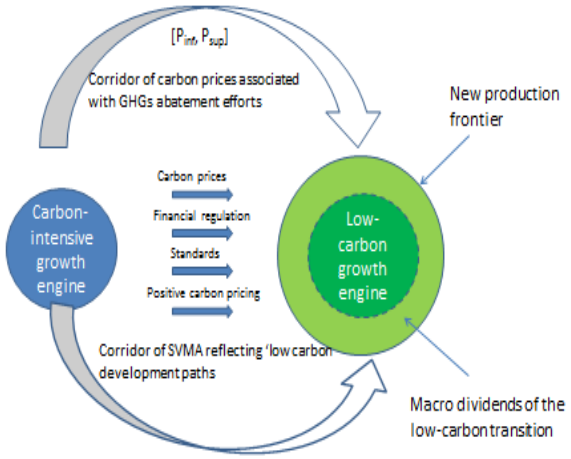
investments in energy efficiency, the behaviour of SMEs with limited access to finance beyond self-finance or of firms who anticipate that, some shareholders losing confidence, their value might fall sharply with risks of bankruptcy or of hostile takeover.

Explicit carbon prices capable to convince lenders or shareholders to remain confident in LCIs despite such 'bad surprises' ***have to outweigh the "noises" coming from the volatility of oil markets*** (a range of 100$/TCo2 over the past ten years), ***from the dynamics of other prices*** (real estate prices, land prices, interest rates, exchange rates) and ***from the regulatory uncertainties***. Typically, the pace of penetration of electric cars will not be determined only by the drop of their purchase price. It is also dependent upon the de-carbonation of the power generation, the investments in electrical grids and battery recharching systems and the very urban dynamics. These in turn depend on the trade offs between commuting costs and housing prices and on of the capacity of proactive infrastructure (transportation, water, electric grids) and land policies to shape urban forms instead of running after their uncontrolled development (under rents inciting to converts of agricultural lands to building lands)

When systemic changes are at play on many dimensions of development, switching carbon prices are contingent upon other policy measures (technical standards, subsidized loans, public garanties, tariff regulations, infrastructure policies, real estate policies). This is the old lesson that prices levels *'depend on the path and the path depends on political decisions'* (Drèze & Stern, 1990). Climate policies thus face the following contradiction: ***non carbon price measures are enabling conditions of the emergence of socially acceptable carbon prices but carbon prices cannot be high enough to hedge against their potential arbitrariness***.

The **SVMA** escapes this contradiction. For a given of set of beliefs about the future state of the economy and value judgments about sustainability objectives, it ***provides a reference value*** which can be transmitted through many channels (e.g. carbon prices, real estate pricing policies, standards)[3] and its assessment is independent from these channels.

Driving the low-carbon transition in a second best world



2. Positive Carbon Pricing to bridge the funding gap

As explained in Shukla et al (2017) the SVMA encompasses the ***discounted shadow carbon prices of the 2°C target,*** the ***domestic joint products of GHGs abatement*** in terms of air pollution reduction and

[3] On the equivalence between carbon pricing and 'caps' of the price of housing based on an econometric study on the French case between 1960 and 2010 see Lambrot et al. Energy Policy 2012

of improvement of energy security, the ***technological benefit*** of an early launching of a learning-by-doing efforts to help low carbon technologies to cross the 'valley of death' of innovations (Grubb et al.) and the ***knock on effect of LCIs*** on the short term growth of the countries and the long term sustainablity of their development pattern[4].

This SVAM can be expressed per ton of avoided carbon emission to assess a Social Value of the Avoided Ton of emission (SVAT). This SVAT is function or lifetime of the projects and gives the full signal which should be launched in direction of projects of given lifetimes. Part of this signal can be in the form of explicit carbon prices, part in the form of notional prices incorporated in financial devices aiming at [5] ***de-risking low carbon investments*** by moving away the 'danger line' which inhibits them.

An explicit carbon price rewards carbon saving every year but this reward often comes too late for capital intensive projects faced with large uncertainties. Public guarantees on a share of the expected avoided emissions priced at the SVAT would secure part of this reward by giving it upfront. They would first counterbalance the short-term bias of corporate companies managed under a *shareholder value business regime* (Berle & Means 1932; Roe 1994), of SMEs and local authorities with a costly access to credits, of households who retain high discount rates when they invest in energy efficiency. Second, to get financial institutions out of the tragedy of the horizons (Carney 2015), they could support financial products backed on ***climate remediation assets*** to attract savers in search of safe and ethical investments (Aglietta et al. 2015).

The SVAT can be ***immediately higher than the implementable explicit carbon prices*** because it does not pose the same distributional issues and does not hurt directly vested interests. To the contrary, in combinaison with public garantees which, well-calibrated, will not impose a burden on taxpayers, it forms it can increase the political support to carbon pricing and change its perception as a penalty: higher leverage effect of a given level of carbon prices on the amount of LCIs, redirection of investments in function of development priorities, creation of new classes of assets

Progressively the amount of public guarantees will be reduced together with the uncertainty about the future trends of carbon prices and the distance between the SVMA and carbon prices will narrow as the co-benefits of LCIs will vanish and the innovation wave will come to an end.

[4] One major co-benefit of mitigation might be macroeconomic in nature. Quantitative Easing policies and low interest rates should be conducive to long term investments. But, in a context of generalized uncertainty, blind liquidities injection boosts the prices of financial assets with a limited impact on productive investments. Targetting liquidity injection towards the low-carbon transition starting by developing and reshaping the infrastructure sectors implies (energy, building, transportation, material transformation and agriculture) which are currently underinvested (IMF, 2014) has instead a potential ripple effect large enough to trigger a long-term growth cycle (Stern (2015). It can support an inclusive development and help reducing the 'fault lines' of the globalization process by a more inward oriented industrial strategy (Rajan, 2016).

[5] Many proposals have been made in this direction: Green Infrastructure Funds managed by multilateral development (Studart&Gallagher 2015; de Gouvello et al. 2015); public guarantee upon a low-carbon investment fund (Emin et al.); using SDRs to fund the paid-in capital of the Green Climate Fund (IMF, 2010; Giraud, 2015), targeting QE policy toward the low-carbon transition and allowing central banks for refinancing low-carbon loans up to the SVMA (Hourcade et al.2012; Aglietta et al. 2015).

3. What SVMAs for what gains of cooperation?

The assessment of the SVMAs cannot be separated from the fact that a successful climate policy needs to solve a 'common goods' problem in a very heterogeneous world and under severe constraints on compensatory transfers. There are thus inevitably two levels of assessment of the SVMA:

- ***World SVMA*** which translates the willingness of the international community to pay for a given climate target and on which a world carbon price should be equated in a given 1st best world.

- ***National SVMAs*** which translate the assessment by each country of its benefits of keeping global warming below the climate target, of the development co-benefits it can derive from mitigation activities and of its political will to contribute to the common struggle.

Countries will determine their own SVMA, this is a matter of national sovereignty. That these national differ does not make a problem. They will be used by governments as notional prices for deploying their INDCs. We can note however that different combinations of values of the components of the SVMA might lead to similar ranges of SVATs (one country prioritizing energy security, a second the reduction in local air pollution, and a third a technological leadership on bio-energy).

The existence of these two levels of SVMA can be transformed into tools to materialize the benefits of cooperating around climate policies and unite in a common struggle very disparate partners. The first tangible gains would come from ***end the dispute on the 100G$ commitment***[6] taken at Copenhagen and expanded in Paris 'beyond' 100G$ (paragraph 54 of the Decision). Public guarantees provided by developed countries on LCIs in developing countries that would incorporate the agreed upon SVAM should entail a low burden on the public debt of the 'donors' because a public guarantee is paid only in case of failure of the projects. They can even help them to reduce it thanks to the commercial flows induced by projects benefiting from the safe-guards of strict Monitoring Reporting and Verifying (MRV) systems (V. Bellasen & N. Stephan 2015).

This would provide a prototype of tools in multilateral agreements organizing pull-back forces (Hourcade, Shukla, Cassen 2015) to prompt countries to announce and deploy ambitious INDCs and to raise the level of their domestic SVAT in view of reaping higher development benefits of cooperating around these INDCs[7]. These tools could be articulated with today discussed climate finance initiatives [8] which otherwise could be undermined by suspicions of 'green-washing' and fragmentation of overseas assistance.

[6] OECD vs India http://dea.gov.in/sites/default/files/ClimateChangeOEFDReport_0.pdf

[7] About such pull-back forces in a international climate regime see : 'The Economics of a Paradigm Shift in the Climate Negotiations' in *International environmental agreements: politics, law and economics*, *15*(4) 2015

[8] For example the work of the Green Finance Study Group of the G20 and the Unep-Inquiry and the discussions about the disclosure rules of climate related risks in financial portfolios (Financial Stability Board, art. 173 of the French energy transition law).

A precondition is obviously the existence of an agreed upon corridor of world SVAT. We show in a companion technical paper[9] how such a corridor can be calculated based the trajectories of shadow costs of carbon provided by the IPCC 5th AR. Controversies around these values can be overcome reached far more readily than on carbon prices because the world SVAT is a notional value to redirect international investments and enhance the leverage effect of domestic public supports to INDCs with no direct adverse effects on vulnerable industry and populations. One important condition is to account for the ***exchange rates risk*** which constitutes a strong barrier for large classes of long-term investments (viability of the projects and risk for the lenders). The volatility of exchange rates can generate time inconsistencies in decisions and one response is to assess the SVMAs in terms of the weighted average, in purchasing power parity (PPP) of national prices.

A collateral benefit of this articulation between a world SVMA and national SVMAs is to enable countries to develop carbon pricing policies in whatever form and ultimately raise the real carbon prices. Without violation the paragraph 136 of the Decision of the Paris Agreement, which states that carbon pricing, only applies to "non-party entities" and is not binding upon Parties to the Convention, the rise of domestic SVAMs and the tangible gains of cooperating around climate policies, will enable countries to understand that carbon prices, even in an explicit form, are a support to sustainable development policies and not a constraint or a punishment.

Conclusion

The SVMA might be pivotal in unlocking climate policies in a context where carbon prices cannot be raised at the required level because of distributional issues and where their signal is swanped by many other signals amongst which, primarily, the volatily of fossil fuel prices:

- It can support the emergence of ***financial devices to de-risk low carbon investments*** and build a new classes of assets specifically on infrastructure, which could ***attract many categories of savers***
- Financial devices incorporating this value could ***help bridging the funding gap*** which penalizes the ***deployment of infrastructures*** in developing economies and their low carbon retroffiting in developped countries
- Both a World SVMA and national SVMAs are needed: the latter can be used as a notional price to support INDCs through voluntaree domestic public policies, the former is needed to support funding mechanisms and materialize the gains of a North/South cooperation around climate policies.
- Converted into a SVAT i.e. a value per avoided ton of emissions, the SVAM can anchor ***signals higher than the explicit carbon prices in the short term*** and help to organize the long term convergence of these prices.

Corridors of values of mitigation activities should help launching a sequential learning process with values reassessed pragmatically every five years (with no retroactivity on adopted projects) in function

[9] About the possible use of the Social Value of Mitigation Activities to bridge the Carbon Pricing gap and reduce the funding gap see Hourcade et al. Working Paper Cired n°2017-59

of the observed leverage effect of the positive carbon pricing devices on the private and public financial flows redirected toward their NDC and of their development benefits.

Bibliography

Aglietta, M., Espagne, E., & Perrissin-Fabert, B. (2015). *A proposal to finance low carbon investment in Europe*. France Stratégie: Paris.

Aglietta M., Hourcade J.C., Jaeger C., Perrissin-Fabert B. (2015) : *Financing transition in an adverse context : climate finance beyond carbon finance*, International environmental agreements: politics, law and economics, 15:403-420, DOI 10.1007/s10784-015-9298-1

Bellassen, N. Stephan (eds), *Accounting for carbon. Monitoring, reporting and verifying emissions in the climate economy* / V., 2015. Cambridge University Press. 561 p

Berle, A., Means, G., 1932. *The Modern Corporation and Private Property*. New-York: Harcourt, Brace and World.

Carney, M. (2015). *Breaking the Tragedy of the Horizon—Climate Change and Financial Stability*. Speech given at Lloyd's of London (29 September).

De Gouvello, C., & Zelenko, I. (2010). *Scaling up the financing of emissions reduction projects for low carbon development in developing countries proposal for a Low-carbon Development Facility (LCDF).* Policy research working paper. World Bank.

Drèze, J., & Stern, N. (1987). The theory of cost-benefit analysis. *Handbook of public economics*, *2*, 909-989.

FSB TCFD (Financial Stability Board – Task Force on Climate related Financial Disclosure) https://www.fsb-tcfd.org/wp-content/uploads/2016/12/16_1221_TCFD_Report_Letter.pdf

Emin E., Lepetit M., Grandjean A., Ortega O., *Energy Shift Financing Agency feasibility study: synthesis report* - Energy renovation of public buildings, 2014, http://projet-sfte.fr/?page_id=320

Hourcade J. C. , Perrissin Fabert B, Rozenberg J: Venturing into uncharted financial waters: an essay on climate-friendly finance *International environmental agreements: politics, law and economics*, (2012) 12, 165–186 DOI 10.1007/s10784-012-9169-y

Lampin L., Nadaud F., Grazi F., Hourcade J.-C. (2013) Long-term fuel demand : Not only a matter of fuel price, Energy Policy 62, p°780-787

Grubb M, Hourcade J.C., and Neuhoff K. (2014): Planetary Economics: energy, climate change and the three domains of sustainable development.

Hourcade, J. C., Shukla, P. R., & Cassen, C. (2015). *Climate policy architecture for the Cancun paradigm shift: building on the lessons from history*. International environmental agreements: politics, law and economics, *15*(4), 353-367.

Rajan, R. G. (2016). *Fault Lines: How Hidden Fractures Still Threaten the World Economy: With a new afterword by the author*. Economics Books.

Roe, M. J., 1994. *Strong Managers, Weak Owners: the Political Roots of American Corporate Finance*. Princeton: Princeton University Press

Sirkis, A., Hourcade, J.C., Aglietta M., Perrissin Fabert, B., Espagne, E., Dasgupta, D., da Veiga, J.E., Studart, R., Gallagher, K., Stua, M., Coulon, M., Nolden, C., Sabljic, V., Minzer, I., Nafo, S., & Robins, N. (2015). *Moving the trillions: a debate on positive pricing of mitigation actions*

Shukla P.R, Dhar S (2011) *Climate Agreement in India: Aligning Options and Opportunities on a new track*, International environmental agreements: politics, law and economics, *11 229-243*

Shukla P., Hourcade J.C., La Rovere,E., Dahr S., Espagne E., Finon D., Pereira A., Pottier A. *How to use SVMAs to reduce the Carbon Pricing and Climate Finance Gap: numerical illustrations*, WP CIRED n°59

Stern, N. (2015, August). *Economic development, climate and values: making policy*. In Proc. R. Soc. B (Vol. 282, No. 1812, p. 20150820). The Royal Society.

Stern N, Bhattacharya Amar (2015) *Driving Sustainable Development through better infrastructure,* Global Economy and Development Working Paper 91