

Carbon pricing and links to sustainable development

Franck Lecocq, CIRED

With the help of Jean-Charles Hourcade, CIRED
and Baptiste Perrissin-Fabert, CGDD

International Energy Workshop 2015
Abu Dhabi, 5 June 2015



Concerns about the negotiation outcome spur renewed calls for carbon pricing

- *“Introduction of robust and effective carbon pricing mechanisms [is] a key component to gear investment and orient consumer behaviour towards low-carbon solutions and achieve global net emissions reduction at the least economic cost”* (World Business Climate Summit, May 2015)
- *“The climate change global commons problem will be solved only through coherent carbon pricing”* (Gollier and Tirole, April 2015)

The principles behind carbon trading

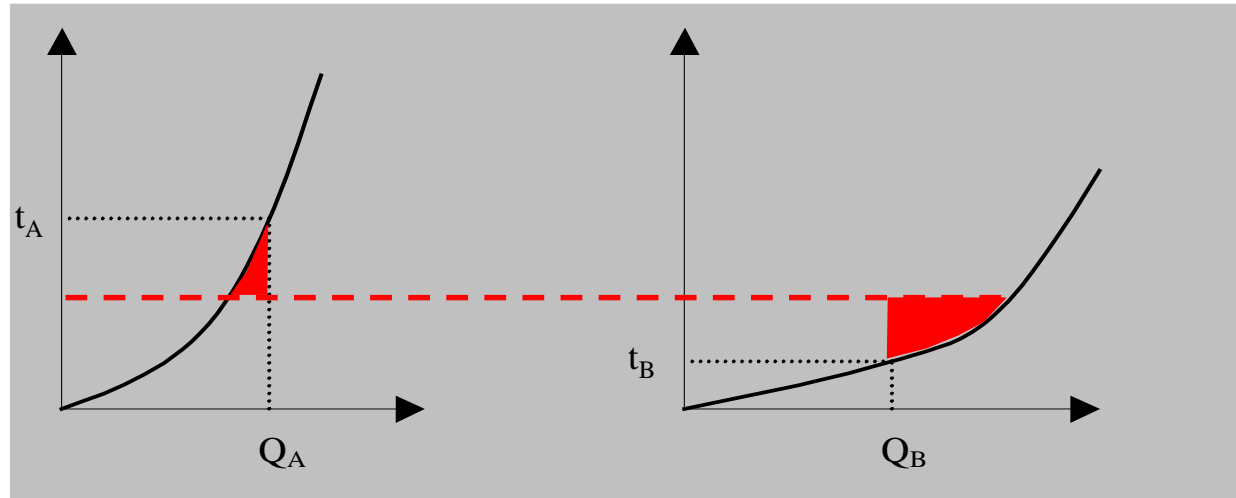
- Pricing carbon **internalizes** social cost of emissions
- **Efficiency** is achieved by having unique price across sectors and countries, thereby avoiding trade distortions
- This will **trigger required investments** in low-carbon projects
- **Equity** can be achieved via international transfers (or initial quota allocation)
- **Enforcement**, problematic, can be dealt with by naming & shaming ; WTO sanctions or IMF sanctions (sovereign debt)
- Coordinated taxes and cap & trade can both achieve the result

The purpose of this presentation is to discuss the carbon-trading-only option, and explore implications for negotiation

Outline

- Welfare maximization does not necessarily imply unique price of carbon
 - A unique price of carbon would create distortions in heterogenous World
- Pricing C is not sufficient to trigger necessary investments
 - Complementary policies are required, notably in terms of financing
- Pricing carbon is not sufficient to trigger shifts in development patterns (i.e., baselines)
 - Targeted policies are necessary

The standard reasoning of equalizing MACC across regions yields a C price



- A sectoral model computes MACCs
- Minimizing total costs yields unique price of carbon

However, macro costs differ from micro because of general equilibrium effects

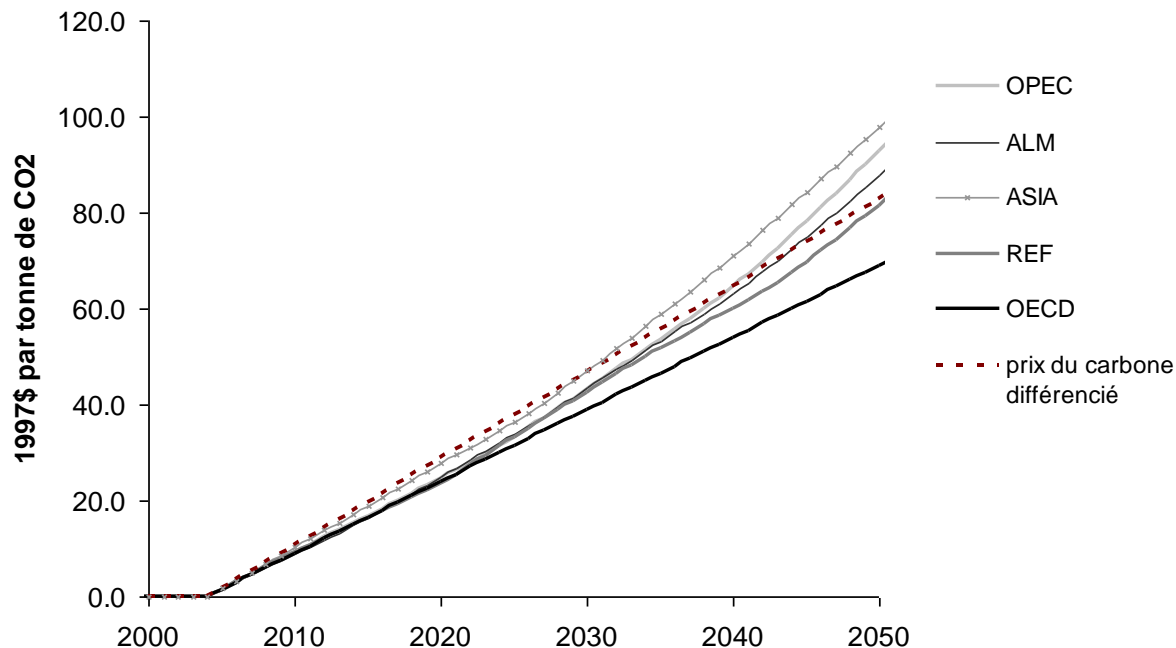
- The resulting price is relative to the price of the composite good, taken as numeraire.



- General equilibrium analysis is required to estimate propagation effect.
 - It can be significant

And propagation effects have no reason a priori to be equivalent across countries

International price of carbon vs. domestic



- In this case, impact of C price on trade and exchange rates drives different evolutions of non-carbon CPIs

Differences in propagation effects stem from heterogeneities in e.g.,

- Shares of energy in household consumption and in production costs
- Preexisting prices of energy
- Preexisting fiscal policies
- Firm behavior, notably in production price increases passed on to consumers
- Fragmented markets (labor, real estate, etc.) that impact C price impact on economies

Welfare maximization does not necessarily imply marginal (micro) cost equalization

- A heuristic welfare maximization model (abatement constraints with transfers)

$$\text{Max}_{A_{r,s,t}, T_{r,t}} \sum_r \alpha_r \cdot W_r \left(Y_r, C_{r,s=1} (A_{r,s=1}), \dots, C_{r,s=S} (A_{r,s=S}), T_r \right)$$

- Under constraints

$$\sum_{r,s} E_{r,s}^{ref} - \sum_{r,s} A_{r,s} = \bar{E}$$

$$\sum_r T_r = 0$$

Welfare maximization does not necessarily imply marginal (micro) cost equalization

- First-order condition $\forall r, \forall s \quad \frac{\frac{\partial W_r}{\partial C_{r,s}}}{\frac{\partial W_r}{\partial T_r}} \cdot \frac{\partial C_{r,s}}{\partial A_{r,s}} = cste$
- dW/dT and dW/dC are not necessarily equal across regions
 - dW/dC will differ across regions, e.g., if macro costs differ (other reasons may include differences in initial revenues, distributional issues or cobenefits)
 - dW/dT may also differ across regions, e.g. if T modifies terms of trade

Carbon pricing also confronts political economy risks

- We have a history of *not* setting high C prices in allowance markets and of *not* implementing C taxes
- C Pricing hits existing capital stock and vested interests
- There is clear reluctance to large international compensations or transfers associated with mitigation

EU-ETS: A good example of lobbying

- Harmonized free allocation to industry and carbon leakage provisions

Share of free allocation calculated based on benchmarks per sector	2013	2014	2015	2016	2017	2018	2019	2020	From 2021
Electricity production	0%	0%	0%	0%	0%	0%	0%	0%	0%
Industry sectors	80%	72.90%	65.70%	58.60%	51.40%	44.20%	37.10%	30%	View of 0% by 2027
Industry sectors deemed exposed to carbon leakage	100%	100%	100%	100%	100%	100%	100%	100%	Decreasing share

Carbon leakage list 2015-2019 (adopted in 2014) Source: Climate Action, EU ETS Handbook, 2014

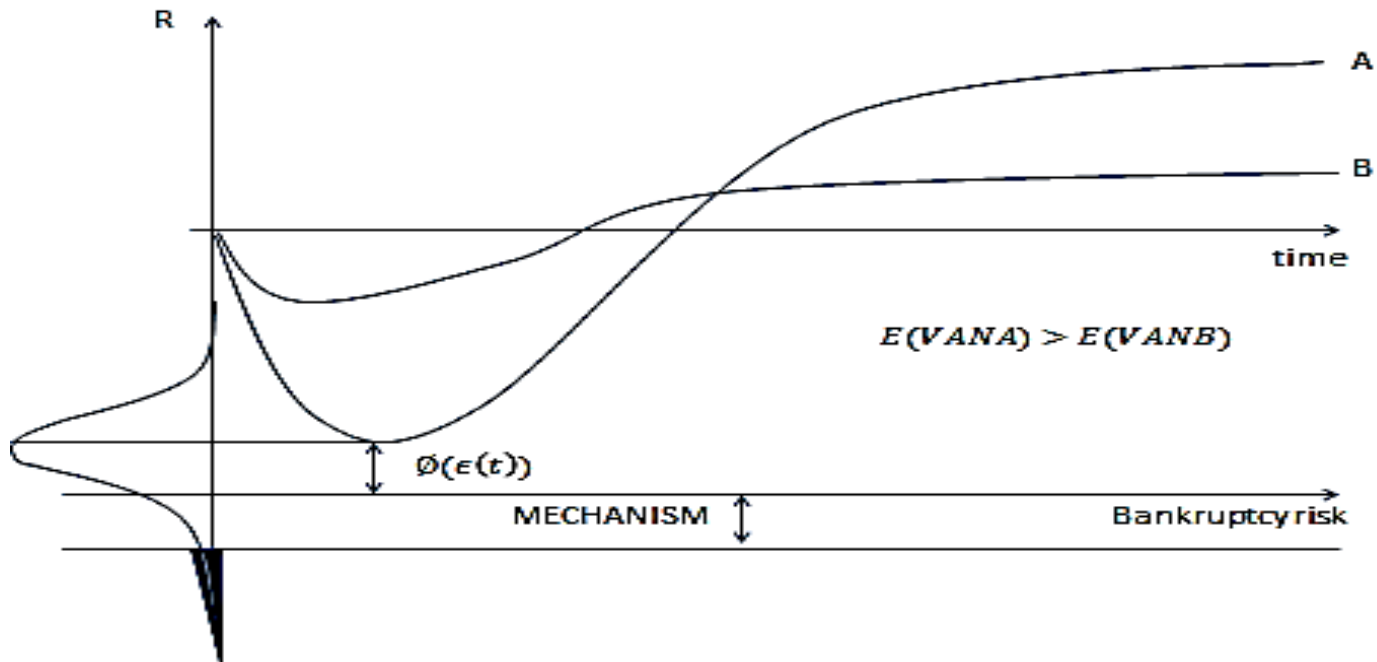
Policy implications

- Heterogeneous carbon prices reflect deep institutional and social heterogeneities leading to different political constructs
 - Social contracts are different
- Connecting too quickly very different types of systems may generate 'fault lines' (Raghuran Rajan 2010) and economic distortions
 - Lowest common denominator or non-agreement risk, as demonstrated extensively
- Accepting C price heterogeneity, and using agreement on Social Value of Carbon as attractor ?

Investments in low-carbon projects require credible price signals in the long-run

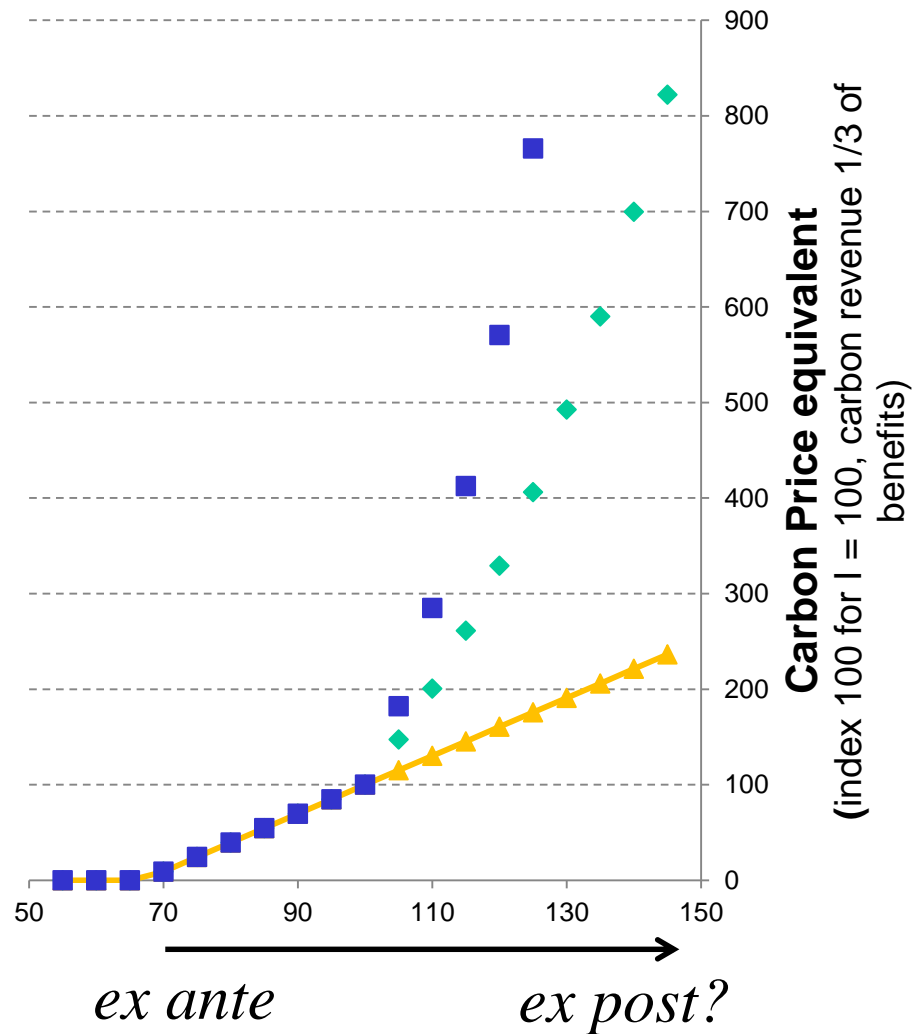
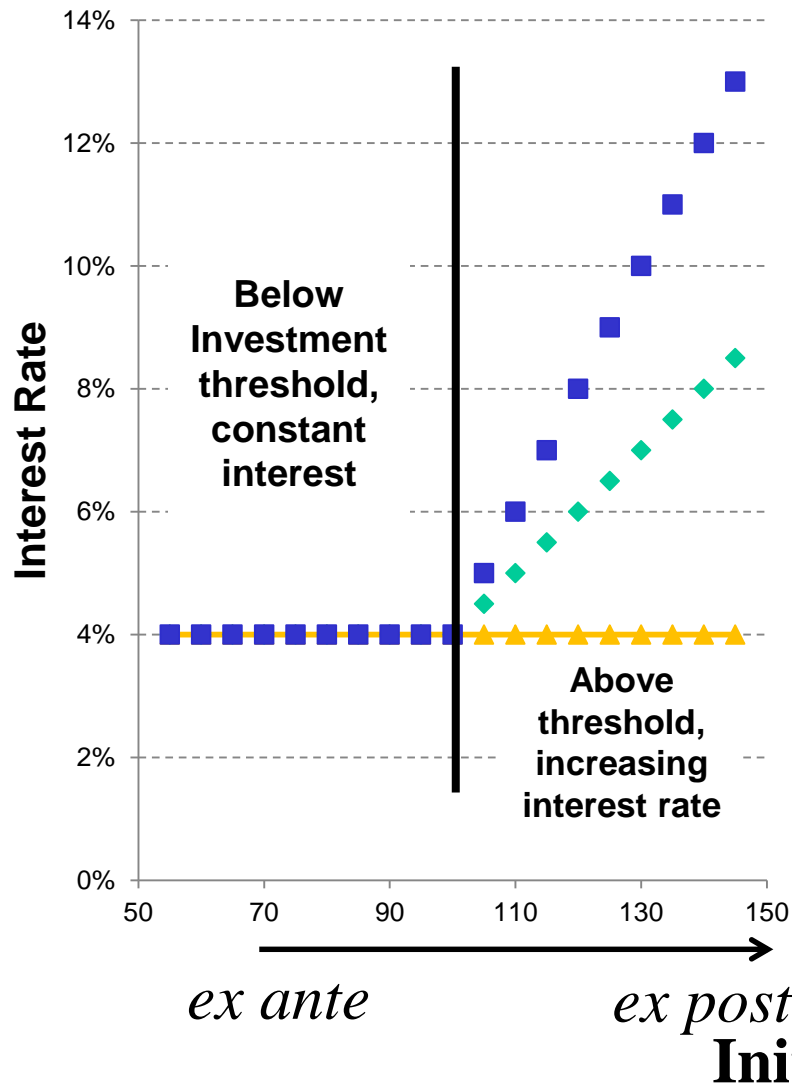
- Investments in low-carbon projects typically span years/decades, thus requiring C price trajectory
- How does one provide signal credibility over time?
 - Intrinsic volatility of the C price (depends on instrument) (Blyth et al. 2007, Yang et al. 2008)
 - Noise associated with other price signals (Oil and gas, exchange rates, land, etc.)
 - Shareholder value regime
- Laffont and Tirole (1996) also point to time inconsistency of environmental policies
 - Making less certain for investors to recoup investment

Even with C price, NPV-maximizing, low-carbon projects may not materialize for lack of financing



- Even if the low-carbon project has higher benefits in the future, it requires upfront financing
- Capital markets and financial intermediations do not provide enough financing for low-carbon projects or programs

When the 'banker' demands higher interest rates, carbon prices needed to trigger investments increases exponentially



Policy implication

- Key issue: financing (or lack thereof)
- Insufficient public resources in a context of debt crisis
- Large private savings
- Issue: reorient part of these savings towards low-carbon projects

Proposal: A Climate Remediation Asset (CRA) mechanism

1. ***Its anchor*** : an agreement, under UNFCCC on ***a Social Value of Carbon*** (per ton of avoided carbon emissions)
2. ***Voluntary commitments, by 'clubs' of governments,*** to back a quantity of ***CRAs*** over every five years
3. Central banks open ***credit lines*** and accept as repayment ***carbon certificates (CC)*** to fund LCIs
4. ***An Independent Supervisory Body*** to certify the eligibility of the projects in function of the ***NAMA's*** list and secure the ***statistical additionality*** of the system through the allocation rules of the CC
5. ***Asset swap after certification*** of project completion: ***CC <-> CRA***
CRAs appear on the balance sheet of central banks (like gold)

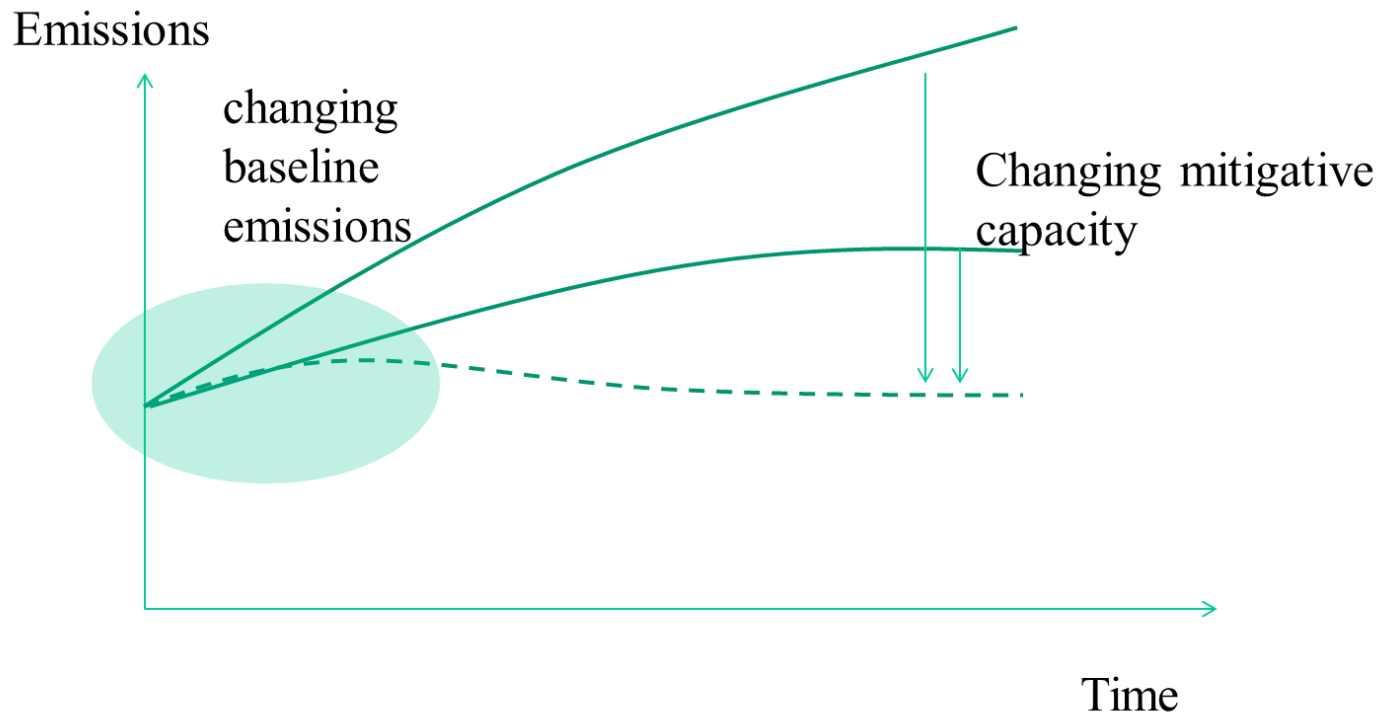
(Hourcade et al., 2012, Hourcade et Perrissin-Fabert 2014)

Articulating carbon pricing and carbon finance

- The CRA mechanism complements C pricing
- It aims at relaxing the financial constraint on LCIs
- It is structured around an internationally agreed social value of carbon
- It passes an upfront signal
- The agreed VSC can also be anchor for C prices convergence over time
- It secures the economic consistency of 'non-price policies'

Pricing carbon is not sufficient to trigger shifts in development patterns

- Mitigation policies have to tackle drivers of future emissions and of future ability to mitigate (Shukla et al. 2008, Haines et al. 2007)
 - Example: shape of cities
 - All the more so when bifurcations are possible



Pricing carbon is not sufficient to trigger shifts in development patterns (2)

- It covers only part of induced emission reductions from projects (Gilotte, 2004, Edenhofer et al. 2006)
- It covers only part of the indirect and induced emissions from long-lived capital stock projects (Lecocq and Shalizi, 2014)
- C price has limited influence on adoption of reforms (e.g., fiscal, labor market, etc.) conducive to mitigation (Victor and Heller, 2007)

A broader scope of policies in which to streamline climate concerns

- Solutions to climate mitigation may lie not only in carbon market but in other spheres as well (Hourcade and Shukla, 2006)
 - For example, development of nuclear, biomass and CCS depend on other things than just C price signal (Hourcade and Shukla, 2006)

“This does not eliminate the importance of policy actions to mitigate climate change, but it reveals the importance of developments that occur outside what is typically regarded as climate policy.”

IPCC AR3 (Banuri et al. 2001, p.85)

Policy implications

- Need to complement C pricing + financing device with identification and support for structural policies, on a case by case basis
- Compatible with INDC framework:
 - Evaluate implementation of INDCs in terms of structural policy content ?
 - And NOT in terms of +2°C
- Articulation between decarbonization and other development goals easier to identify this way
 - Including, but beyond the “cobenefits and adverse side effects” agenda

Conclusion

- Mitigation policies try to influence large number of decisions
 - Consumption by household, investment and R&D by firms, “structural” policies that drive future emissions and mitigative capacity
- C pricing alone cannot do it all
- Complement it with financing device and support for structural policies, on a case by case basis
- On basis of World heterogeneity, accept some degree of differentiation of C prices, possibly using internationally negotiated VSC as anchor
- Implications for research: macro & finance, non-climate policies, intl consistency



C.I.R.E.D.
CENTRE
INTERNATIONAL
DE RECHERCHE
SUR L'ENVIRONNEMENT
ET LE DÉVELOPPEMENT



Thank you

www.centre-cired.fr



