Carbon pricing and Climate Finance: a new form of what and where flexibilities

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(Work in progress)

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Introduction

• In the current world context, necessity of assessing the costs of climate policies in a 2nd best framework.

➢ The time profile of emission reduction will result from the capacity of societies to embed climate polices in response policies to short term tensions and concerns
  Consider the emission objective as an exogenous constraint on the economy
  Or, consider an exogenous carbon signal price

➢ Economic interactions have a second best nature (inertia, imperfect foresights, rents, debts …)

➢ Uncertainty is a key obstacle to the efficiency of carbon price only policies in triggering low carbon investments

➢ Redirecting global savings to reduce the mismatch between where the savings are and where the low carbon investments should take place is key for the low carbon transition
The IMACLIM-R model
multi-region and multi-sector Dynamic General Equilibrium

- Hybrid Social Accounting Matrixes in Money values and physical quantities secure the consistency of the engineering based and economically based analyses
- Annual time step – Recursive succession of top-down static equilibria and bottom-up dynamic modules
- “Second best” nature of economic interactions
  - Market Imperfections, partial use of production factors (e.g. unemployment)
  - Imperfect foresights for investment decisions
  - Inertia on technical systems
A specific approach to study policy mixes

- No prescribed temperature target

- Piling up measures without climate finance
  - Carbon price only policies
  - Non carbon price infrastructure policies (urban policies, transport)
  - Smart recycling of carbon taxes revenues (payroll taxes)

- Adding financial devices to de-risk low carbon investments

What consequences in terms of macro-economic costs?
An exogenous global CO$_2$ price trajectory

- 20 $/tCO2 in 2020
- 150 $/tCO2 in 2030
- 200 $/tCO2 in 2040

This generates a carbon budget 2010-2050 of 1052 GtC0$_2$

- -6% in 2020
- -37% in 2030 wrt. the reference scenario
- -54% in 2040

What consequences in terms of macro-economic costs?
Despite a fast increase of the carbon price,
- Imperfect expectations
- Inertia on installed capital & end-use equipment
Slow down the redirection of investment choices to decarbonize the economy.

High transition costs ("carbon price only" policy)

Global GDP variation between climate and reference scenarios

FF based economy + Carbon price
Increase of
- Production costs & Consumption prices
- Unemployment
  → High transition costs
Stabilized costs over the long run ("carbon price only" policy)

Global GDP variation between climate and reference scenarios

- Induced Technological change, learning by doing
- Consumption structure change
- Reduction of the FF economies dependences
- Less vulnerability to FF price increase
A North vs. South Asymmetry

GDP variation between climate and reference scenarios

Same trends, but significant magnitude differences...

The effects of the carbon price ↔ The energy-to-labor cost ratio
The higher the ratio, the higher the costs.

- Developing countries: energy costs in production costs are significantly high comparing to labor costs
  Their economy is significantly hurt…particularly compared to developed countries (with the same level of carbon price)
A policy mix with
Infrastructure policies and fiscal reform
2. **Carbon price and Infrastructure policies**

- Carbon pricing (same exogenous carbon price)

+ 

- Infrastructure policies that aim at controlling the structural determinants of transport emissions:
  
  (i) Reallocation of transportation investments in favor of lower forced mobility and dependence to road (urban policies)
  
  (ii) Adjustments of the logistics organization to decrease the transport intensity of production/distribution processes.
**Carbon price and Infrastructure policy**

- **Emissions reductions**: Decrease of 3% in the cumulated emissions 2010-2050
- Improvement of the Macroeconomic situation
  - spill over effects of investments and increase in the utilization rate of production capacities

**GDP variations btw climate and reference scenarios**

**Developed countries**

**Developing countries**

**Global losses**
We prescribe global CO₂ emission trajectory obtained in the previous scenario

- Satisfied by a global carbon price + infrastructure policies
- “smart” recycling of the carbon tax revenues:
  Revenues of carbon tax: Used to reduce pre-existing labor taxes (vs. fully redistributed to Households)
Higher Carbon tax that stabilizes after 2030

- The recycling on labor taxes proves to reduce mitigation costs significantly
  - lowers propagation explosion of production costs
  - Decrease the energy-to-labor costs ratio in the production process by fostering more intense use of laborers during the transition.
Small ‘double dividend’ in **developed countries** over the short term (better utilization rate of equipment induced by a higher final demand)

Significant macro-economic improvement in **developing countries** but no significant impact over the first five periods
4. Adding Financial de-risking devices

- We prescribe an exogenous global carbon price (lower than in scenario 1 & 2) + infrastructure policies + “smart” recycling of the carbon tax revenues

+ Financial de-risking devices
De-risking low carbon investments through *public guarantees* (Hourcade, Dasgupta, Nafo, 2019) calibrated on a social value of carbon (article 108 of the decision of the Paris Agreement)
Financial de-risking devices

- De-risking low carbon investments through *public guarantees* (Hourcade, Dasgupta, Nafo, 2019) calibrated on a social value of carbon (article 108 of the decision of the Paris Agreement).

- A device of which the expected macroeconomic positive impact is to reduce the ‘gap between the propensity to save and the propensity to invest’ (negative rate for long term bond markets) and the structural underinvestment in infrastructures (IMF 2017) to hedge against the risks of ‘structural stagnation’ (L Summers, O Blanchard).

- For this preliminary exercise: lower the discount rates (Electricity sector) according to the country specific level of risk (rating AAA, AA, …BB..)
  - Developed countries: 10% → 4%
  - Developing countries: 10% → 5% or 6% (depending on the region)
Financial de-risking devices and a new form of where flexibility

- Same carbon budget than in scenario 1 & 2 (with lower carbon tax)
- Macroeconomic improvements, principally for developing countries which benefit from capital inflows from the ‘North’
Concluding remarks

- Implementing a policy package that incorporates carbon prices help reducing the costs of the triggering phase of the low-carbon transition.

- Early low-carbon financial devices reduce initial risks by decreasing the upfront investment costs, which allows for a significant reduction of the carbon price needed to reach the climate objective in the transition phase, generating thus lower macroeconomic costs.
Implementing a policy package that incorporates carbon prices help reducing the costs of the triggering phase of the low-carbon transition.

Early low-carbon financial devices reduce initial risks by decreasing the upfront investment costs, which allows for a significant reduction of the carbon price needed to reach the climate objective in the transition phase, generating thus lower macroeconomic costs.

Next steps:
- Reference scenarios with or without ‘secular stagnation’
- Differentiating the cuts in discount rates in function of country and sector specific risks and the leverage effect of guarantees
- De-risk all the LCIs in all sectors and not only in the electricity
- Tracking the balance sheets of a) the households and industry b) the financial intermediaries and c) the public budgets
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Such a policy package

→ Is particularly important during the first phase of the climate policy, in which energy costs rise and technical change is limited by strong inertias and risk aversions.

→ Helps the deployment of a development model that will be more labor intensive, more resilient to external economic and political conditions including the oil prices, more inclusive thanks to better infrastructures and with a higher level of energy security.
Next steps

- Differentiated carbon prices
- Refine the infrastructure policy
- Implement a differentiated recycling policy (real lump sum for south countries) according the region
- Refine the implementation of the financial device:
  - Introduce a better link between the degree of risk of each region (its rating) and the decrease of the discount rate
  - Generalize its application to other sectors beyond the only electricity sector (Residential, Industry…)}
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