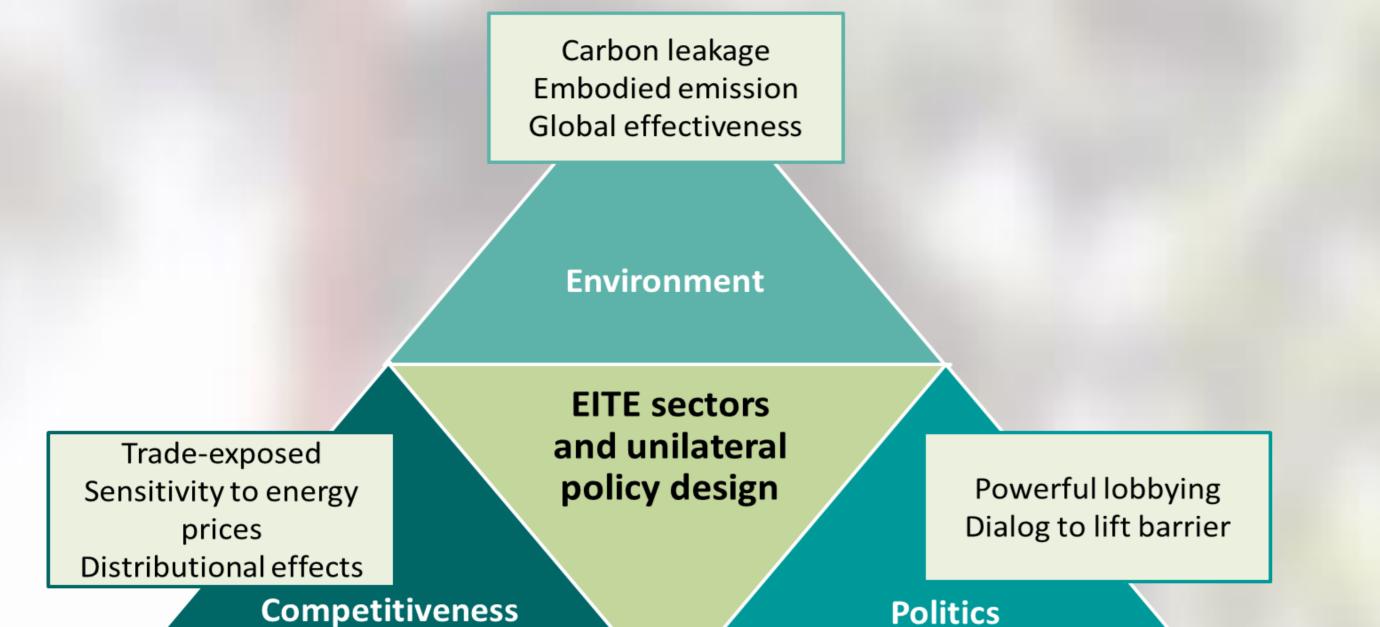# Climate policy design and the competitiveness of the French industry : a Computable General Equilibrium Analysis

Gaëlle LE TREUT - letreut@centre-cired.fr

Drawbacks of climate , trade, and political economy

Carbon leakage
Embodied emission
Global effectiveness

Environment

EITE sectors
and unilateral
policy design

Trade-exposed
Sensitivity to energy
prices
Distributional effects

Competitiveness

Powerful lobbying
Dialog to lift barrier

Politics

Objectives

Data hybridization for energy sectors and energy-intensive and trade-exposed (EITE) sectors

- A method for embarking physical quantities and disaggregating key sectors

Computable General Equilibrium analysis for France with IMACLIM-S FRANCE

- Implications of disaggregation of two EITE sectors (steel and cement)
- Impacts of a carbon tax reform on microeconomic and the two key EITE sectors

A static equilibrium approach with IMACLIM-S FRANCE

Two level of sectoral description

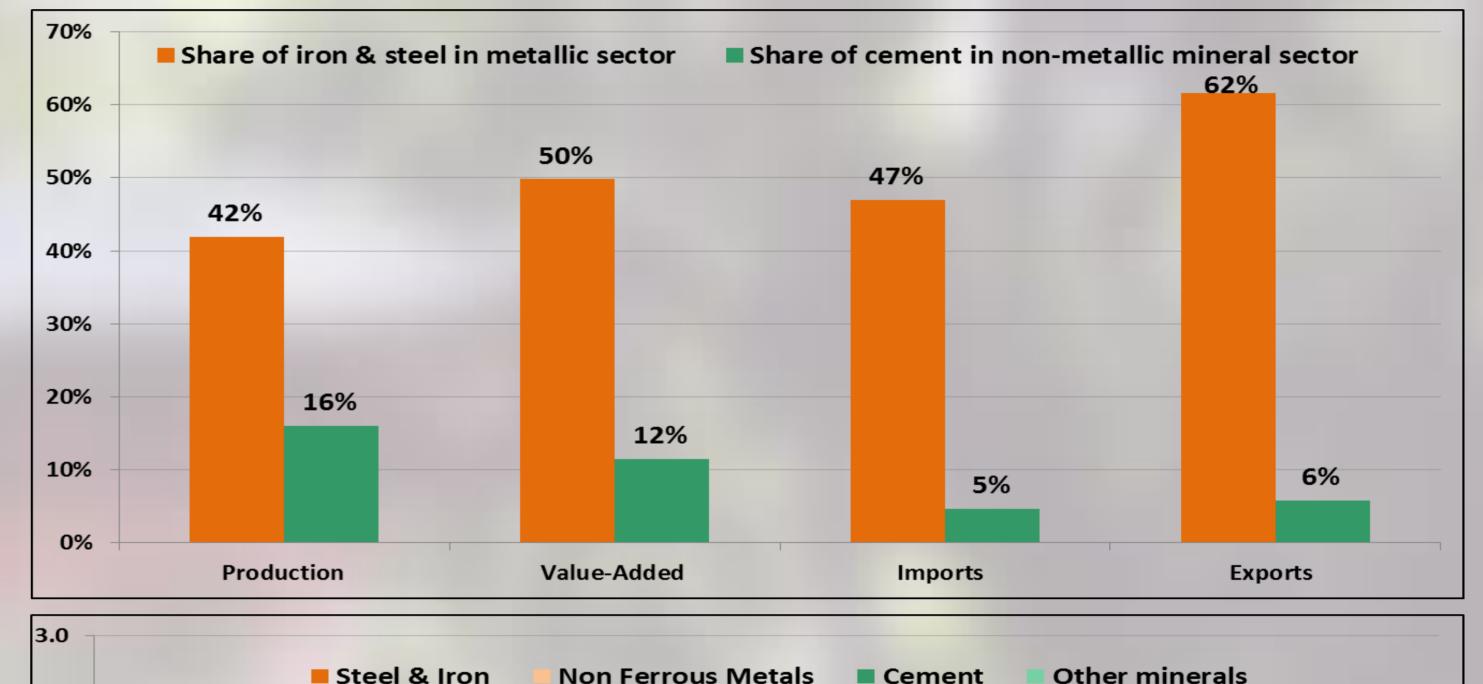| Aggregated model	Disaggregated model
Crude oil	Crude oil
Gas	Gas
Coal	Coal
Fuel products	Fuel products
Electricity	Electricity
Heat, geothermic	Heat, geothermic
Metals	Iron and steel
	Non ferrous metals
Minerals	Cement
	Other minerals
Other industries	Other industries
Agriculture	Agriculture
Composite	Composite

Unilateral carbon tax

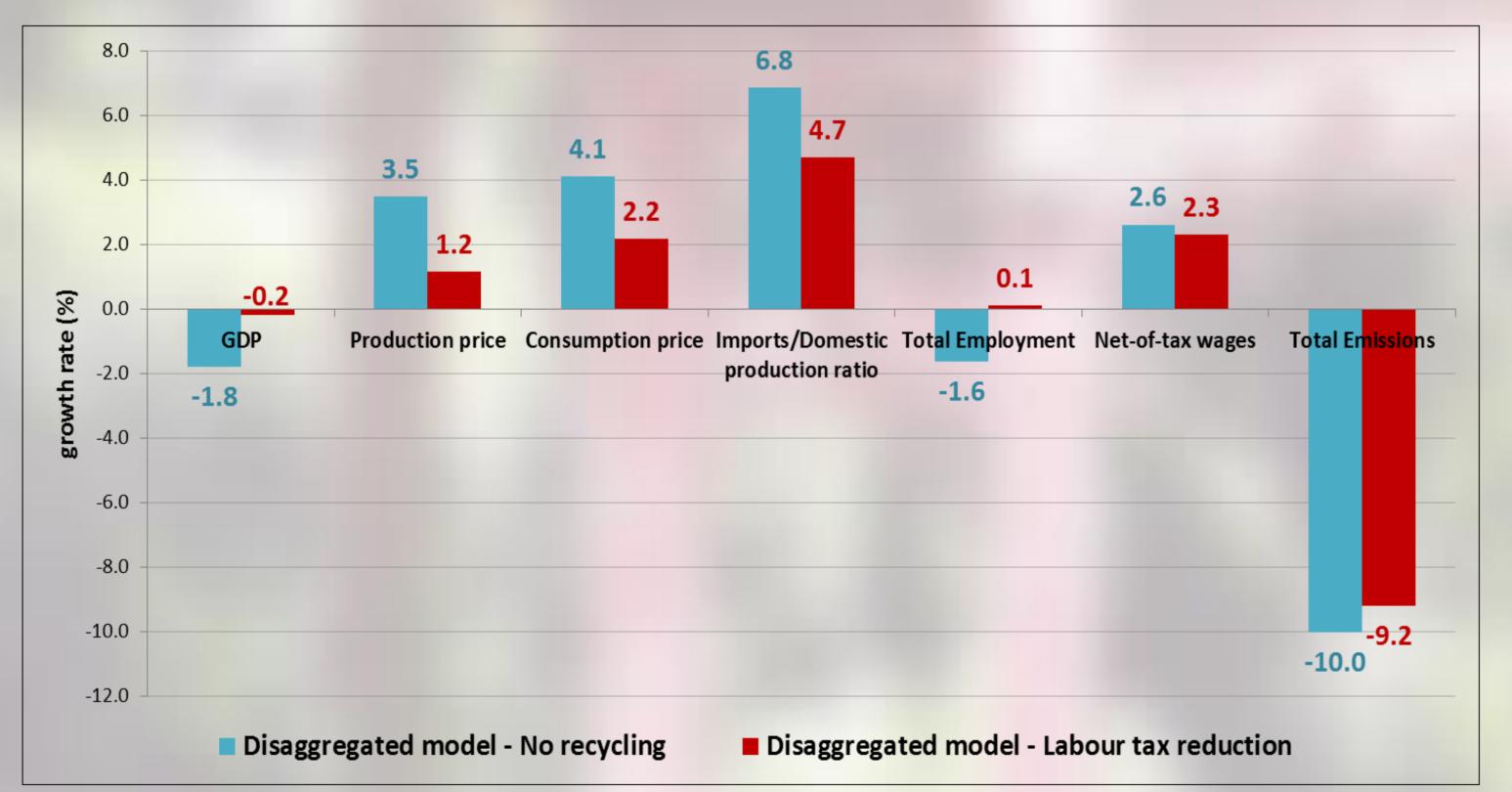- 80€/tCO$_2$ on intermediate and final energy consumptions
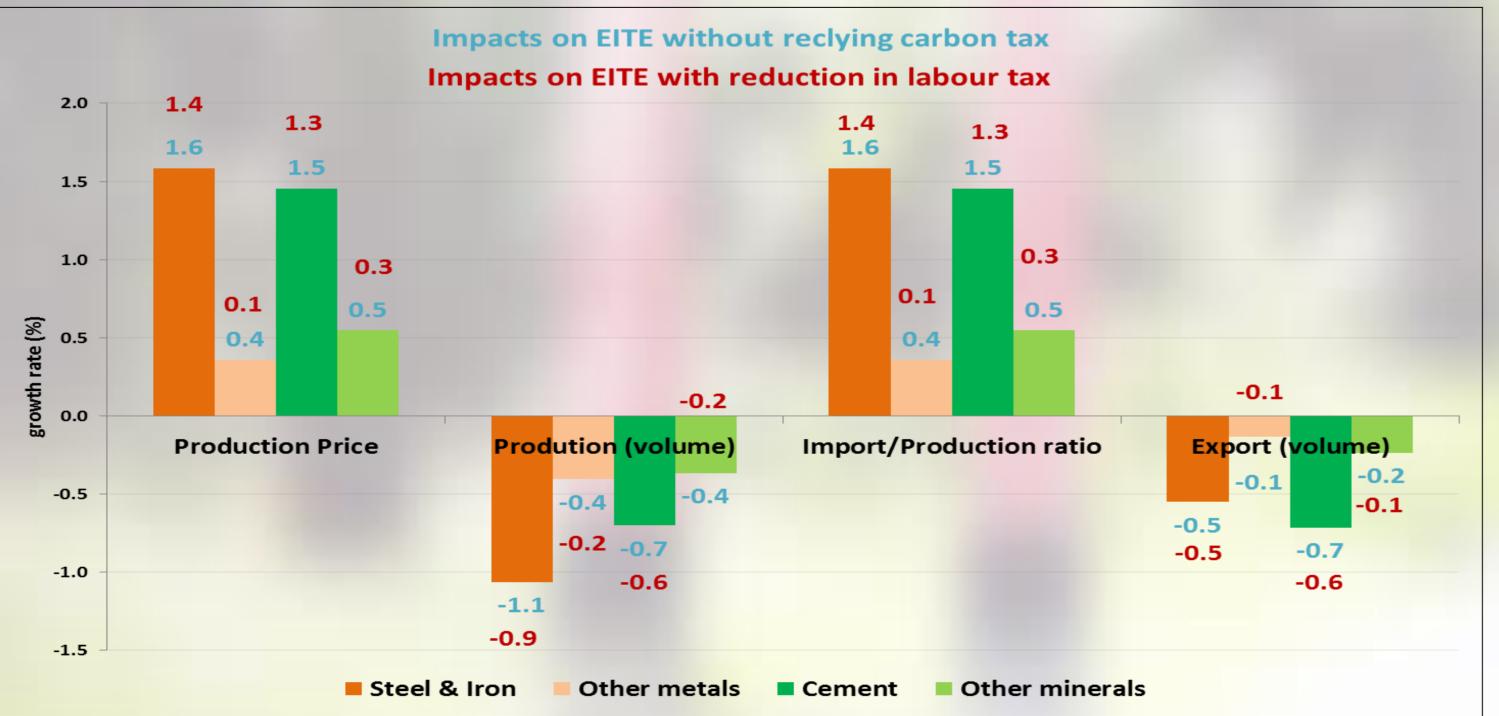
Two cases for the tax revenues

- No return to the private agents
- Return to the private agents via labour tax cut

Disaggregation of EITE sectors by hybridization procedure

Share of iron & steel in metallic sector / Share of cement in non-metallic mineral sector

	Production	Value-Added	Imports	Exports
Share of iron & steel in metallic sector	42%	50%	47%	62%
Share of cement in non-metallic mineral sector	16%	12%	5%	6%

Steel & Iron / Non Ferrous Metals / Cement / Other minerals
(Energy/Labour cost, Trade Intensity, Import Penetration)

IMACLIM-S France results with an unilateral carbon tax

growth rate (%)

	Disaggregated model - No recycling	Disaggregated model - Labour tax reduction
GDP	-1.8	-0.2
Production price	3.5	1.2
Consumption price	4.1	2.2
Imports/Domestic production ratio	6.8	4.7
Total Employment	-1.6	0.1
Net-of-tax wages	2.6	2.3
Total Emissions	-10.0	-9.2

Impacts on EITE without reclying carbon tax
Impacts on EITE with reduction in labour tax

growth rate (%)

Steel & Iron / Other metals / Cement / Other minerals

	Steel & Iron	Other metals	Cement	Other minerals
Production Price (no recycling)	1.6	0.4	1.5	0.5
Production Price (labour)	1.4	0.1	1.3	0.3
Prodution (volume) (no recycling)	-1.1	-0.4	-0.7	-0.4
Prodution (volume) (labour)	-0.9	-0.2	-0.6	-0.2
Import/Production ratio (no recycling)	1.6	0.4	1.5	0.5
Import/Production ratio (labour)	1.4	0.1	1.3	0.3
Export (volume) (no recycling)	-0.5	-0.1	-0.7	-0.2
Export (volume) (labour)	-0.5	-0.1	-0.6	-0.1

Main results

Macroeconomic impacts

- Disaggregation of the industrial sectors have only second order effects

Distributional effects and EITE sectors

- Aggregates hide important disparities among sectors
- The share of aggregates most impacted by a carbon tax is not the most exposed to competitiveness issues by nature

Conclusion and perspectives

Methodological developments

- Bridge the gap between top-down and bottom-up analyses
- Enable the joint analysis of competitiveness, carbon leakages and macroeconomic issues

Next steps:

- Emissions embodied in imports
- Different technical possibilities and trade elasticities
- Distributional impacts among households and equity issues

References

- Alexeeva-talebi, V., Löschel, A., & Mennel, T. (n.d.). Climate Policy and the Problem of Competitiveness : Border Tax Adjustments or Integrated Emission Trading ?, (08).
- Caron, J. (2012). Estimating carbon leakage and the efficiency of border adjustments in general equilibrium — Does sectoral aggregation matter? Energy Economics, 34, S111–S126.

Chaire Modélisation prospective
au service du développement durable

C.I.R.E.D.