

École des Ponts
ParisTech



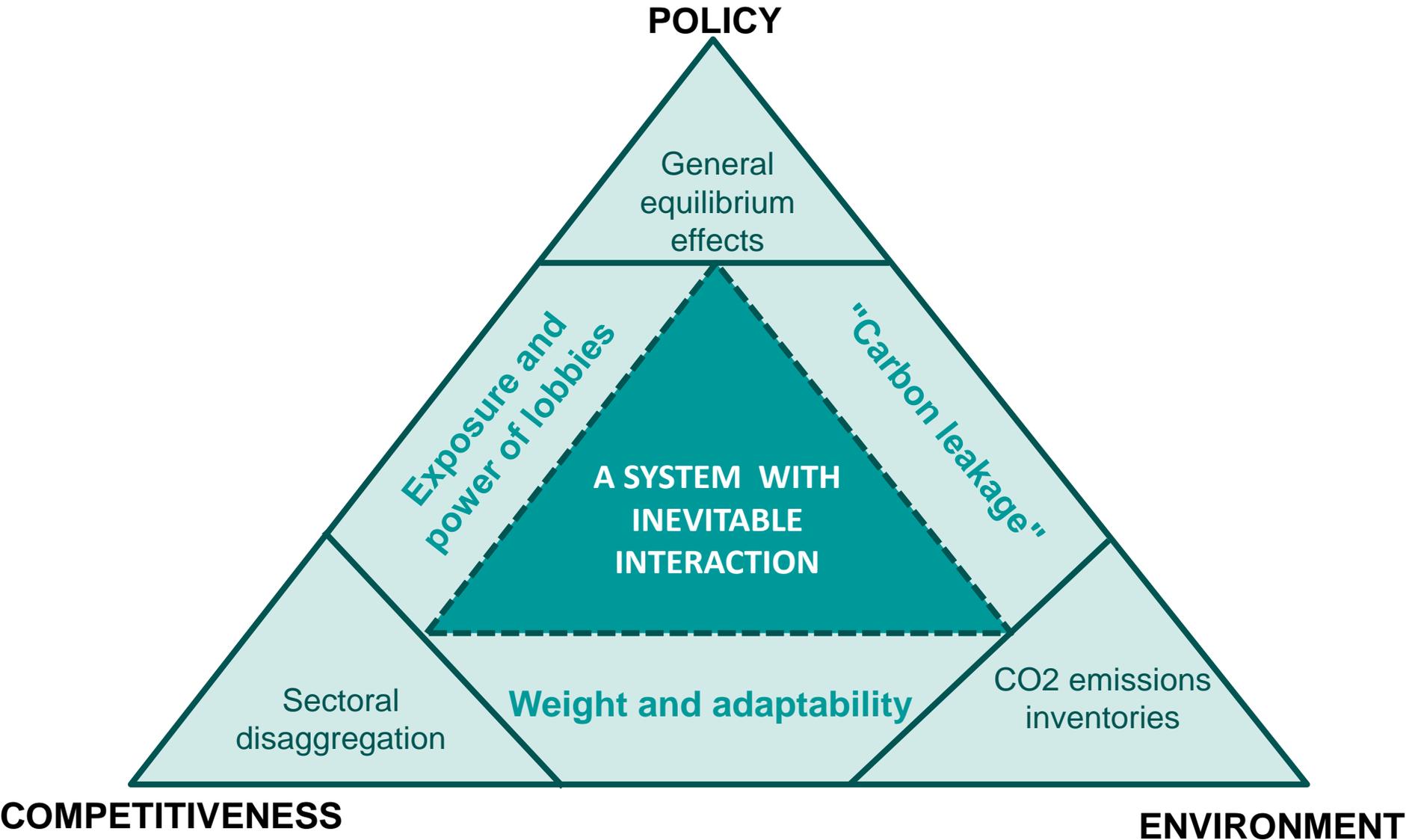
Methodological proposals for hybrid modelling : implications for climate policy analysis in an open economy (France)

Gaëlle LE TREUT

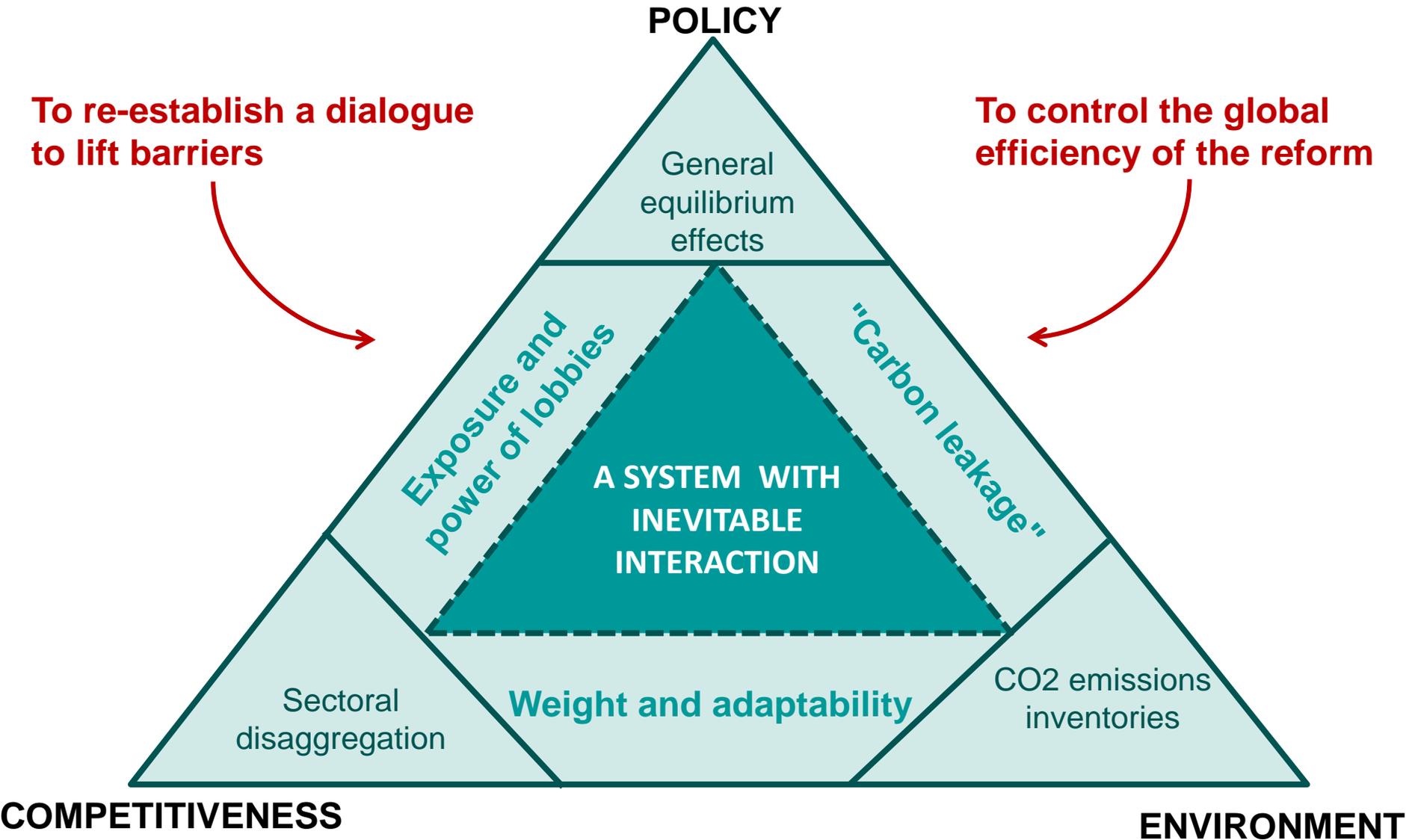
AIM workshop, NIES

November, the 27th, 2017

Challenge: integrating a multi-dimensional problem at the country-scale (France)



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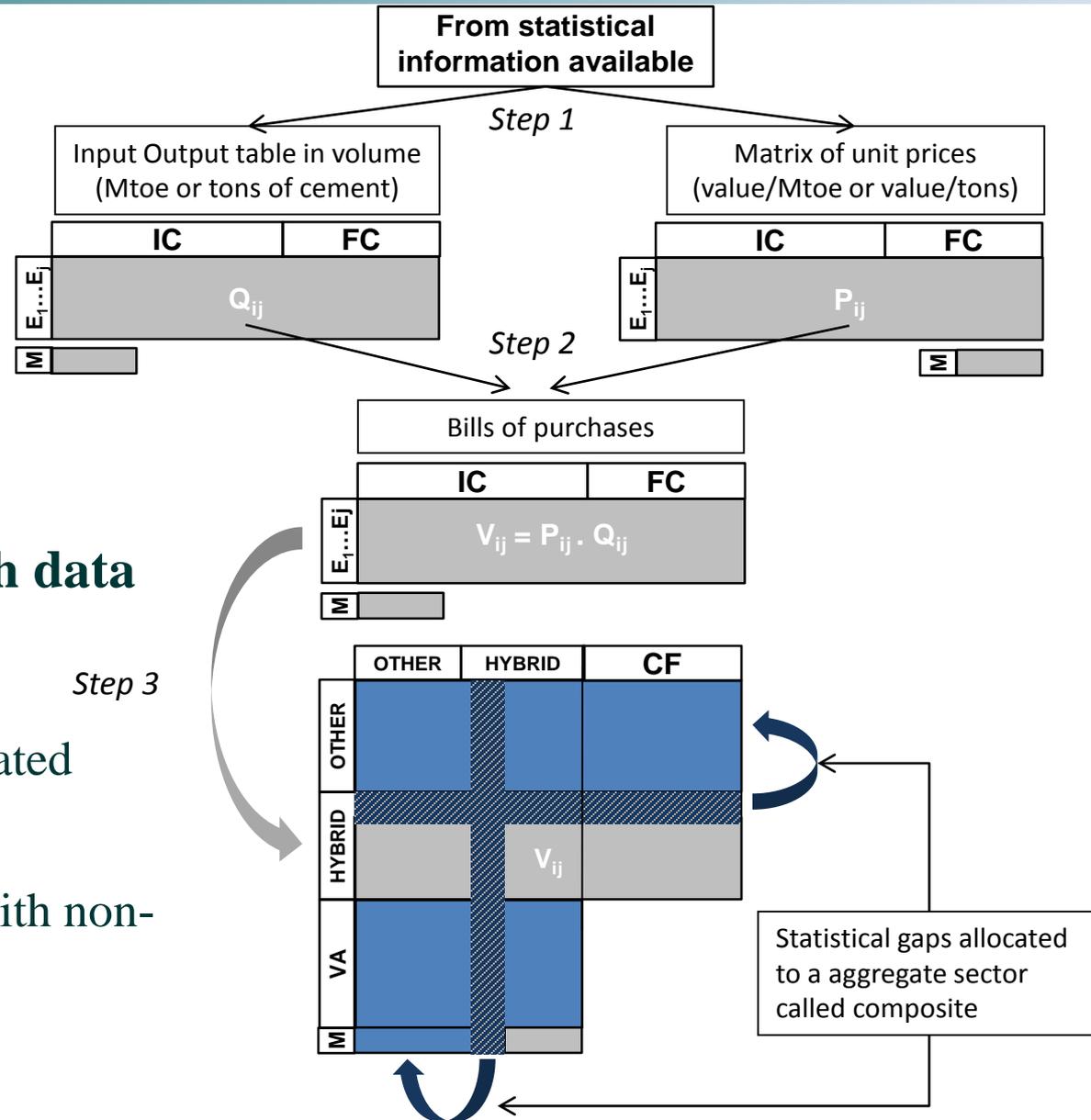
A dual description: the IMACLIM hybridisation procedure

Main rules

- Value-added of the economy (GDP) from national accounts is preserved
- Sectoral data on quantities and prices are added

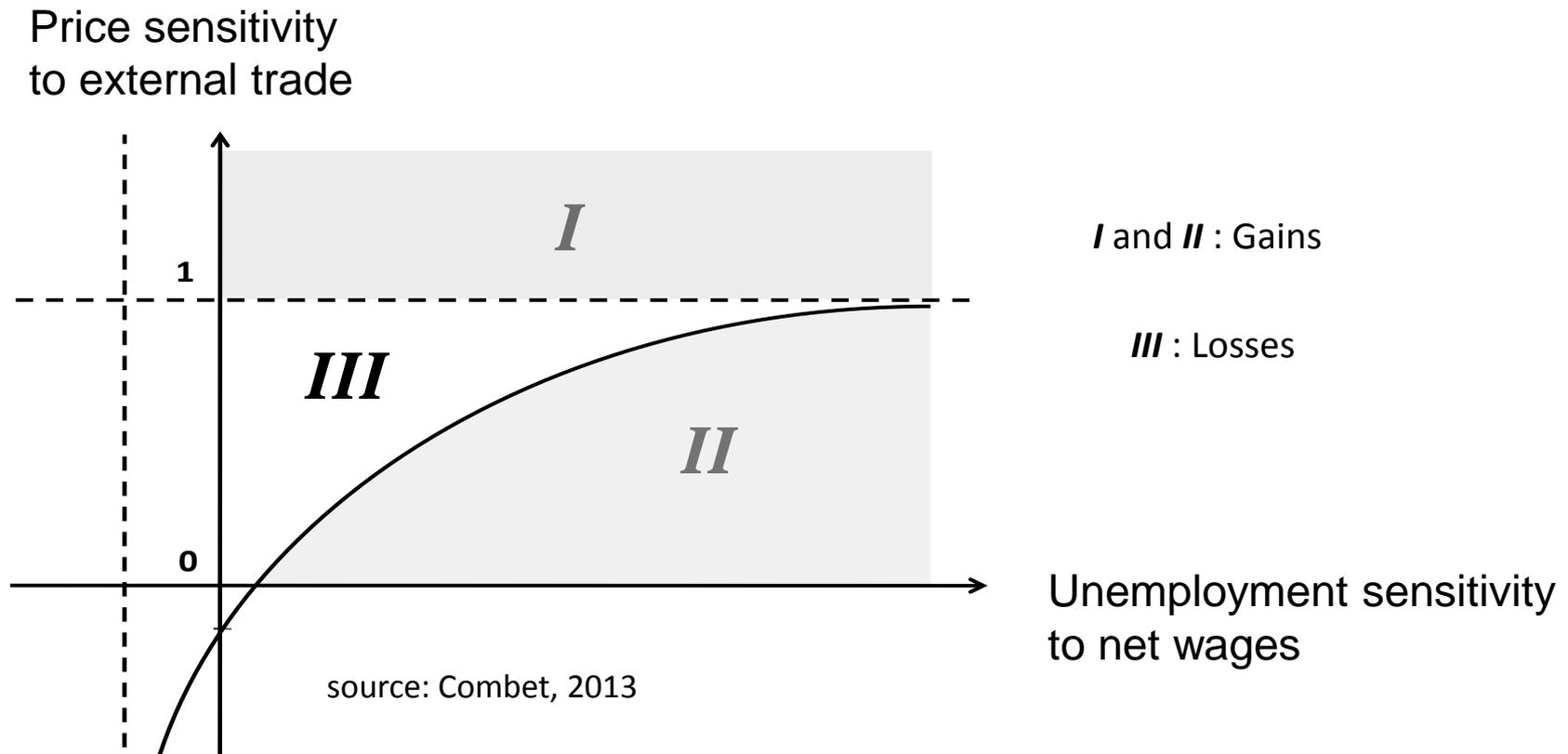
Application on 2010 French data

- 15 energy sectors
- Steel and iron sector (aggregated with metal sector)
- Cement sector (aggregated with non-metallic minerals sector)



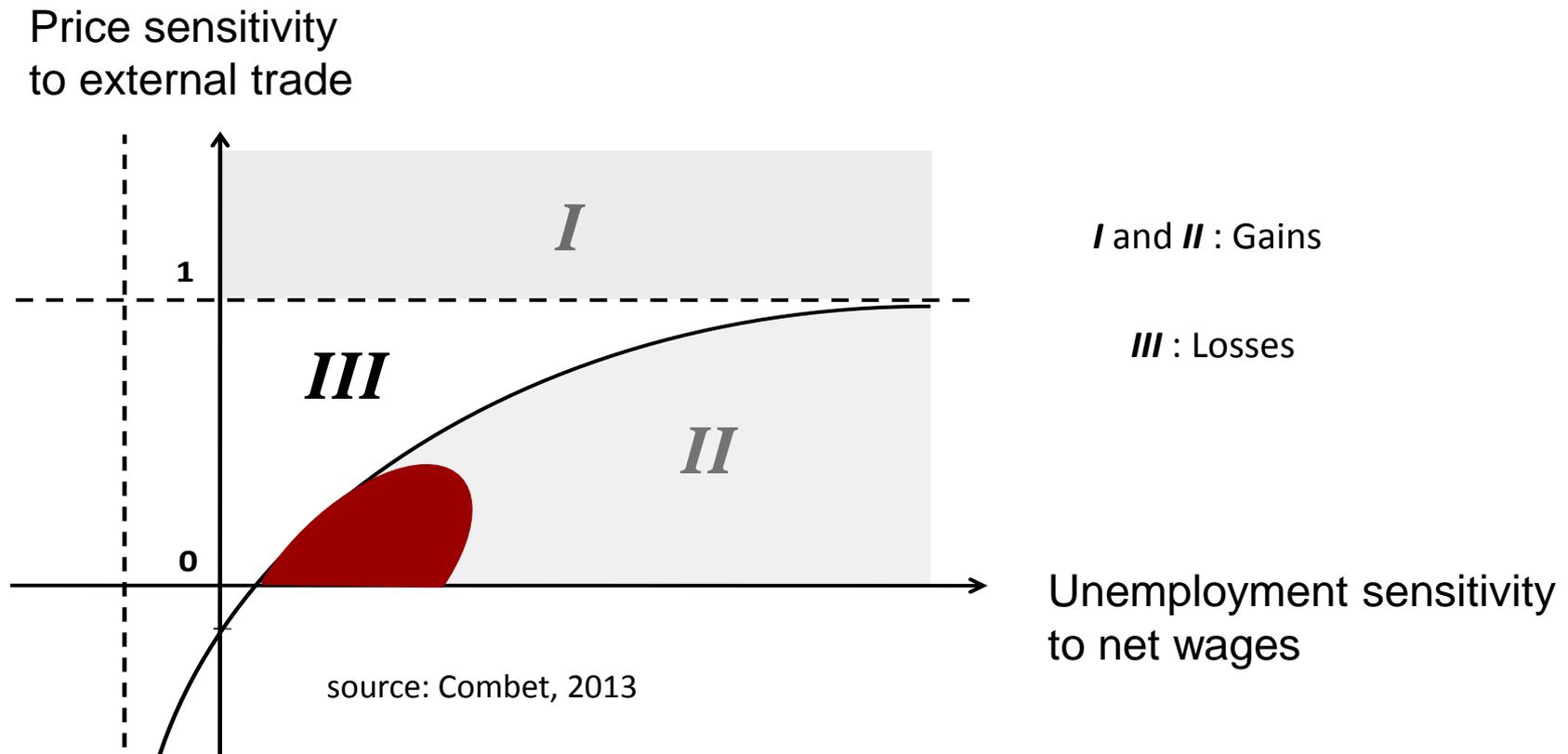
A double dividend that depends of two controversial parameters

Articulation between curve wage and international trade for carbon tax implication recycled into labour cost reduction

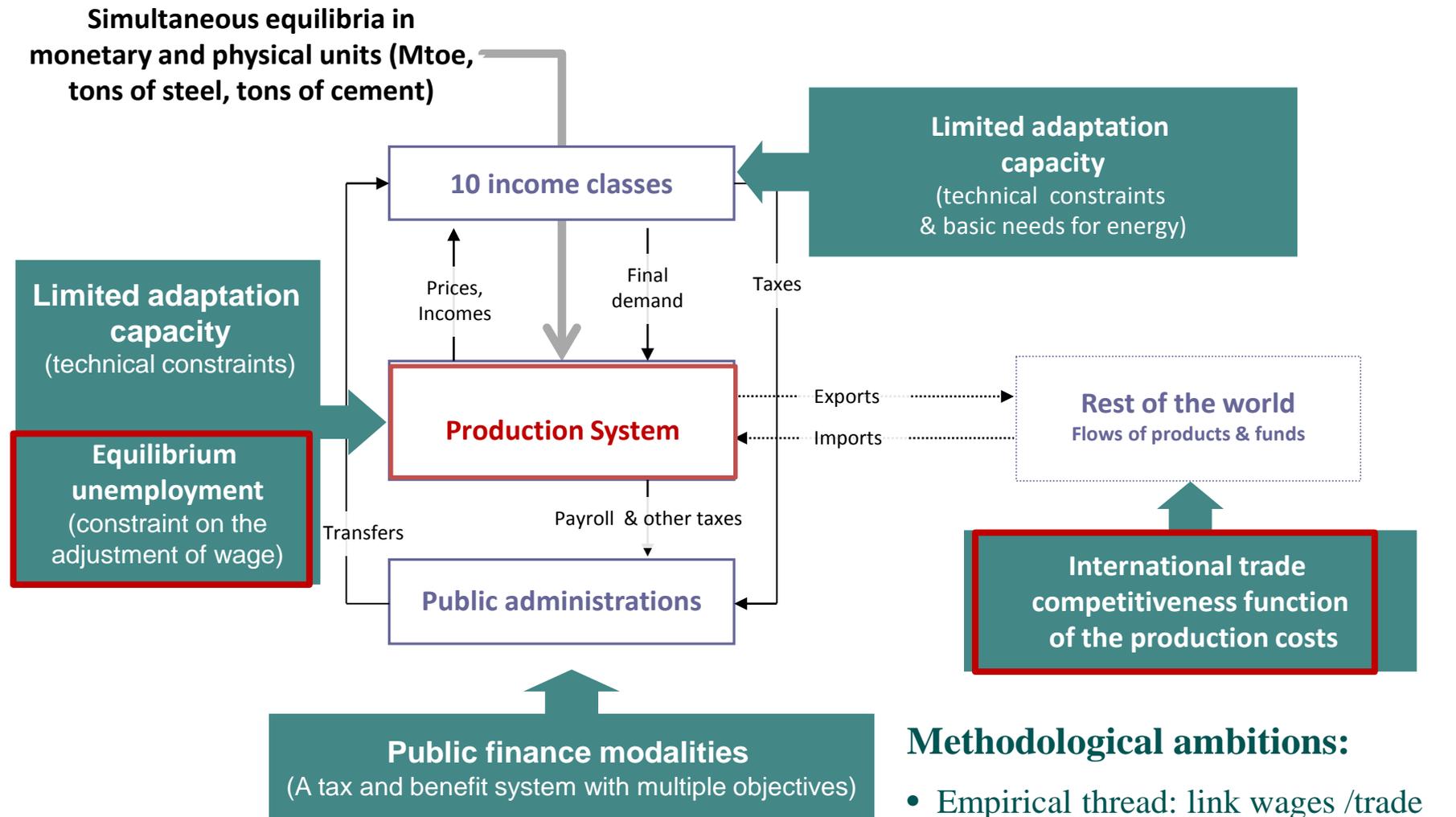


A double dividend that depends of two controversial parameters

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IMACLIM: a hybrid CGE model in open economy



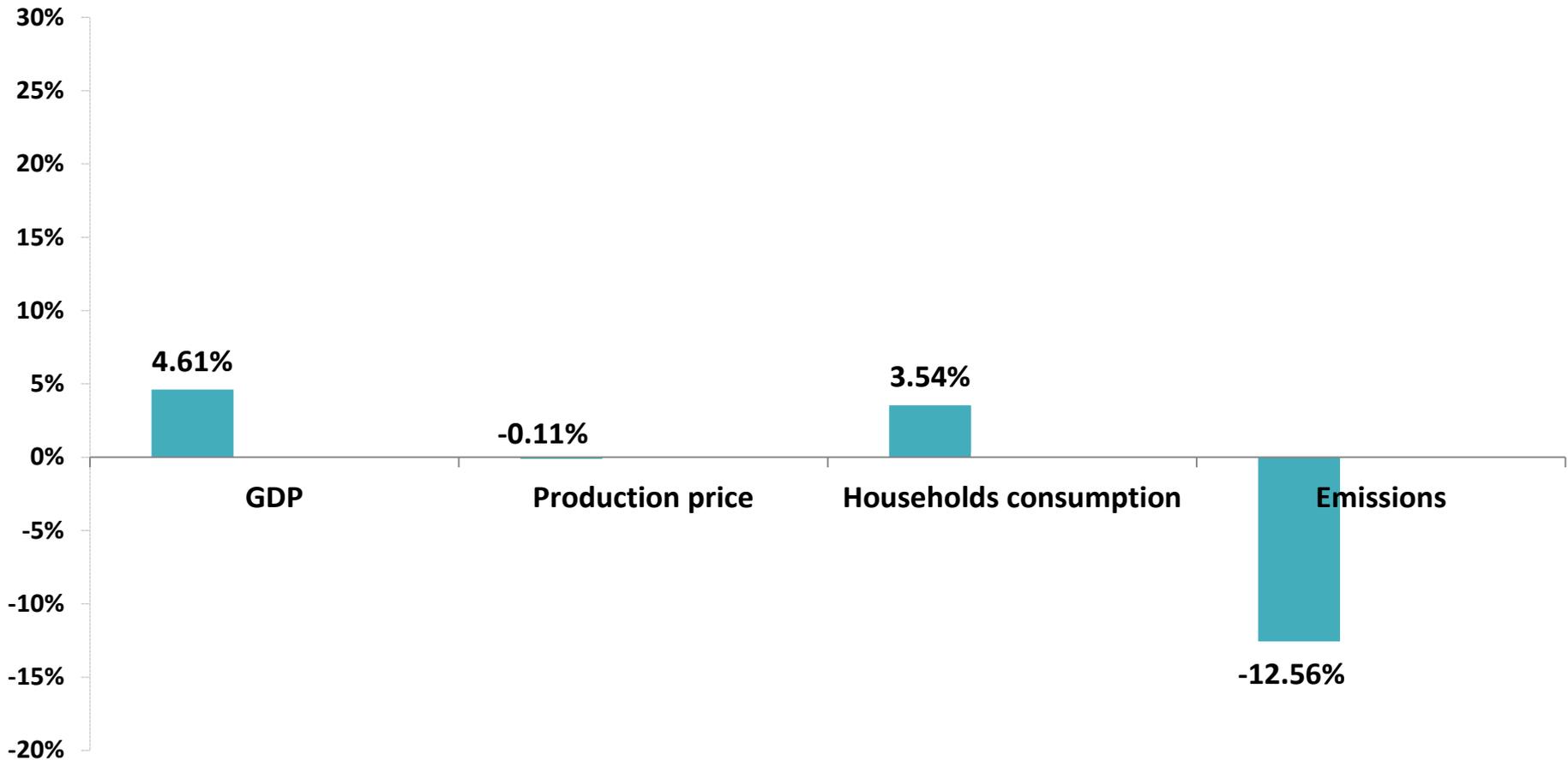
Methodological ambitions:

- Empirical thread: link wages /trade
- More realistic representation through a gain in granularity

1st obs .: link between wage indexation and exposure of the economy in a compact model

500 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

Setting: wage curve & int.trade elasticity
■ International price + Ref elasticity



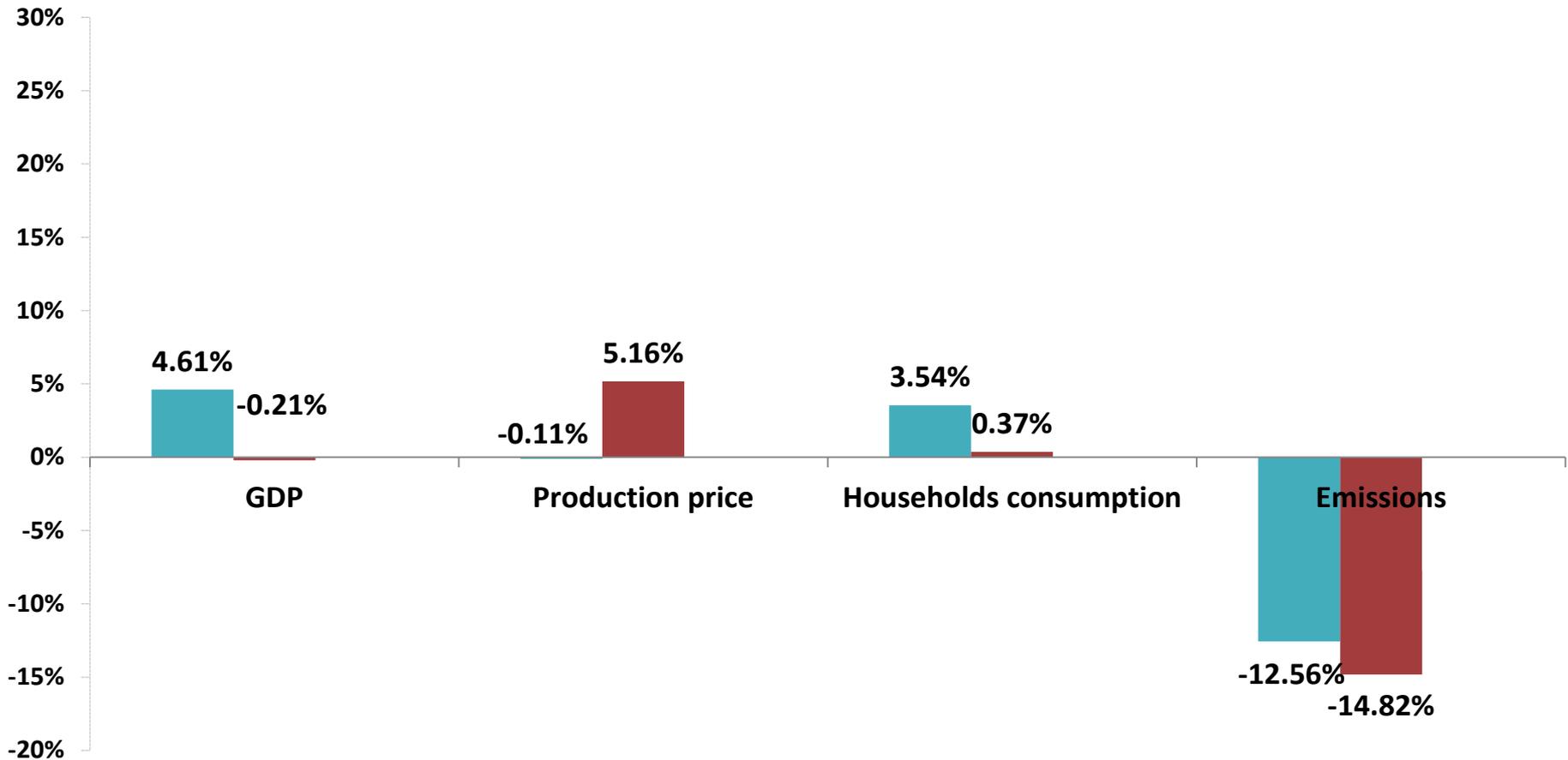
1st obs .: link between wage indexation and exposure of the economy in a compact model

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Setting: wage curve & int.trade elasticity

■ International price + Ref elasticity

■ Domestic price + Ref elasticity

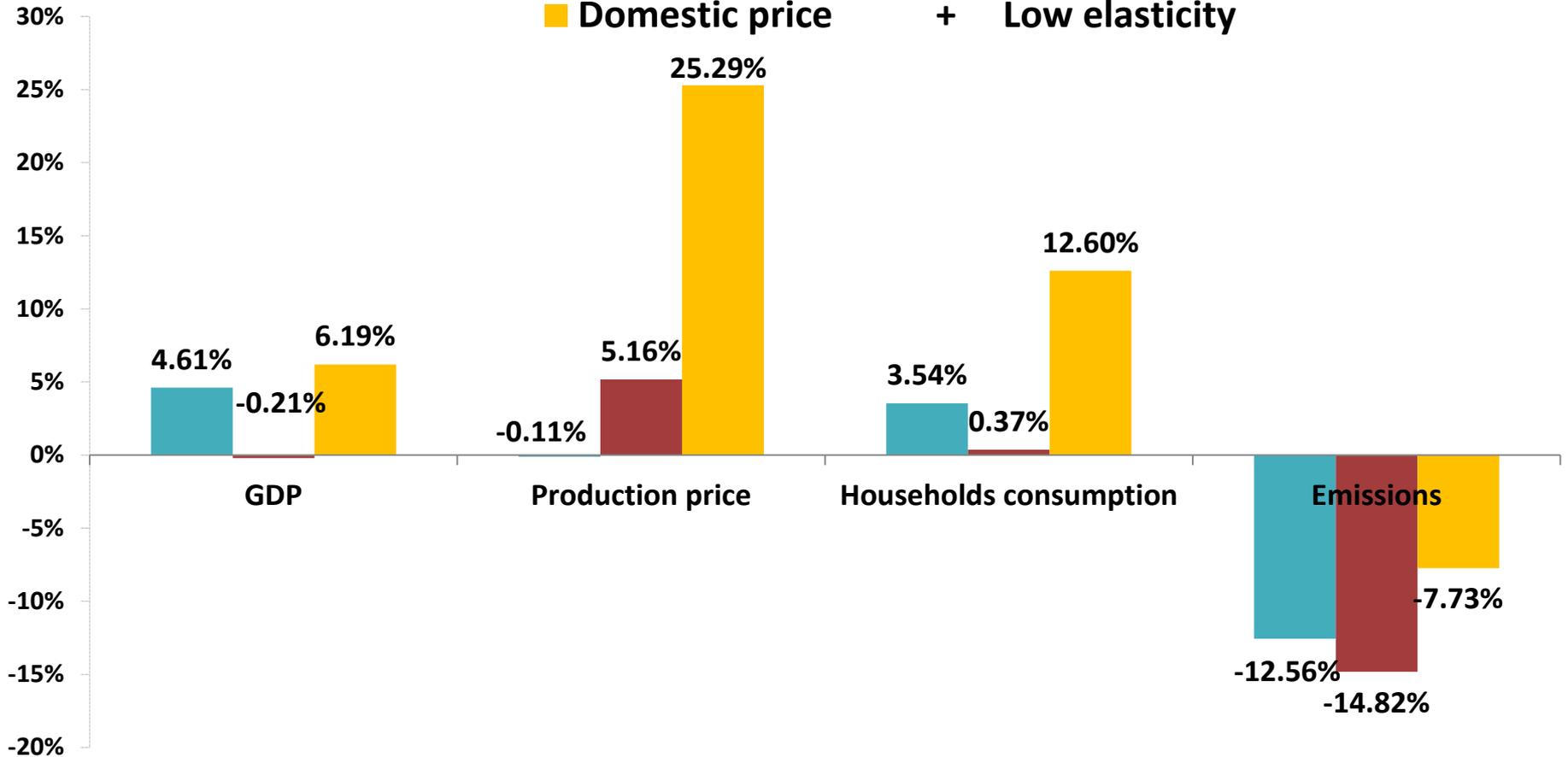


1st obs .: link between wage indexation and exposure of the economy in a compact model

500 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

Setting: wage curve & int.trade elasticity

- International price + Ref elasticity
- Domestic price + Ref elasticity
- Domestic price + Low elasticity

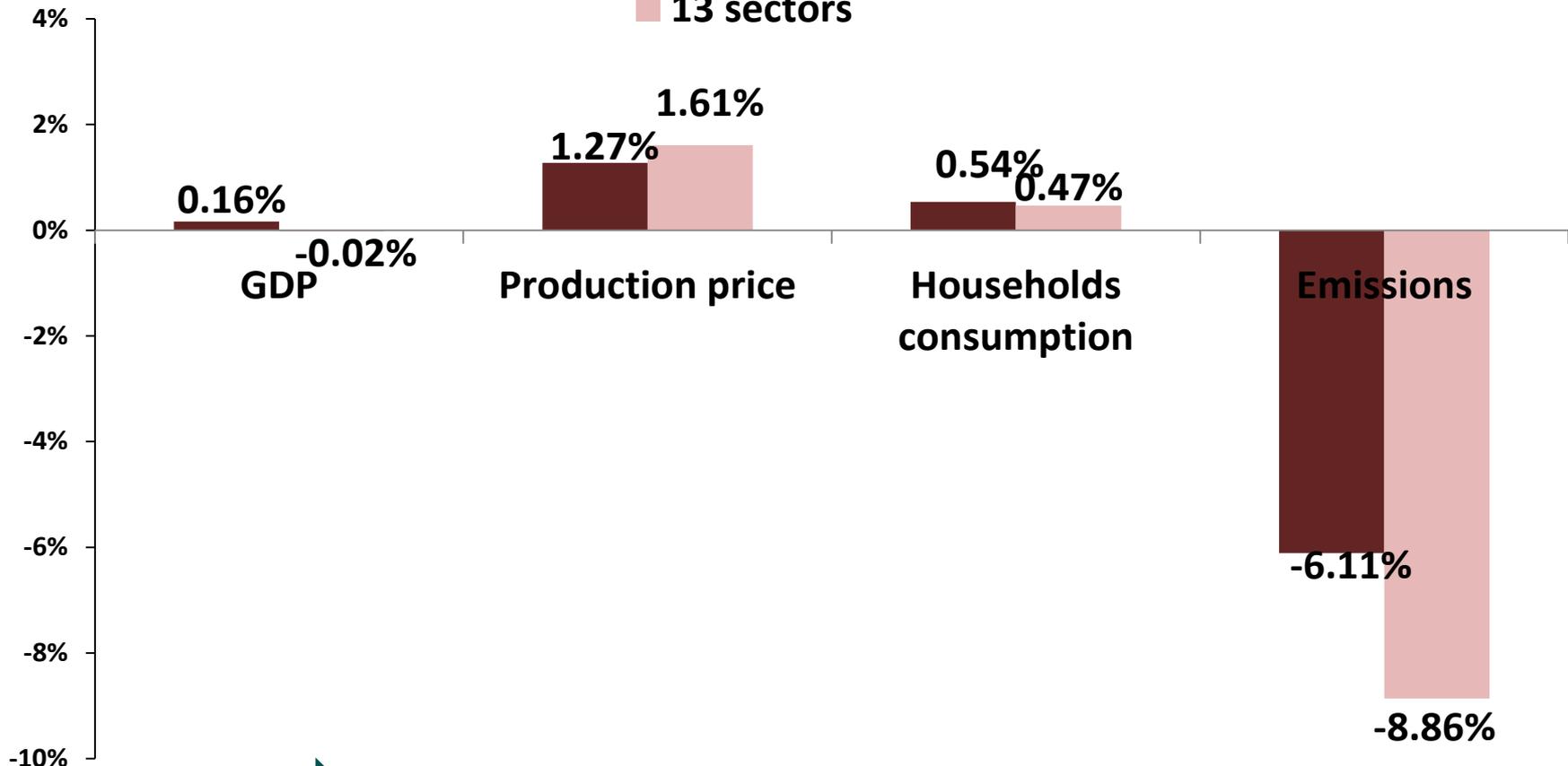


2th Obs .: impacts of a gain in sectoral granularity at calibration

100 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

IMACLIM calibrated: ■ 3 sectors (Final En, Prim. En., Compo)

■ 13 sectors



Quite insensitive but a homogeneous sectoral setting

1st step: integrating differentiated elasticities and compatible with IMACLIM

500 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

1^{era} attempt :

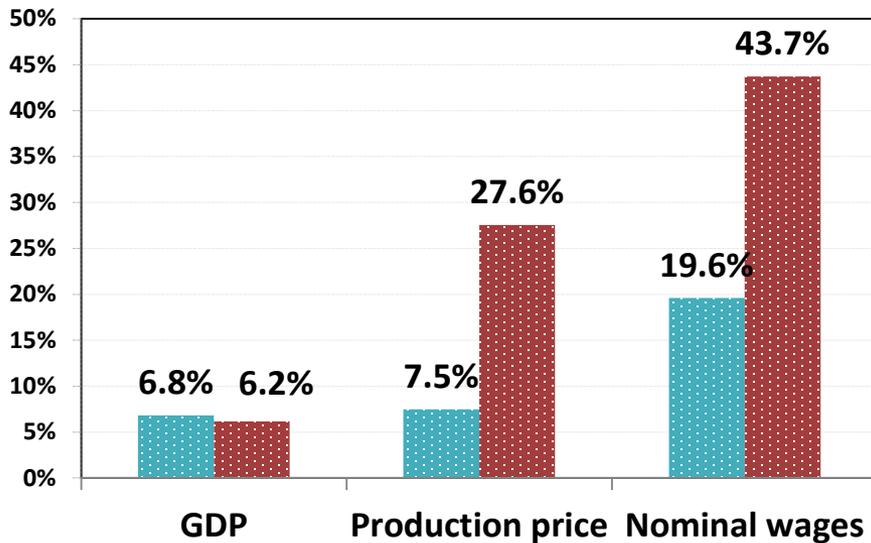
Aggregate elasticities of trade in value from the literature (Fouquin, 2001/Erkel, 2002) as a calibration constraint for sectoral elasticities

1st step: integrating differentiated elasticities and compatible with IMACLIM

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Wage indexation:

■ International price ■ Domestic price



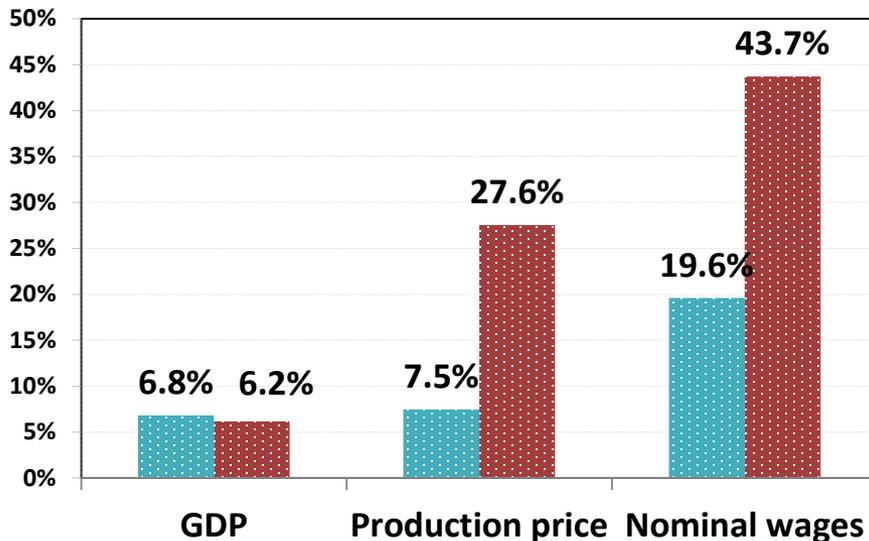
A paradox and an insured gain

1st step: integrating differentiated elasticities and compatible with IMACLIM

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A paradox and an insured gain

2th attempt :

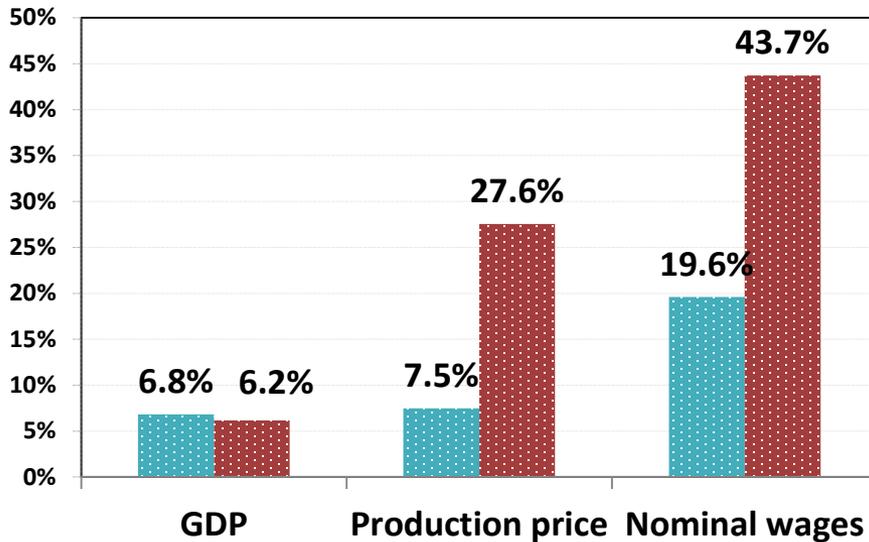
Elasticities reinterpreted as consistent volume with IMACLIM to way out of the 'econometric puzzle' (Fontagné, 2017)

1st step: integrating differentiated elasticities and compatible with IMACLIM

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Wage indexation:

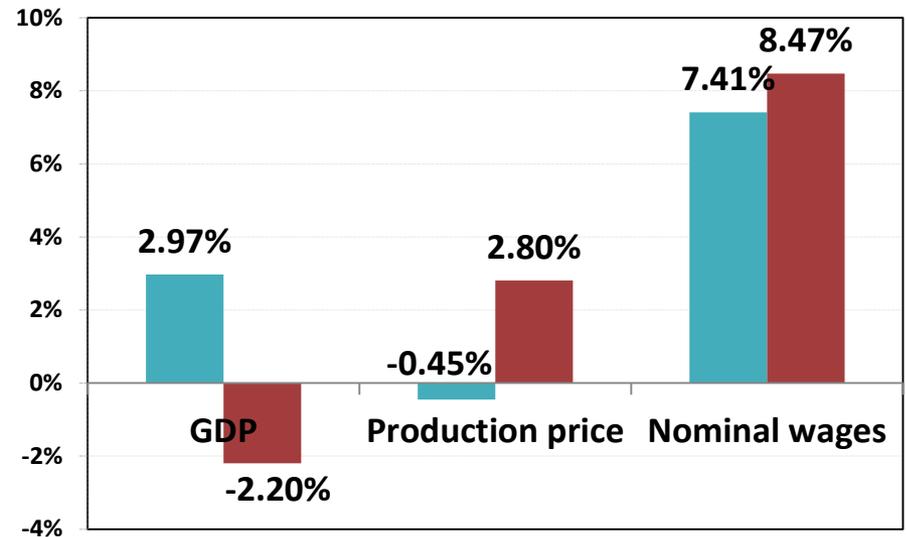
■ International price ■ Domestic price



A paradox and an insured gain

2th attempt :

Elasticities reinterpreted as consistent volume with IMACLIM to way out of the 'econometric puzzle '(Fontagné, 2017)



Wage indexation:

■ International price ■ Domestic price



Mechanisms retrieved

2nd step: differentiated wage curve indexation for sectors

500 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

Three levels of 'wage adjustment'

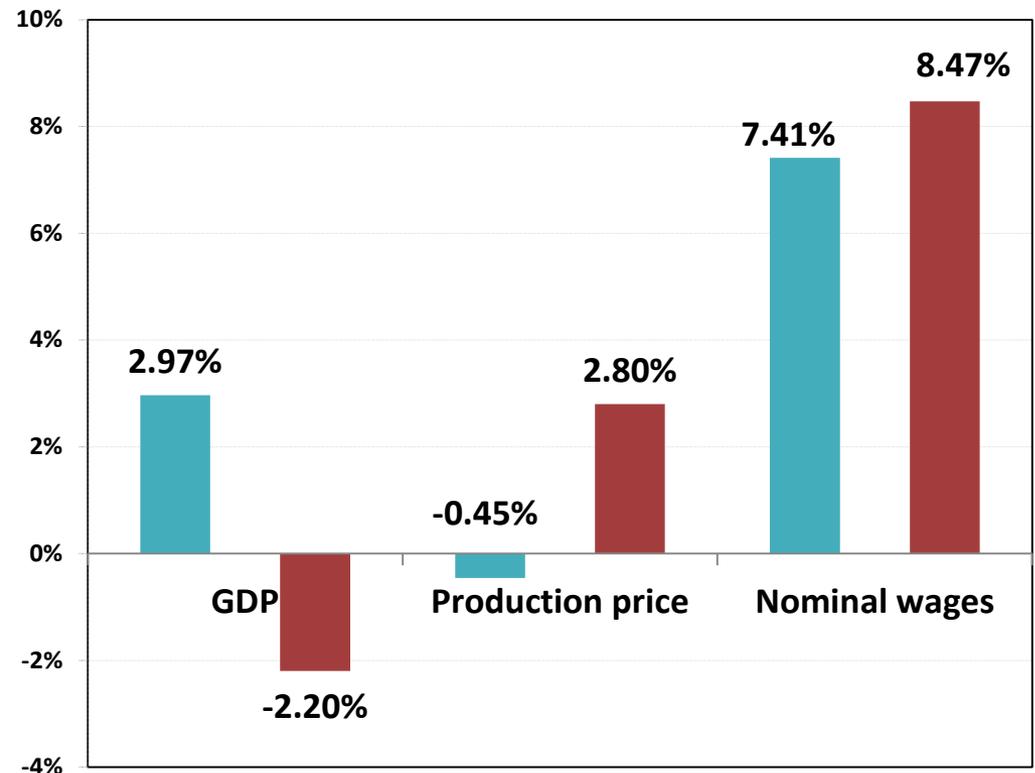
Definition sector by sector by:

- The intensity of international trade
- The degree of exposure jobs

Wage curve indexation:

■ International price

■ Domestic price



2nd step: differentiated wage curve indexation for sectors

500 €/ tCO₂ unilateral carbon tax recycled into reduction of labour costs

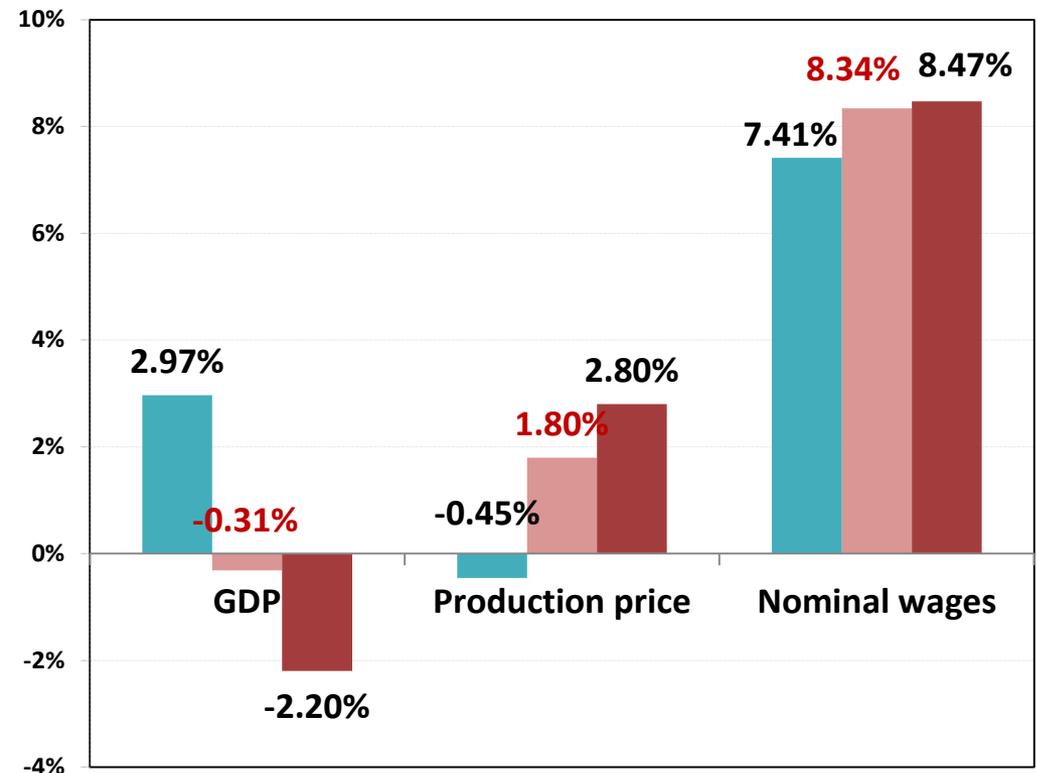
Three levels of 'wage adjustment'

Definition sector by sector by:

- The intensity of international trade
- The degree of exposure jobs

Wage curve indexation:

- International price
- Heterogeneous wages indexation assumed
- Domestic price



Conclusions and perspectives

- **Interest of hybridization for economic discussions:**
 - Gain in sectoral granularity
 - Understanding of economic mechanisms

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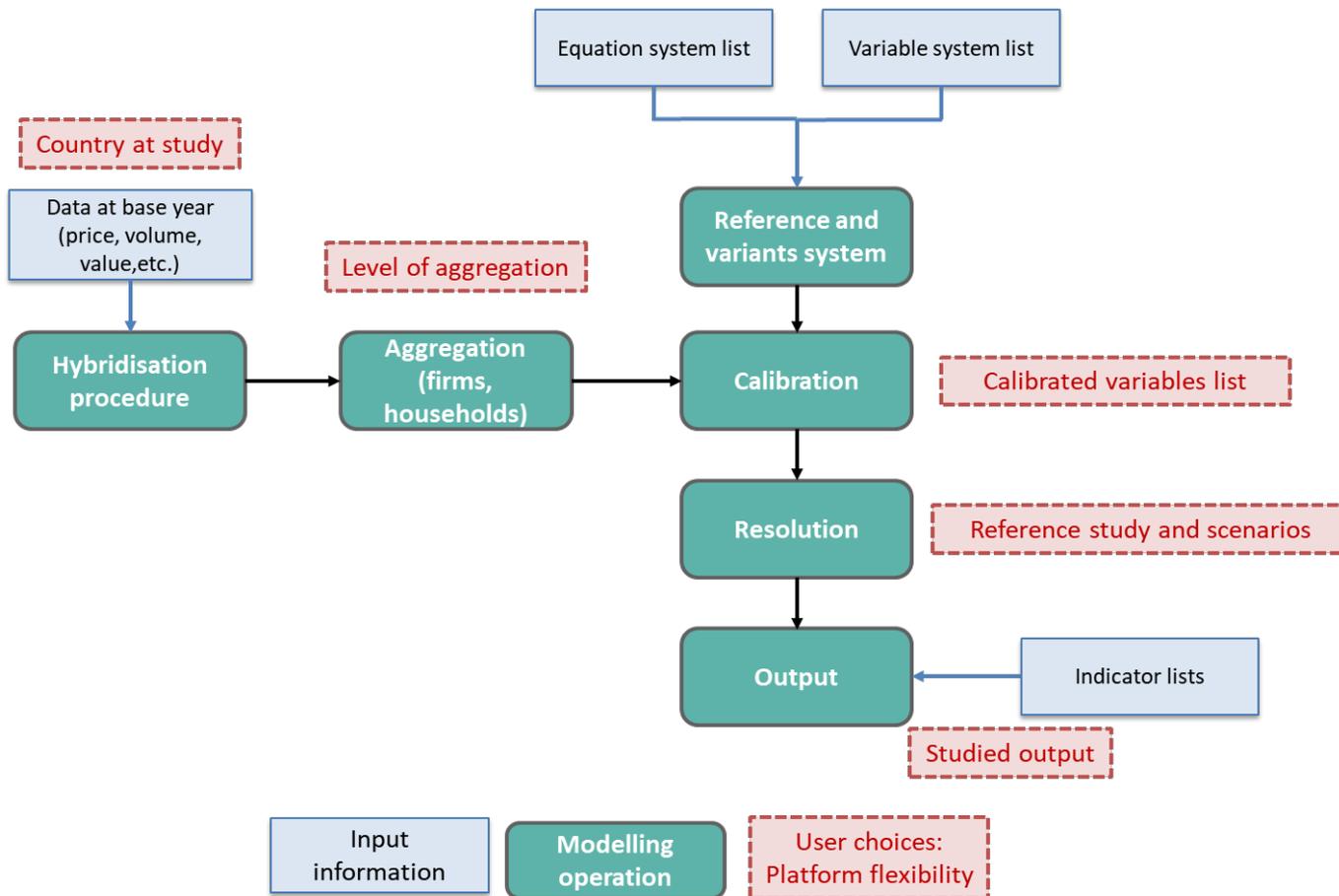
- **Understanding the interaction between wages and international trade**
 - Sectoral representation
 - Introduction of parameters to link dynamics and gather information

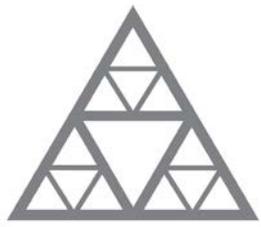
Conclusions and perspectives

- **Interest of hybridization for economic discussions:**
 - Gain in sectoral granularity
 - Understanding of economic mechanisms
- **Understanding the interaction between wages and international trade**
 - Sectoral representation
 - Introduction of parameters to link dynamics and gather information
- **Challenges around energy transition: a tool to feed the debate**
 - Investments and economic recovery
 - Developments of industries within international trade
 - A model used for the French climate-plan scenarios

Conclusions and perspectives

- **Extension of the IMACLIM-country platform**
 - New modelling capacities
 - Consistent inter-regional comparison





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Thank you for your attention

**Methodological Proposals for hybrid modeling:
implications for climate policy analysis in an open
economy (France)**

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