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C.I.R.E.D.

Hybrid Input-Output tables for CGE model calibration and consequences on energy policy analysis

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Why and how building hybrid Input-Output table

- The need of hybrid Input-Output table for :
  - Overcoming the limits of Bottom-Up and Top-Down approaches
  - Enriching the picture of the economy (material content)

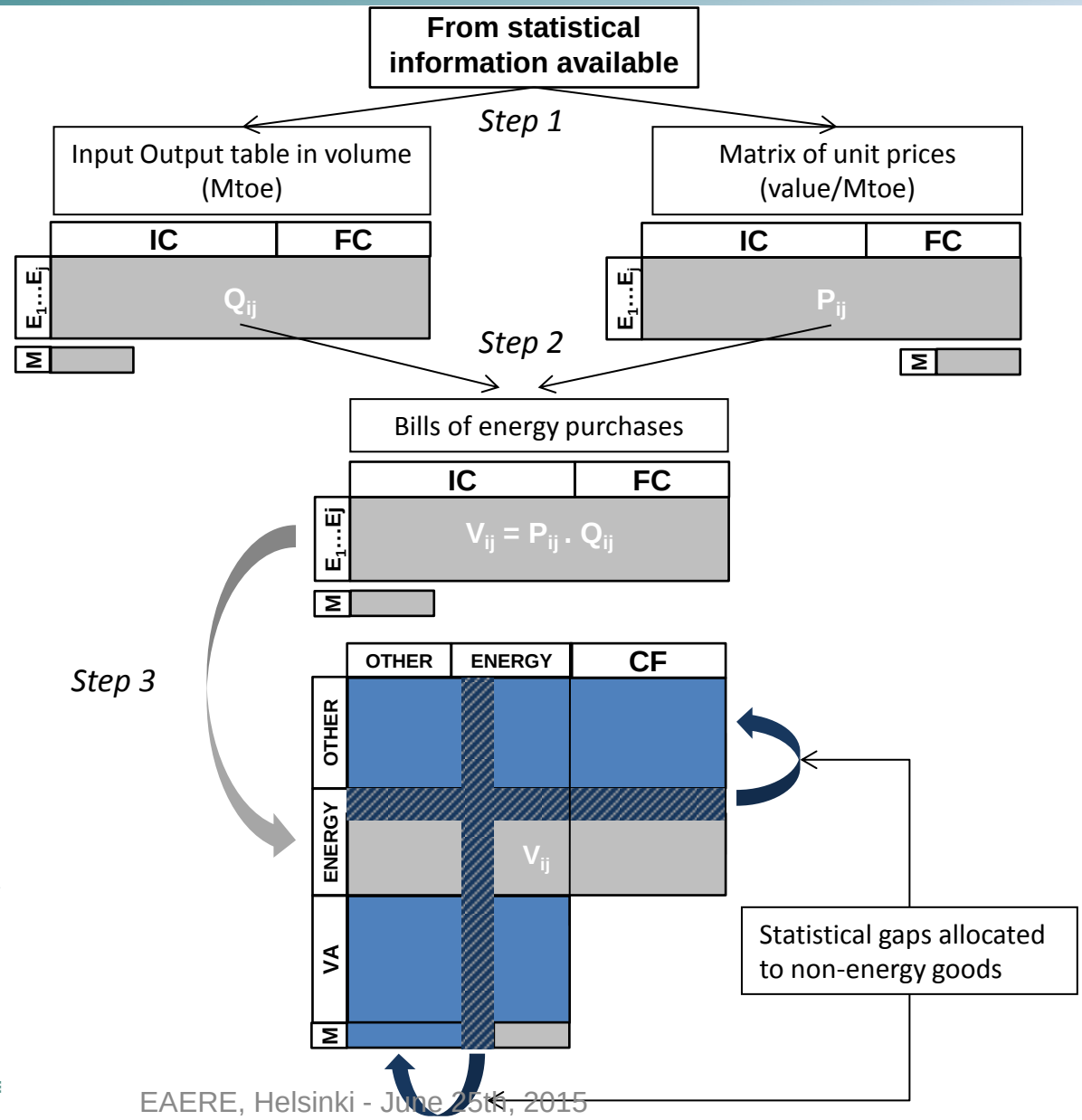
- Basic accounting principles for consistent dual systems
  - Physical and money descriptions must respect conservation principles **and** must be linked by a system of price

➡ Different procedures for bridging statistical gaps

Outlines

- An illustration of hybridization: procedure for IMACLIM
- Application on French data (2010)
- CGE model calibration: consequences for energy policy analysis
  - Calibration on IMACLIM hybrid matrices
  - “Standard” calibration on non-hybrid matrices

IMACLIM hybridization procedure



Two main rules:

- The total size of the economy is preserved
- Data on energy quantities and prices faced by economic agents are reintroduced

Input-Output tables - Aggregated results
France 2010

National accounts table

2010 - Million of euros	Intermediate consumption		Final consumption				Total uses
	Composite	Energy	HH Cons	Gov	Invest	Exports	
Composite	1 563 850	40 288	1 010 980	521 643	376 721	444 564	3 958 046
Energy	80 001	88 622	80 350	-	-	15 589	264 561
Labour net	732 458	8 010					4 222 607
Labour taxes	401 063	4 386					
Ouput taxes	55 339	1 967					
Operating surplus	522 131	16 061					
Total output	3 354 841	159 333					
Imports	448 519	64 145					
VAT	120 266	15 313					
Excise E IC	-	-					
Excise E FC	-	-					
Excise Oth.	34 420	25 770					
Total supply	3 958 046	264 561	4 222 607				

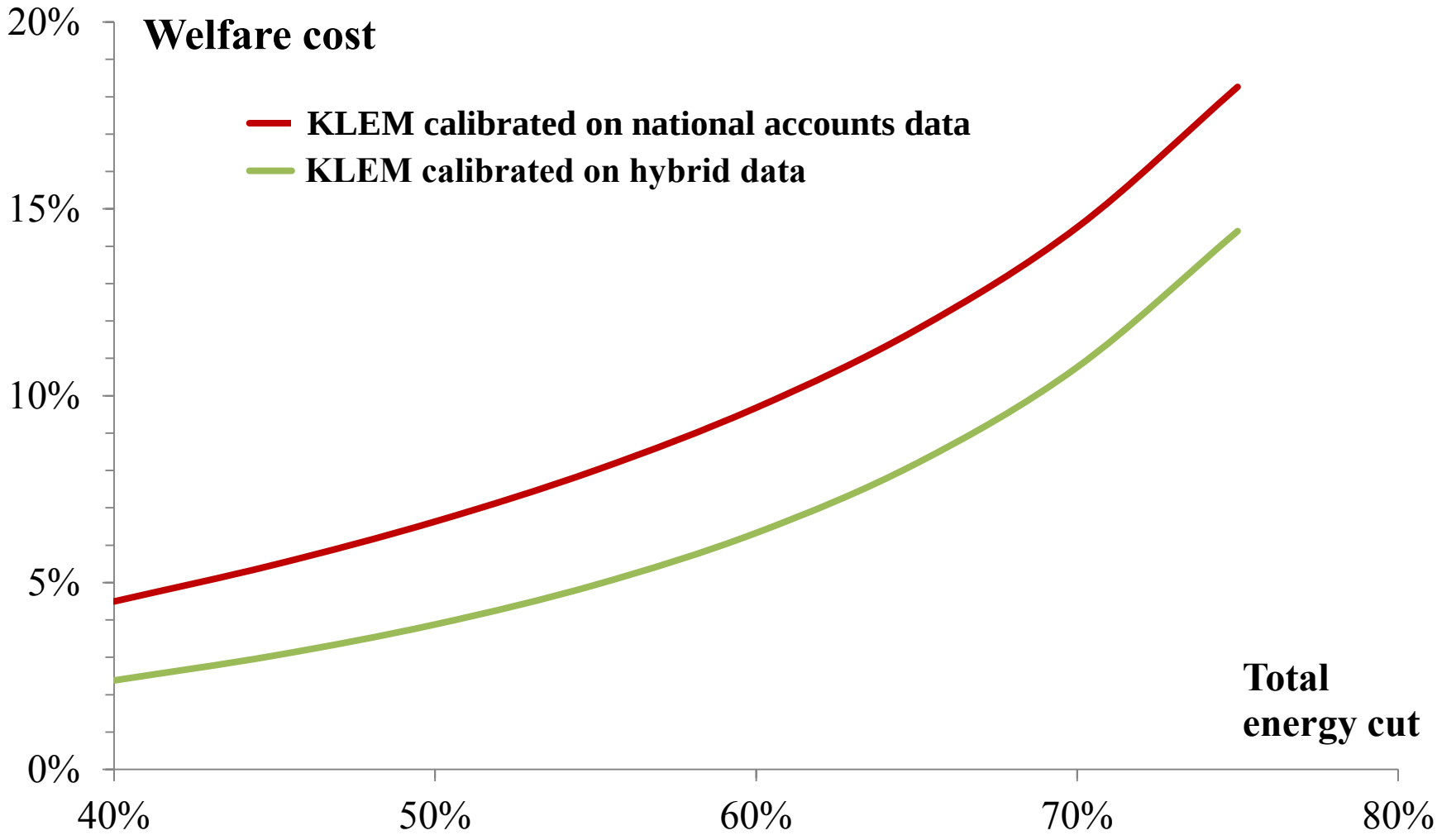
Hybrid table

2010 - Million of euros	Intermediate consumption		Final consumption				Total uses
	Composite	Energy	HH Cons	Gov	Invest	Exports	
Composite	1 651 628	27 516	1 019 041	521 643	376 721	443 497	4 040 047
Energy	59 387	34 229	72 289	-	-	16 656	182 561
Labour net	734 346	6 122					4 222 607
Labour taxes	402 097	3 352					
Ouput taxes	55 836	1 470					
Operating surplus	526 016	12 176					
Total ouput	3 429 310	84 865					
Imports	454 823	57 841					
p/cost marg compo	-	9 279					
p/cost marg Energy	-	-17 346					
p/cost marg HH cons	-	8 913					
p/cost marg Gov	-	-					
p/cost marg Invest	-	-					
p/cost marg Exports	-	-846					
VAT	120 847	14 732					
Excise E IC	-	7 199					
Excise E FC	-	16 378					
Excise Oth.	35 067	1 546					
Total supply	4 040 047	182 561	4 222 607				

	Energy share in uses	Energy share in HH consumption	Energy cost share in compo output
National Acc.	6.3%	7.4%	2.4%
Hybrid Acc.	4.3%	6.6%	1.7%

	Energy price for HH/composite ratio
National Acc.	1
Hybrid Acc.	2.0

Impacts on welfare of different levels of total energy cuts



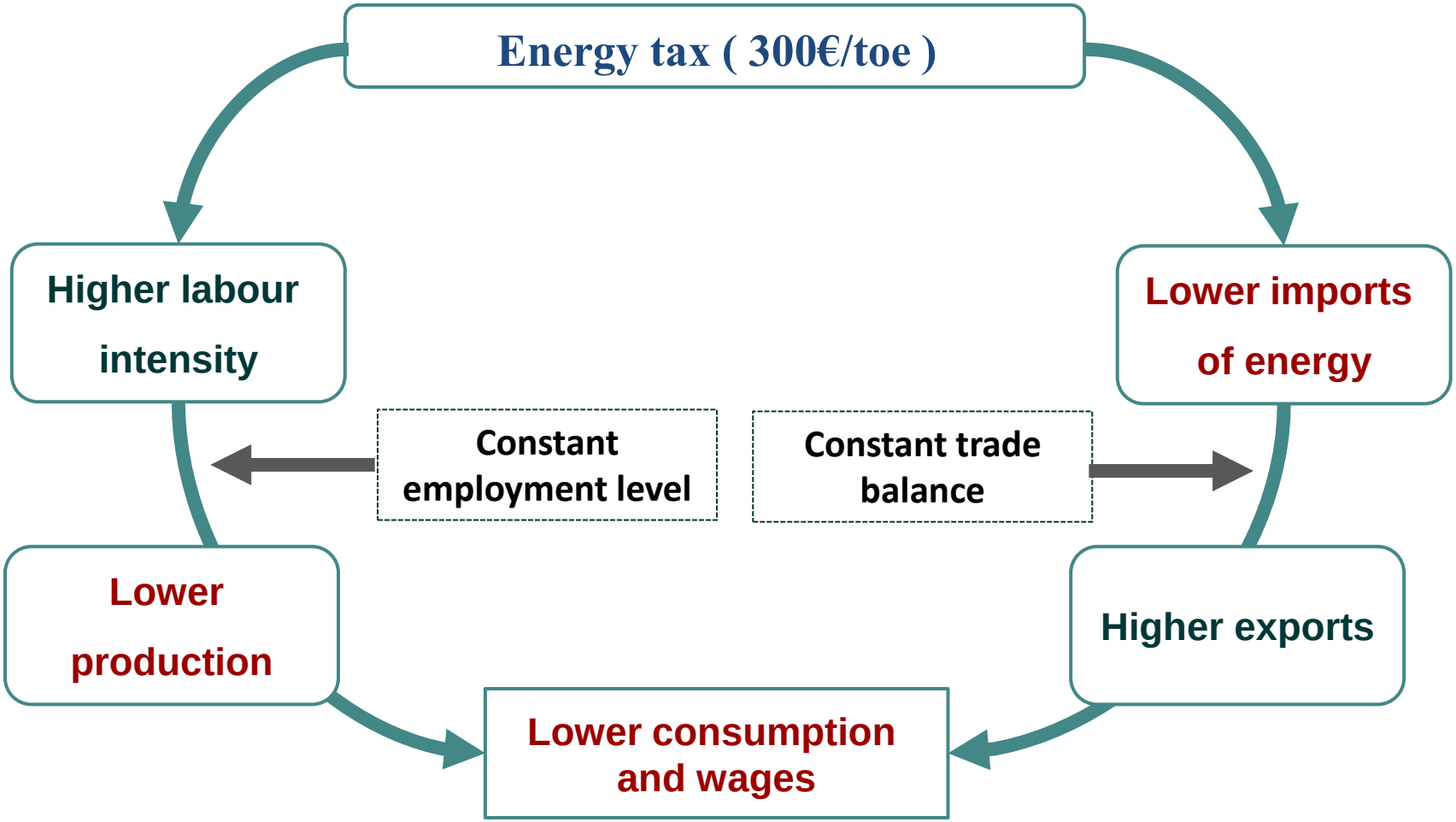
Comparative exercise with a mean same level of tax

- Some key results taxing all economic agents
  - Fixing tax at 300€/toe

Relative change on..	Variation	KLEM model calibrated on.. National accounts IOT
Final consumption	$\Delta C_{compo} / C_{compo}$	-0.8%
Nominal salary	$\Delta w_{compo} / w_{compo}$	-3.2%
Purchasing power of wages	$\Delta PP_{compo} / PP_{compo}$	-3.8%

Tax has less negative effect in hybrid case

A mechanisms of potential synergy



A key driver : production prices hybrid vs. national accounts

- Solving $\begin{cases} P_{comp} = f^1(P_{comp}, P_E + t) \\ P_E = f^2(P_{comp}, P_E + t) \end{cases} \Rightarrow {}^{\delta P_{comp}}/_{\delta t}$

- Impact of indirect effects (multiplier effects of IO analysis)
  - ↓ with energy cost share of inputs

$$Cost\ Share\ {}^{E}/_{Compo\ ,Hybrid} < Cost\ Share\ {}^{E}/_{Compo\ ,Nat.Acc}$$

$$\Rightarrow \frac{\delta P_{comp,Hybrid}}{\delta t} < \frac{\delta P_{comp,Nat.Acc}}{\delta t}$$

Gap : 17%

Tax has less effect on production price in hybrid case

Conclusions and perspectives

- Reconciliation of energy/macroeconomic data impacts :
  - Empirical description
  - Evaluation of energy policy

- Going further:
  - Comparison of existing hybrid methods (impacts on empirical features)
  - Impacts on results with different CGE behavioral assumptions

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Thank you for your attention

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