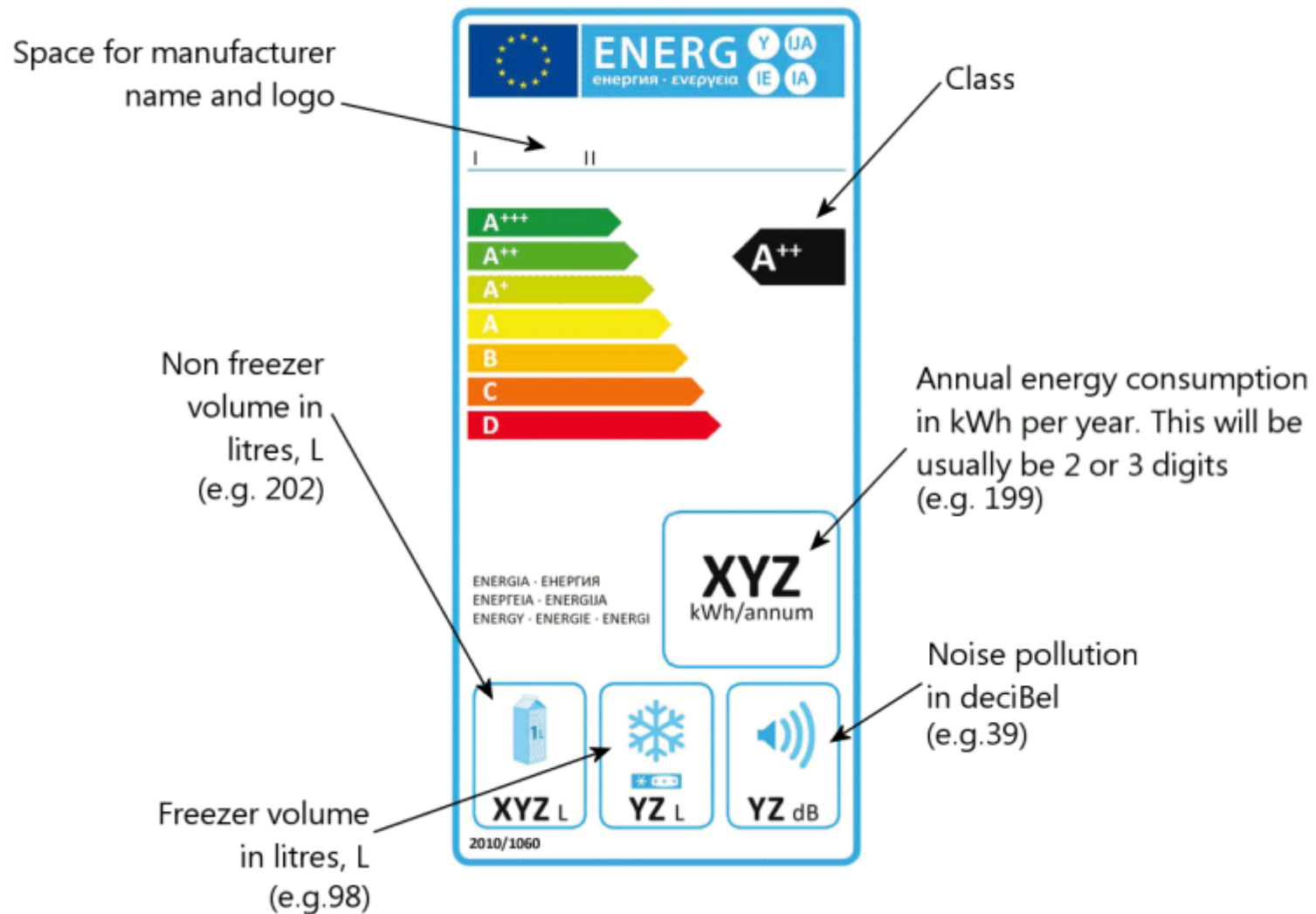


9th FIW-Research Conference 'International Economics'
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IMPORT DEMAND ELASTICITIES REVISITED

Julia Grübler (with Mahdi Ghodsi and Robert Stehrer)





Comparing diverse policies with each other and tariffs

$$\underbrace{\frac{\partial \ln(m_{ih})}{\partial Policy_{ih}^n}} = \underbrace{\frac{\partial \ln(m_{ih})}{\partial \ln(p_{ih})}} \times \underbrace{\frac{\partial \ln(p_{ih})}{\partial Policy_{ih}^n}} = \varepsilon_{ih} AVE_{ih}^n$$



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$$\underbrace{\frac{\partial \ln(m_{ih})}{\partial Policy_{ih}^n}}_1 = \underbrace{\frac{\partial \ln(m_{ih})}{\partial \ln(p_{ih})}} \times \underbrace{\frac{\partial \ln(p_{ih})}{\partial Policy_{ih}^n}} = \varepsilon_{ih} AVE_{ih}^n$$



Trade
responsiveness

'How do import quantities change, if a trade policy is applied?'



Comparing diverse policies with each other and tariffs

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'How do import quantities change, if a trade policy is applied?'



Import demand
elasticity

'How do import quantities change, if prices of imports increase?'



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1

Trade
responsiveness

‘How do import quantities change, if a trade policy is applied?’

2

Import demand
elasticity

‘How do import quantities change, if prices of imports increase?’

3

Ad-valorem
equivalents

‘Which change of import prices would have the same effect on imports as the trade policy?’



Comparing diverse policies with each other and tariffs

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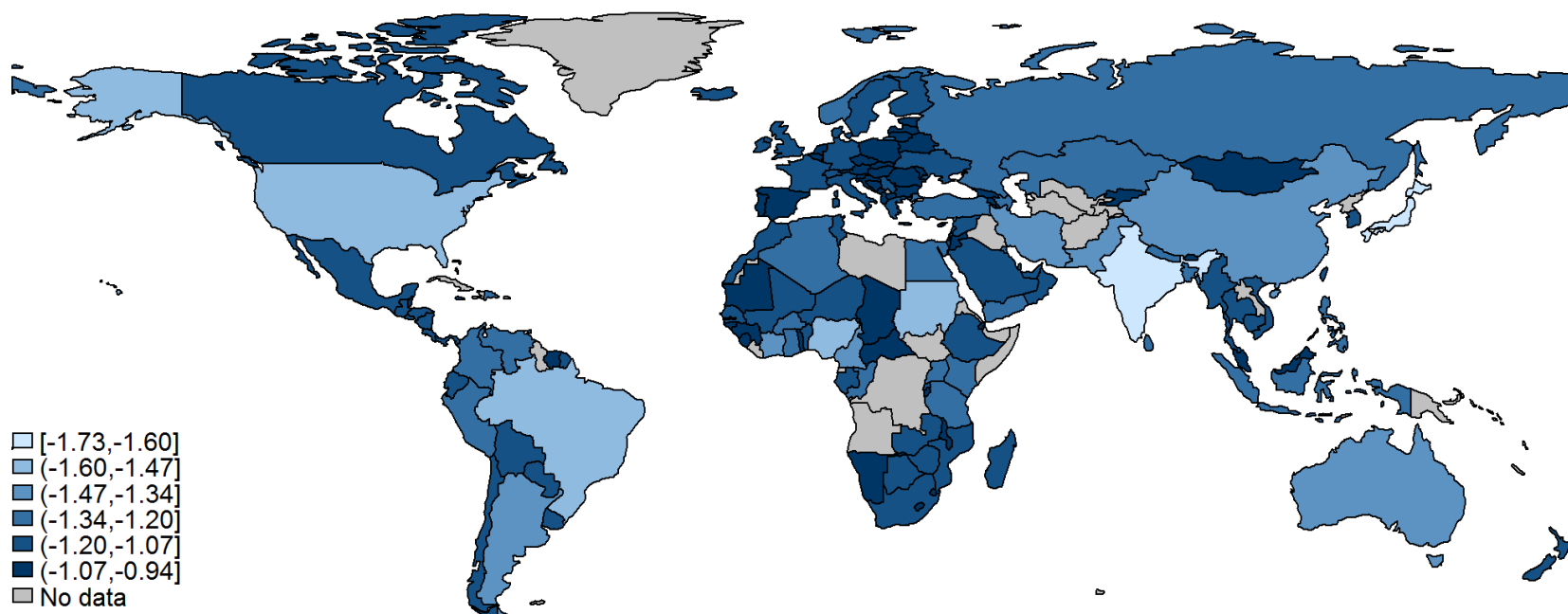


Ad-valorem
equivalents

‘Which change of import prices would have the same effect on imports as the trade policy?’

Results

- Import demand elasticity estimates for **167 countries**
- and **5,124 products** at the six-digit level of the Harmonised System
- **Most elastic:** South Asia & North America,
Least elastic: Sub-Saharan Africa & Europe



Note: Simple average binding elasticities per country



Results *by country characteristics*

	(1)	(2)	(3)
Product's share in GDP	5.685***	5.878***	4.615**
GDP	-4.42e-08***	-4.56e-08***	-4.61e-08***
(GDP) ²	2.21e-15***	2.28e-15***	2.32e-15***
GDP p.c.	0.00172***		
(GDP p.c.) ²	-0.0000267***		
HDI		0.418***	
(HDI) ²		-0.259***	
ECI			0.0377***
(ECI) ²			-0.0230***
Area	-6.60e-09***	-6.12e-09***	-6.63e-09***
Landlocked	0.0172***	0.0219***	0.0254***
Small Island Developing State	0.0408***	0.0379***	0.0178**
EU membership	0.0819***	0.0818***	0.0785***
Exports of fuels in % of GDP	-0.0281***	-0.0353***	-0.0167***
Constant	-1.164***	-1.316***	-1.159***
<i>Observations</i>	<i>442,281</i>	<i>431,369</i>	<i>343,471</i>
<i>R²</i>	<i>0.306</i>	<i>0.308</i>	<i>0.317</i>
<i>Product fixed effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>



Results by country characteristics: decreasing elasticity (+)

	(1)	(2)	(3)
Product's share in GDP	5.685***	5.878***	4.615**
GDP	-4.42e-08***	-4.56e-08***	-4.61e-08***
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Observations	442,281	431,369	343,471
R ²	0.306	0.308	0.317
Product fixed effects	Yes	Yes	Yes



Results by country characteristics: increasing elasticity (-)

	(1)	(2)	(3)
Product's share in GDP	5.685***	5.878***	4.615**
GDP	-4.42e-08***	-4.56e-08***	-4.61e-08***
(GDP) ²	2.21e-15***	2.28e-15***	2.32e-15***
GDP p.c.	0.00172***		
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Observations	442,281	431,369	343,471
R ²	0.306	0.308	0.317
Product fixed effects	Yes	Yes	Yes

Results *by product characteristics*

	(1)	(2)	(3)
Product's share in GDP	0.957	1.360	-0.265
Sector dummy (1 = agri-food)	-0.0677***	-0.0837***	-0.0870***
Number of exporters per product	0.00260***	0.00251***	0.00228***
Number of importers per product	0.00460***	0.00455***	0.00519***
Low-tech	-0.0582***	-0.0897***	0
Medium-low-tech	0.00647	-0.0236***	0.0471***
Medium-high-tech	0.0461***	0.0110	0.0850***
High-tech	0.225***	0.190***	0.270***
Final consumption good	-0.0951***	-0.0953***	-0.119***
Intermediate good	-0.149***	-0.150***	-0.144***
Constant	-1.872***	-1.822***	-1.974***
<i>Observations</i>	<i>447,259</i>	<i>443,596</i>	<i>412,607</i>
<i>R²</i>	<i>0.044</i>	<i>0.043</i>	<i>0.046</i>
<i>Importer fixed effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Fuels excluded</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
<i>Baseline technology</i>	<i>non-classified</i>	<i>non-classified</i>	<i>low</i>

Results by product characteristics: decreasing elasticity (+)

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Baseline technology	non-classified	non-classified	low

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Importer fixed effects	Yes	Yes	Yes
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Theoretical Framework I

a GDP function approach

- 1 Optimal **net** output vector q^t :

$$G^t(p^t, v^t) \equiv \max_{q^t} \{p^t q^t : (p^t, v^t)\}$$

with v^t denoting factor endowments

with $q^t > 0$ denoting output, incl. exports,

$q^t < 0$ denoting inputs, **incl. imports**

- 2 GDP maximising **import** demand function:

$$\frac{\partial G^t(p^t, v^t)}{\partial p_n^t} = q_n^t(p^t, v^t), \forall n = 1, \dots, N$$



Theoretical Framework II

a flexible translog GDP function approach

3 Translog GDP function:

$$\begin{aligned} \ln G^t(p^t, v^t) = & a_{00}^t + \sum_{n=1}^N a_{nn}^t \ln p_n^t + \frac{1}{2} \sum_{n=1}^N \sum_{k=1}^N a_{nk}^t \ln p_n^t \ln p_k^t \\ & + \sum_{m=1}^M b_{mm}^t \ln v_m^t + \frac{1}{2} \sum_{m=1}^M \sum_{l=1}^M b_{ml}^t \ln v_m^t \ln v_l^t + \sum_{n=1}^N \sum_{m=1}^M c_{nm}^t \ln p_n^t \ln v_m^t \end{aligned}$$

Equilibrium share of imported good in in GDP:

$$4 \quad \frac{\partial \ln G^t}{\partial \ln p_n^t} = \frac{1}{G_n^t(p^t, v^t)} q_n^t(p^t, v^t) p_n^t \equiv s_n^t(p^t, v^t)$$

$$5 \quad s_n^t(p^t, v^t) = a_{0n}^t + a_{nn}^t \ln p_n^t + \sum_{k \neq n}^N a_{nk}^t \ln p_k^t + \sum_{m=1}^M c_{nm}^t \ln v_m^t, \quad \forall n = 1, \dots, N$$



Theoretical Framework III

a flexible translog GDP function approach

6 Change of a good's share in GDP w.r.t. prices:

$$\frac{\partial s_n^t}{\partial p_n^t} = \underbrace{\frac{q_n^t}{G^t} + p_n^t \frac{\frac{\partial q_n^t}{\partial p_n^t}}{G^t} - \frac{q_n^t p_n^t}{(G^t)^2} \frac{\partial G^t}{\partial p_n^t}}_{\text{see eq.(4)}} = \underbrace{a_{nn}^t}_{\text{see eq.(5)}} \frac{1}{p_n^t}$$

7 After rearranging terms:

$$\varepsilon_{nn}^t \equiv \frac{\partial q_n^t(p^t, v^t)}{\partial p_n^t} \frac{p_n^t}{q_n^t} = \frac{a_{nn}^t}{s_n^t} + s_n^t - 1 \leq 0, \forall s_n^t < 0$$

8 How price elastic is import demand of good n ?

$$\varepsilon_{nn}^t \begin{cases} [-100; -1) \text{ if } a_{nn}^t > 0 \\ -1 \text{ if } a_{nn}^t = 0 \\ (-1; 0] \text{ if } a_{nn}^t < 0 \end{cases}$$

Remember: $q^t < 0$
denotes inputs,
incl. imports



Theoretical Framework **empirically**: a **semi**-flexible translog GDP function approach

9 Estimated share equation:

$$s_n^t(p^t, v^t) = a_{0n} + a_{nn} \ln \frac{p_n^t}{p_k^t} + \sum_{m=1, m \neq l}^M c_{nm} \ln \frac{v_m^t}{v_l^t}, \forall n = 1, \dots, N.$$

$$10 \quad \hat{\varepsilon}_{nni} \equiv \frac{\partial q_n^t(p^t, v^t)}{\partial p_n^t} \frac{p_n^t}{q_n^t} = \frac{\widehat{a_{nn}}}{\overline{s_{ni}}} + \overline{s_{ni}} - 1.$$

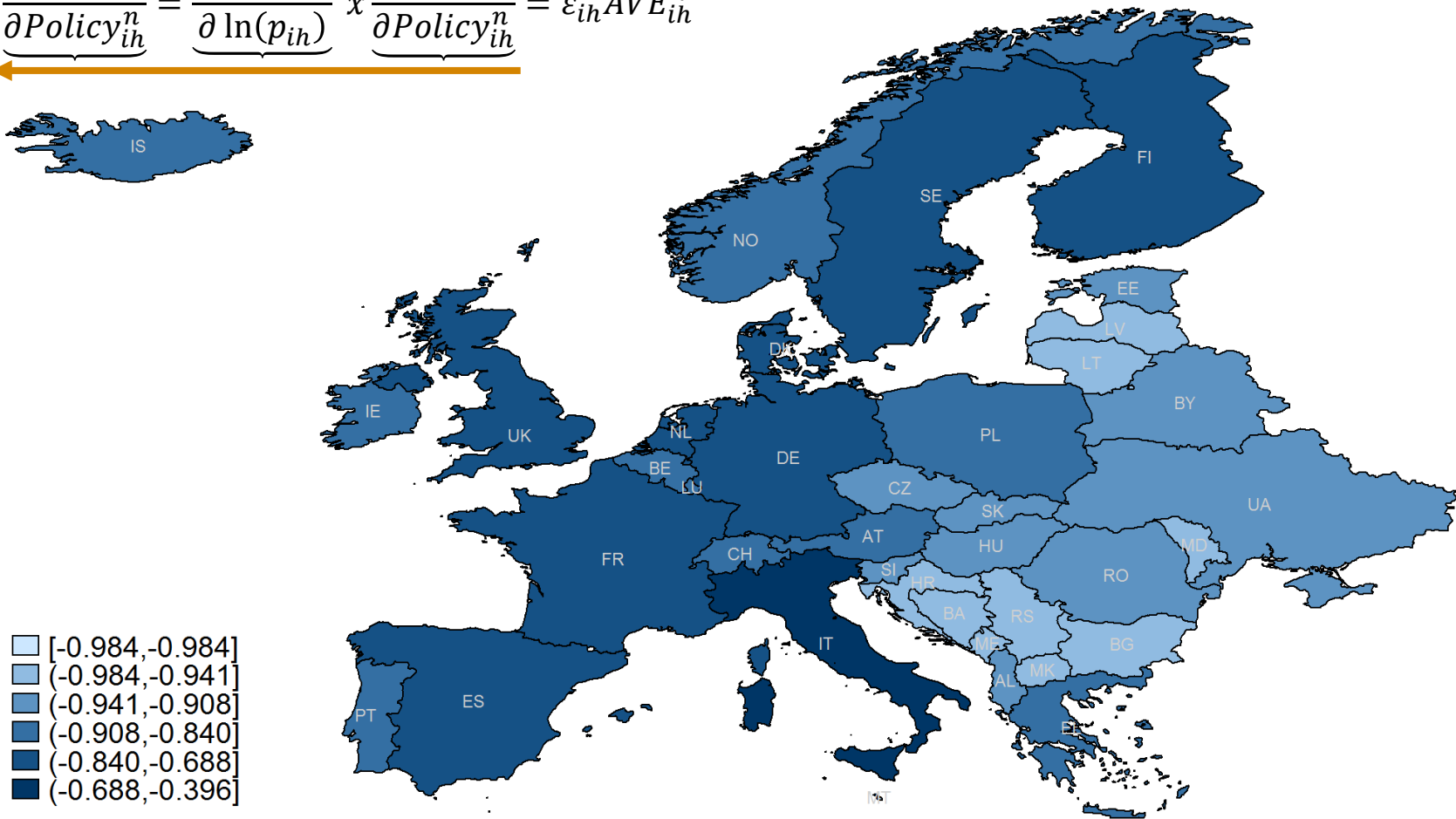
➔ Import demand elasticities can be estimated with data on

- (i) importer-specific product shares in GDP,
- (ii) the GDP deflator,
- (iii) unit values, and
- (iv) information on factor endowments



Import demand elasticities in Europe: for refrigerators

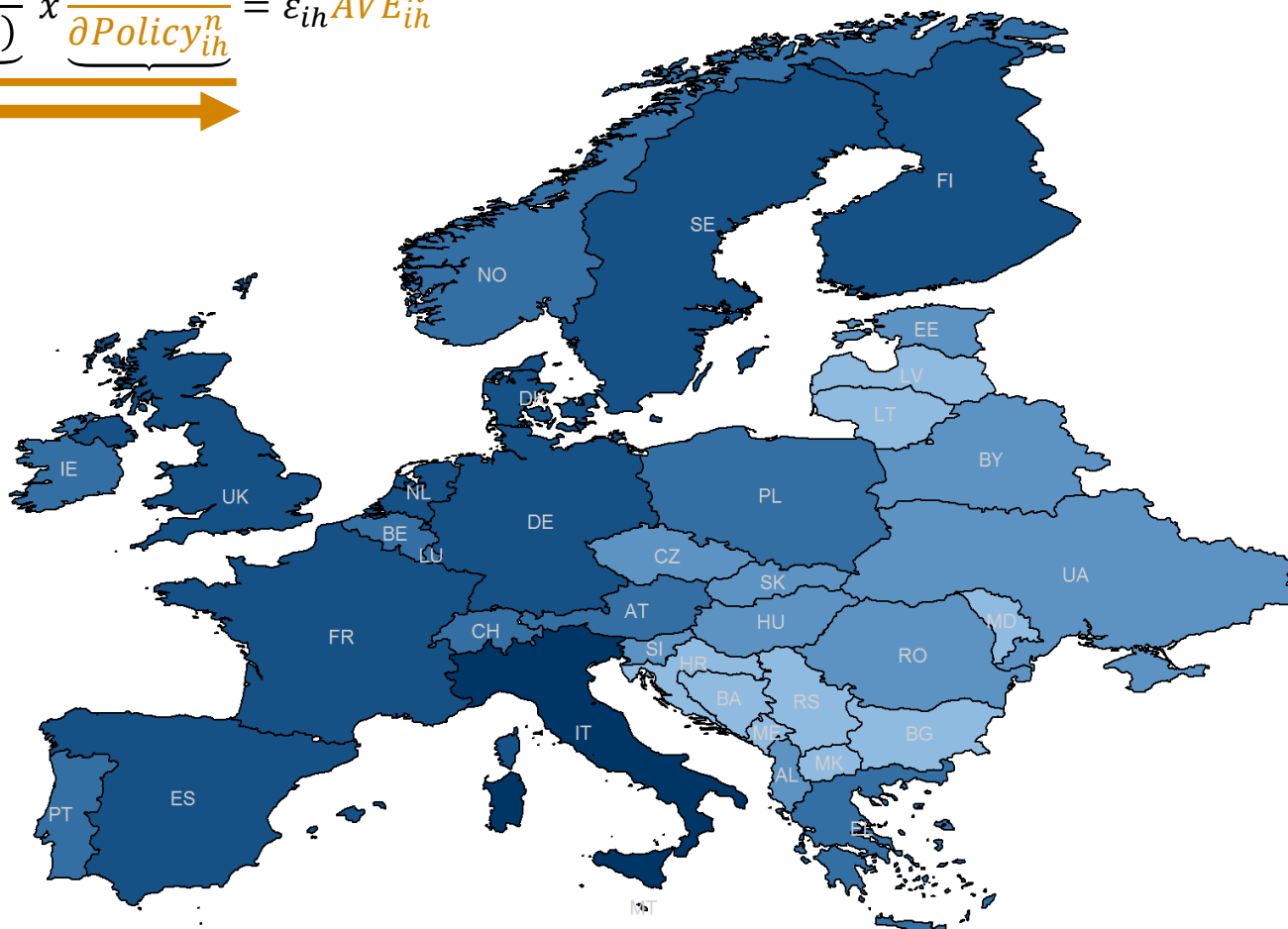
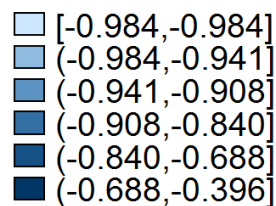
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Note: HS-code 841850 Furniture incorporating refrigerating or freezing equipment; for storage and display (chests, cabinets, display counters, show-cases and the like)

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Key References

- Presentation based on:
Ghodsi, M., J. Grübler and R. Stehrer (2016). 'Import demand elasticities revisited', wiiw Working Paper, No. 132, November.
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