

# Green Exports and the Global Product Space

## Prospects for EU Industrial Policy

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# The green return of industrial policy

“Green growth” via RES-E investment has become a popular policy goal

- ▶ Secure energy supplies
- ▶ Reduce emissions
- ▶ *Promote and protect economic competitiveness*

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- ▶ *Promote and protect economic competitiveness*

The EU has explicitly invoked *competitiveness* as justification for the 20% RES-E target

- ▶ 3rd Climate and Energy Package (Dec. 2008)
- ▶ Commissioner Öttinger, November 2010
- ▶ Commissioner Hedegaard, 13 January 2011

## Will it work? RES-E as “infant industry”

### Could RES-E targets support comparative advantage in “green goods”?

Three assumptions to test:

1. State aid will drive market growth
2. Market growth will support “infant industries”
3. States will respond equally despite different starting conditions

## Will it work? RES-E as “infant industry”

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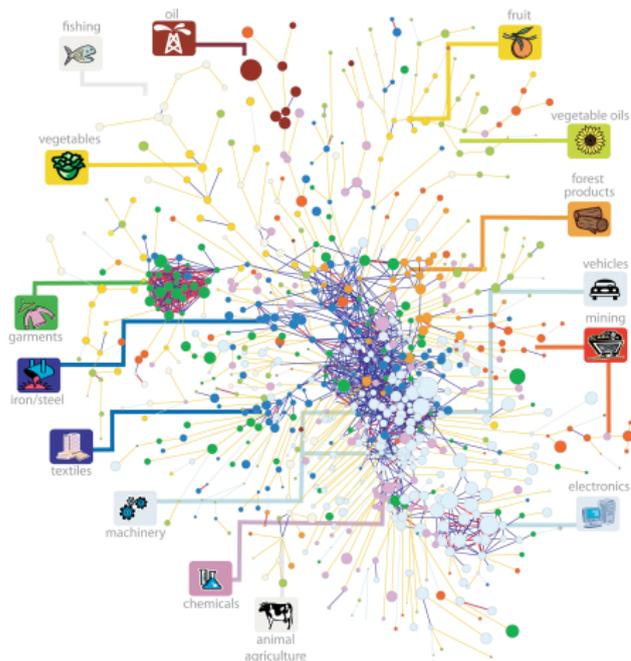
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### Core hypothesis:

*RES-E market expansion reinforces pre-existing industrial capability but does a poor job of creating it from scratch.*

# Design: exploit the global product space to condition on latent national advantage



## KEY

Link Color  
(greenery)

φ > 0.65

φ > 0.55

φ > 0.4

φ < 0.4

Node Size  
(millions of dollars)

0.2 0.4 0.6 0.8 1.0 2000

Node Color  
(Lerner Classification)

Petroleum

Raw Materials

Forest Products

Tropical Agriculture

Animal Agriculture

Cereals

Labor Intensive

Capital Intensive

Machinery

Chemicals

## Research questions:

- ▶ Where do “green goods” sit in the global product space (Hidalgo et al 2007, Hidalgo & Hausmann 2009)
- ▶ Does RES-E adoption improve “green” competitiveness net of a country’s place in the product space?

# The global product space

The global product space is simply a proximity matrix based on *RCA*:

$$RCA_{c,i} = \frac{\frac{x(c,i)}{\sum_i x(c,i)}}{\frac{\sum_c x(c,i)}{\sum_{c,i} x(c,i)}} \quad (1)$$

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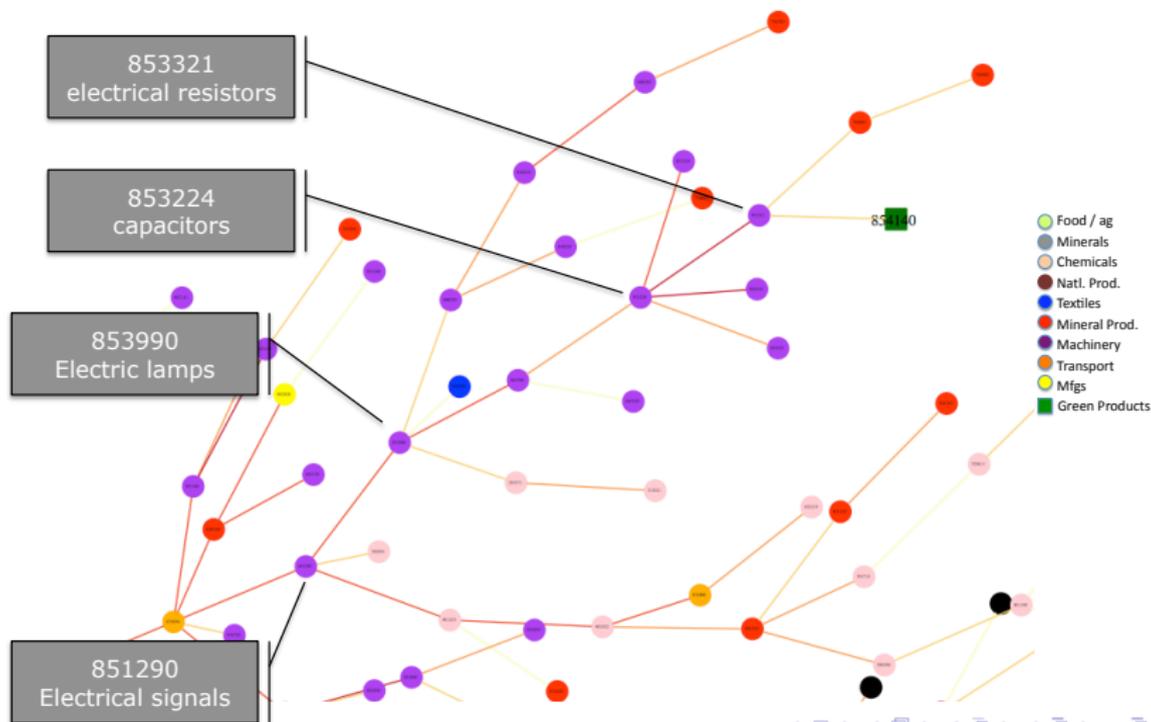
Given  $RCA_{c,i}$ , the proximity matrix becomes:

$$prox_{i,j} = \min(p(x_j|x_i), p(x_i|x_j)) \quad (2)$$

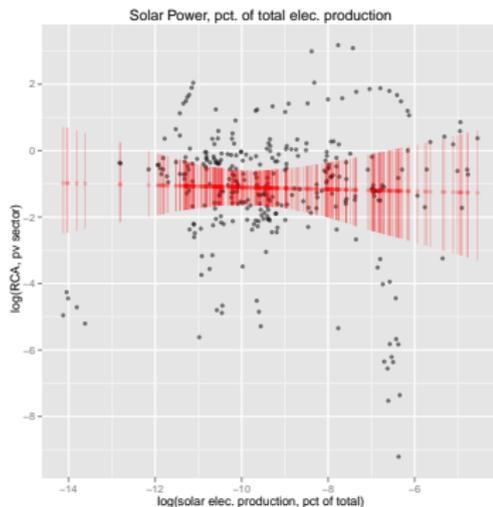
$$p(x_j|x_i) = \frac{\sum_c RCA_{c,j} > 1 | RCA_{c,i} > 1}{\sum_c RCA_{c,i} > 1} \quad (3)$$

I.e., the pairwise conditional probability of export of goods  $i$  and  $j$

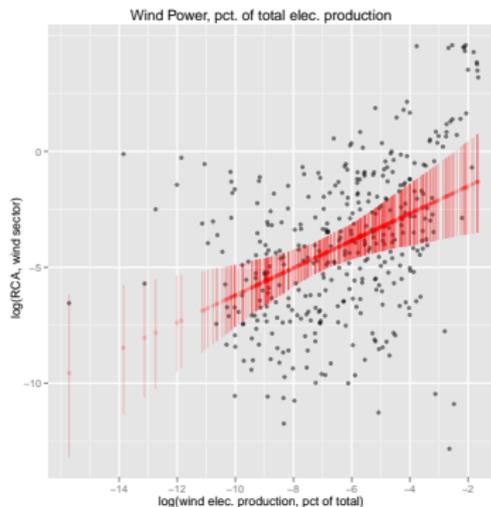
# The local solar cell space (HS-6 854140)



# Does market size drive competitiveness?



(a) PV



(b) Wind turbines

Figure:  $\log(RCA)$  vs.  $\log(\text{market size})$ , 1996-2008

## Do “supporting sectors” matter?

Want to know if this effect holds net of:

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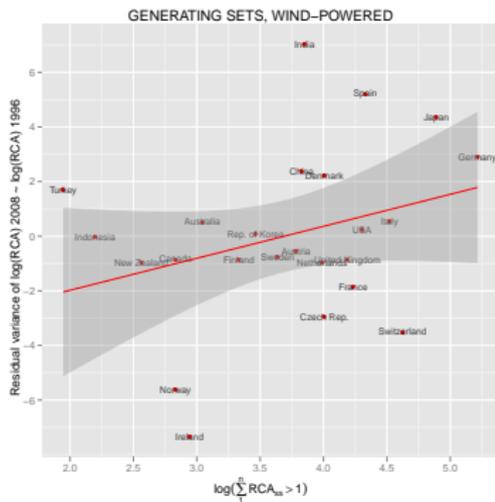
- ▶ Historical strength in “green” sectors
- ▶ Strength in “supporting” sectors in the product space

### What’s a supporting sector:

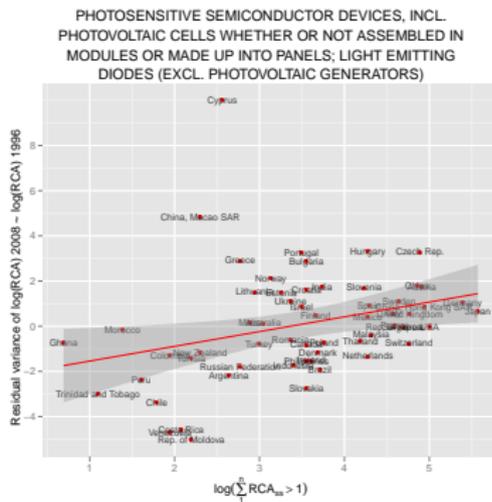
For all products  $i$  with proximity  $p \geq p^*$  to a good  $j$ :

$$SS_{c,j} = \sum_c RCA_{c,i} > 1$$

# Controlling for historic competitiveness



(a) Wind Turbines



(b) PV cells

Figure: Supporting sector influence on residual competitiveness

## Synthesis: multivariate regression

Logit of the form:

$$RCA_{green,c,2008} = RCA_{green,c,1996} + SS_{green,c,1996} + MktSize_{green,c,2008}$$

Where  $RCA_{green,*}$  is of the form ? ( $RCA_{green,*} > 1$ )

## Multivariate results

	Estimate	Std. Error	z value	p-value	Sig. level
Intercept	-5.33	1.36	-3.93	0.00	99.9%
$RCA_{wind,1996}$	10.33	3956.18	0.00	1.00	
$SS_{wind,1996}$	0.04	0.02	2.37	0.02	95.0%
<b><math>MktSize</math></b>	<b>54.14</b>	<b>20.29</b>	<b>2.67</b>	<b>0.01</b>	<b>99.0%</b>

Table: Wind turbines

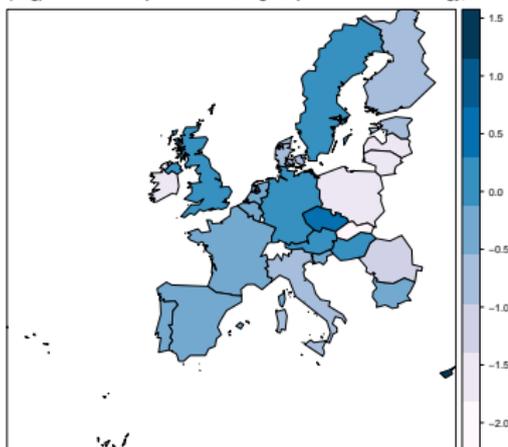
	Estimate	Std. Error	z value	p-value	Sig. level
Intercept	-3.26	0.61	-5.36	0.00	99.9%
$RCA_{solar,1996}$	-0.98	1.10	-0.89	0.37	
$SS_{solar,1996}$	0.03	0.01	3.70	0.00	99.9%
<b><math>MktSize</math></b>	<b>-244.50</b>	<b>376.10</b>	<b>-0.65</b>	<b>0.52</b>	

Table: PV

## Why the difference? A speculative hypothesis

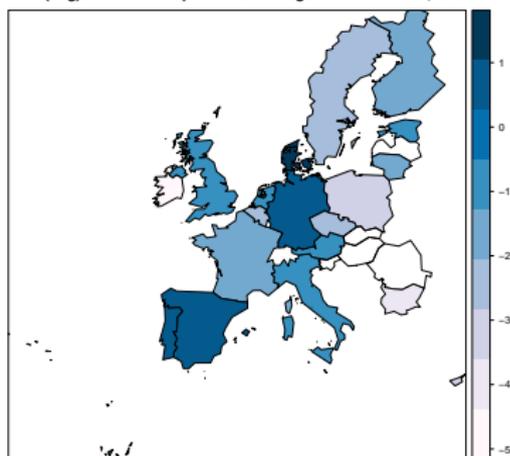
*Market expansion buys domestic turbines but foreign solar cells?*

(Log) Revealed comparative advantage in photovoltaic technology, 2008



(a) RCA, PV

(Log) Revealed comparative advantage in wind turbines, 2008



(b) RCA, Wind Turbines

# Conclusions

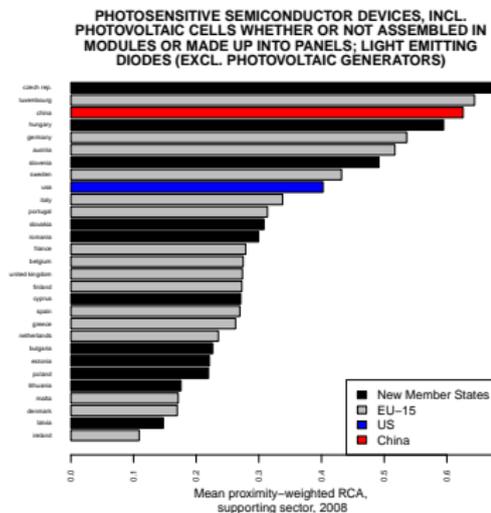
- ▶ There is no such thing as a “green sector”
- ▶ RES-E investment can work to promote export competitiveness in RES-E goods
- ▶ But it heavily on whether a country already has the existing industrial infrastructure and skills
- ▶ And on the character of the goods in question

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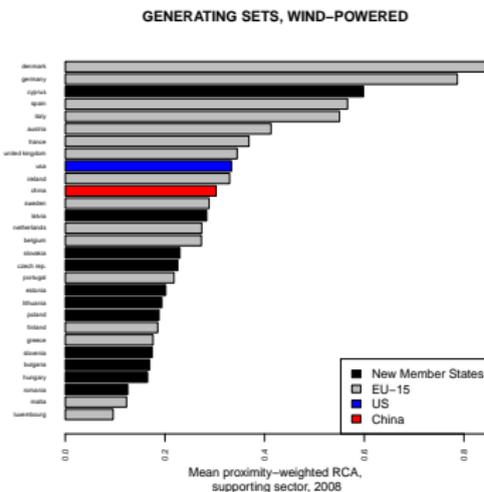
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Nothing here treats the question of whether RES-E programs are “efficient” compared with other incentives for adoption of lower-emissions energy

# Supporting sector strength by country



(c) PV



(d) Wind Turbines