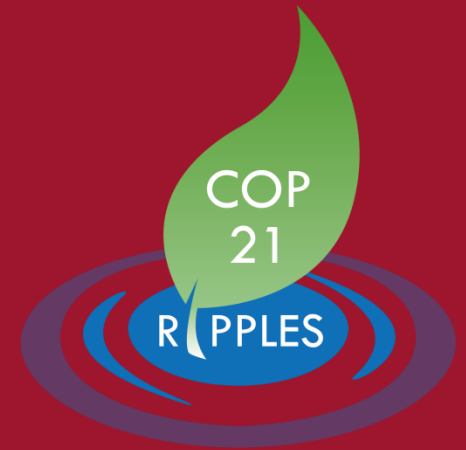




This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730427



# Innovation and comparative advantage in low carbon technologies



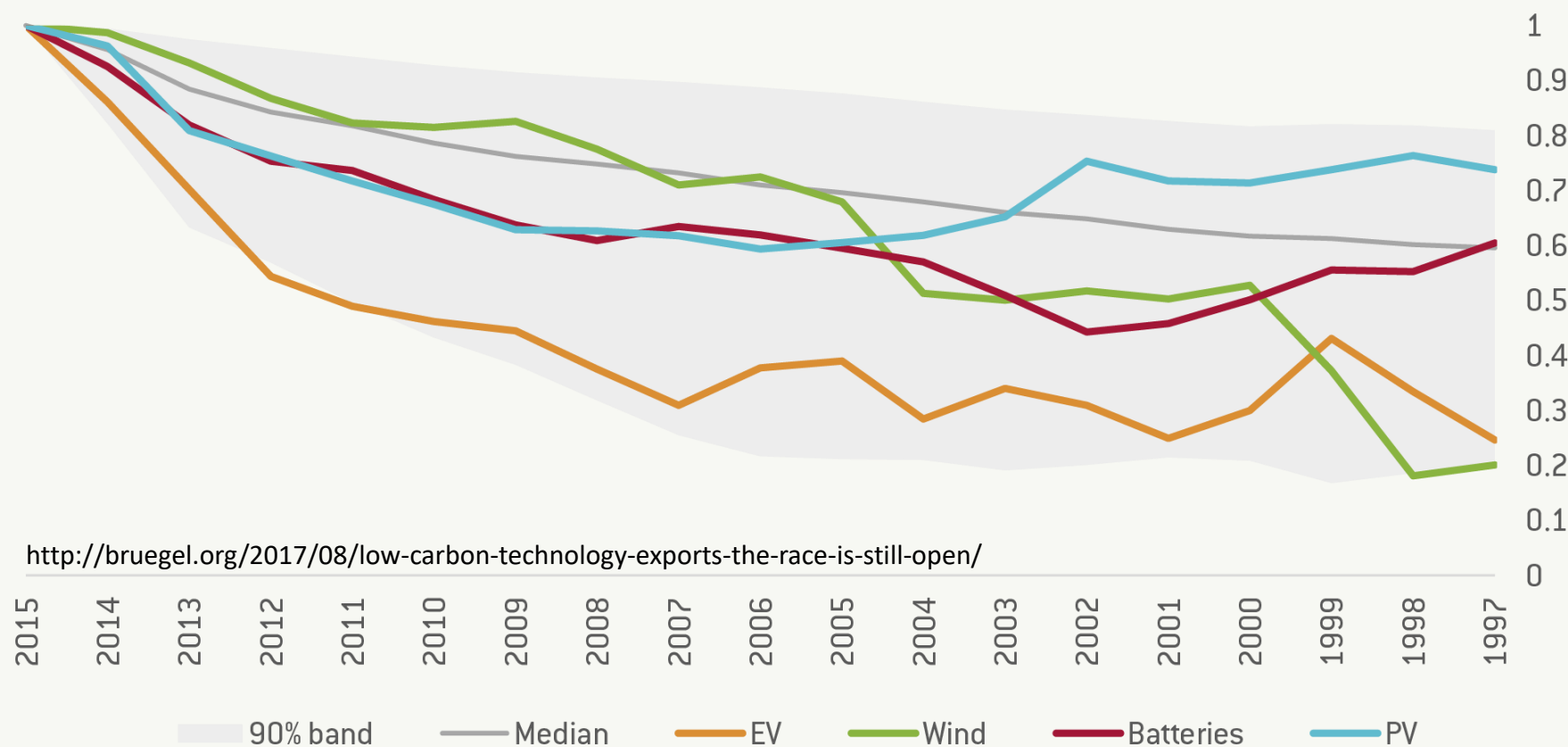
Georg Zachmann

# Motivation

- Development of low-carbon technologies is crucial
- Countries motivated to support innovation and deployment by prospect of gaining comparative advantage

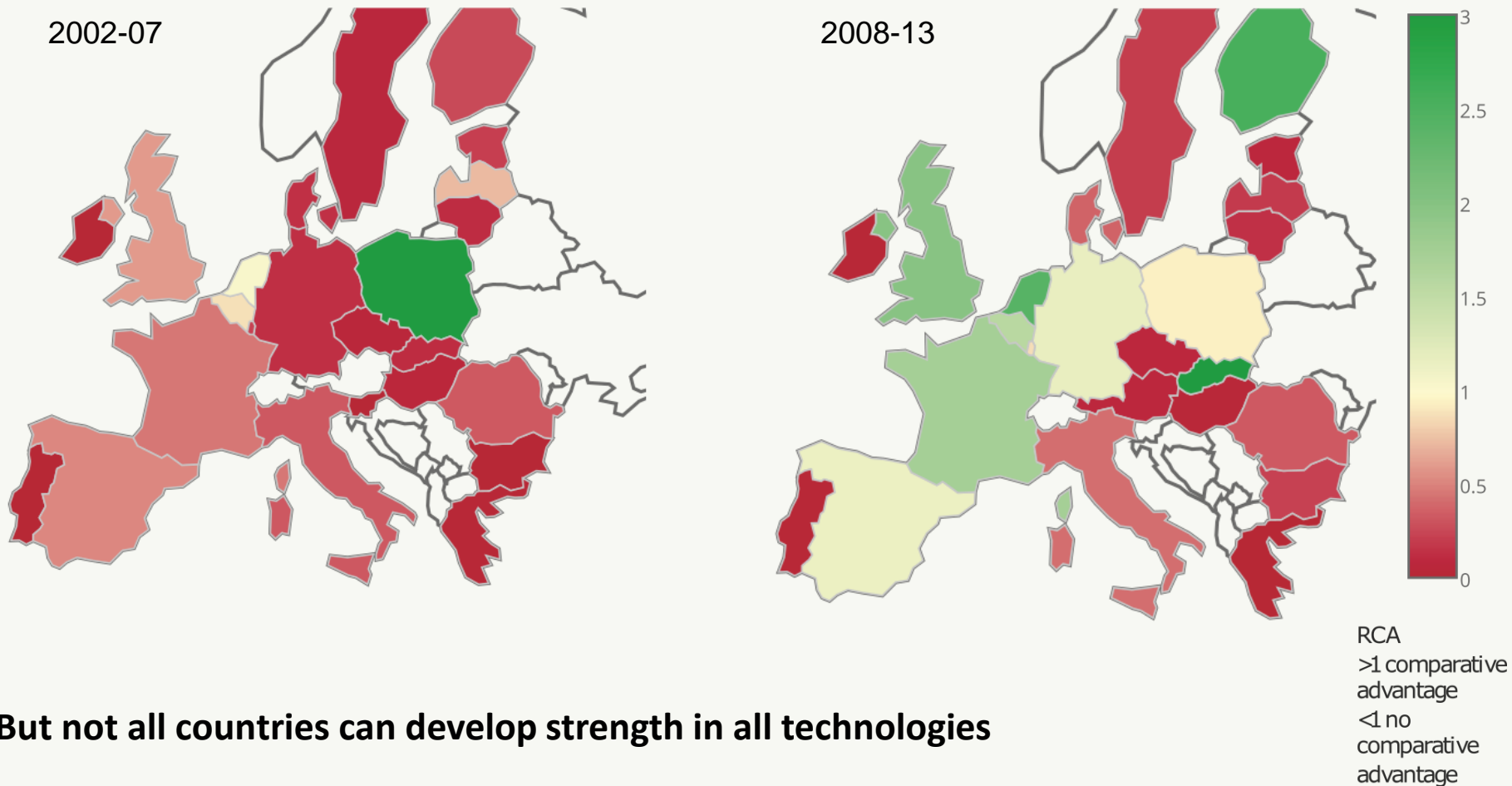
# Low carbon technology exports: the race is still open

Figure: Correlation of the 2015 RCA with the same sector's past RCA



Current strength in low-carbon technology exports (especially EV) less related to past strength.

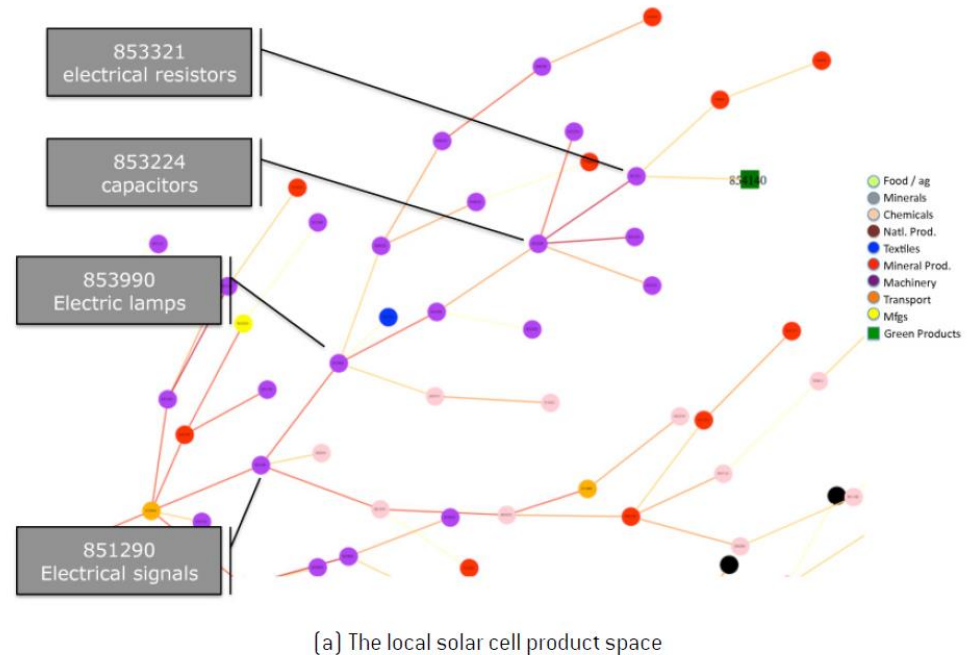
# Which countries have a comparative advantage in electric vehicles?



# It is easier to specialise in products related to current strength

## Different reasons for correlation

- Latent factors
  - Factor cost
  - Infrastructure
  - Geography
  - Domestic market size
  - ...
- Technological links
  - Similar value chain
  - Tech spill-over
  - Education
  - ...



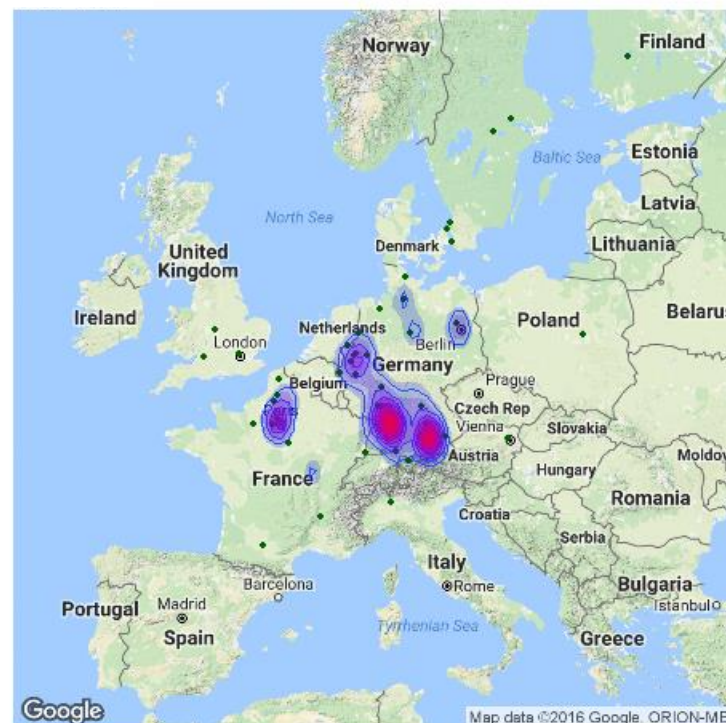
Mark Huberty and Georg Zachmann (2011) Green exports and the global product space: prospects for eu industrial policy

**=> All informative about potential**

# Using patent data to assess potential

- Patent data allow a more forward looking and granular view on technologies and regions
- They allow to identify regional industrial strengths

Electric Vehicles Patent Applications,  
1990 - 13

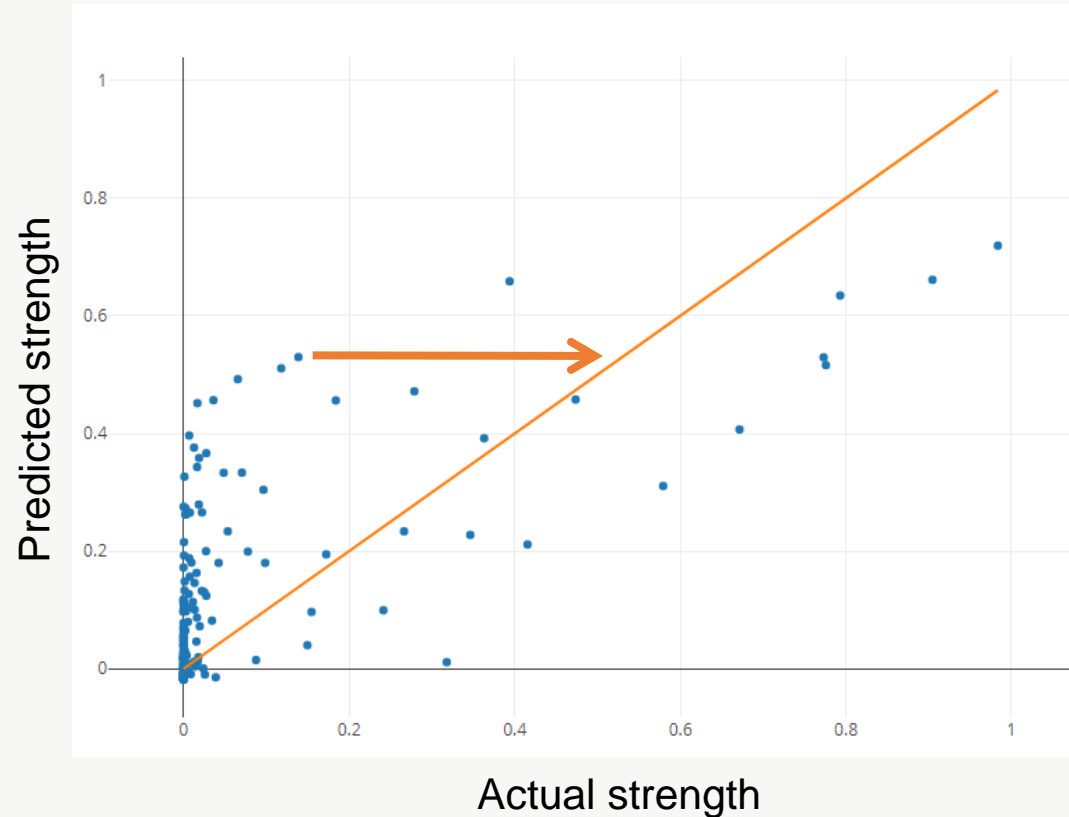


Year: 1990

Source: Bruegel based on Patstat

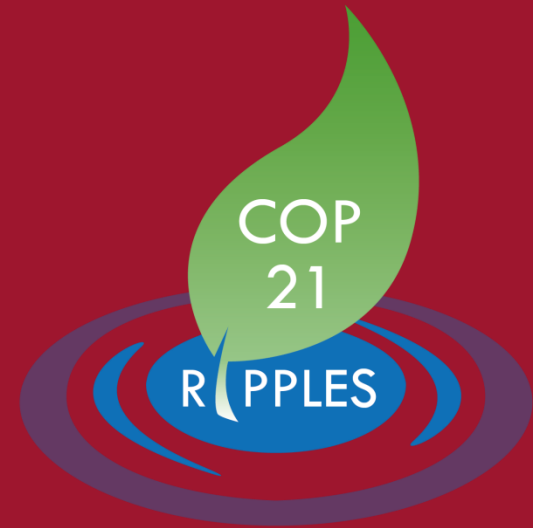
# Conclusions

- Assessing potential is feasible
- This might allow identifying barriers
- We think there might be horizontal policies (education, infrastructure,...) that can remove barriers
- EU has potential, but one-size-fits-all policies would ignore complexity



# Thank you!

twitter: @GeorgZachmann





# Revealed Strength in Technology

## Which country might develop a comparative advantage in Electric vehicles based on research specialisation?

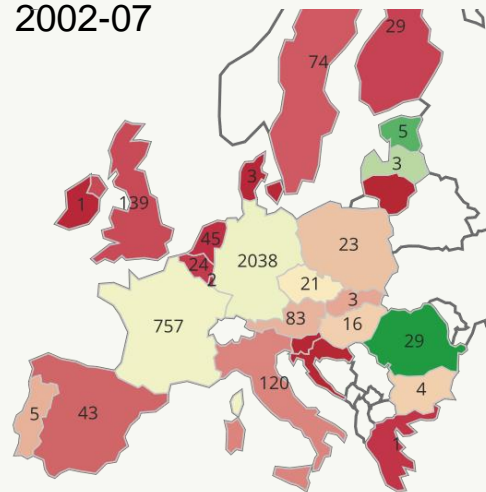
- Innovation is a building block for future comparative advantage
- Patenting as proxy for innovation
- Revealed Technological Advantage (RTA)
  - ✓ Equivalent to the RCA in terms of patenting
- RCA and RTA: complementary indicators for potential of future competitiveness

### Electric vehicles

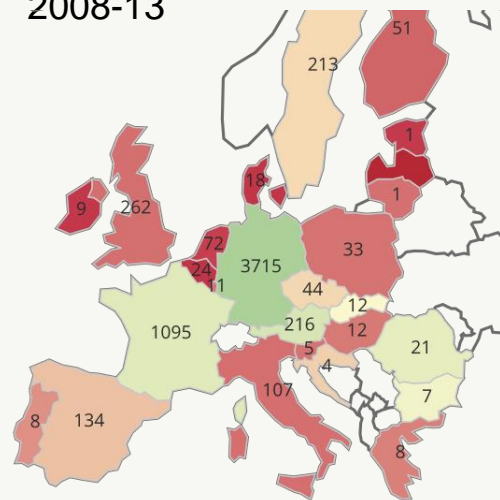
- ✓ All EU countries increased number of patents
- ✓ France, Germany leading
- ✓ Austria also notably improving
- ✓ Italy not improving

### Electric Vehicles

2002-07



2008-13



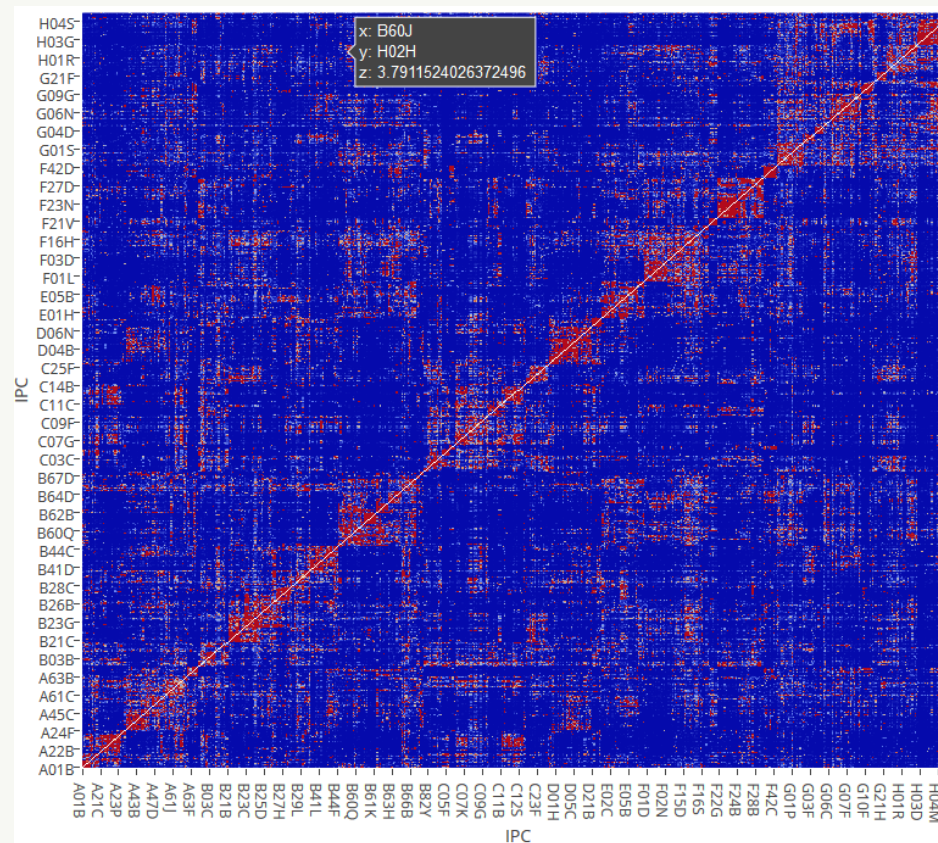
RTA  
>1 specialised  
<1 not specialised

# Technological Proximity

- Related technologies identified by technology proximity
  - Relative frequency of co-occurrence in a patent
- Identify top 5% of related technologies
- Proximity weighted RTA is the weighted (geometric) average of the RTA of related techs

## Electric vehicles

- ✓ Power lines
- ✓ Motor railcars
- ✓ Electric power conversion (AC, DC)
- ✓ ...



# Potential Strength in Technology

**Which country might have some of the prerequisite for developing an advantage in electric vehicles?**

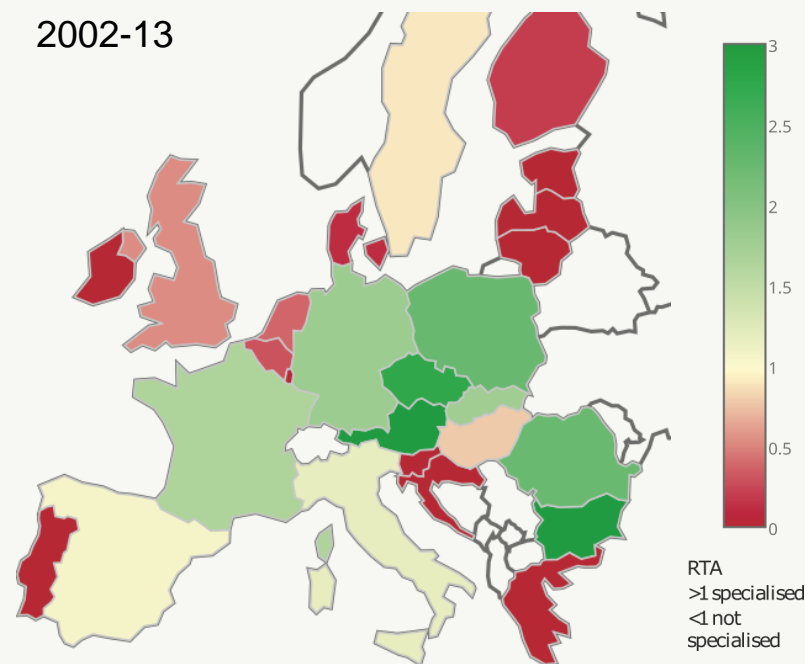
- Countries find it easier to **innovate in techs related to other techs they are good at**
- Promising cases with low specialization in a tech, but high specialization in related tech

## **The case of electric vehicles**

- ✓ Many countries doing well in related fields
- ✓ SPA, FRA, GER, CZR, SLK
- ✓ Italy notable exception

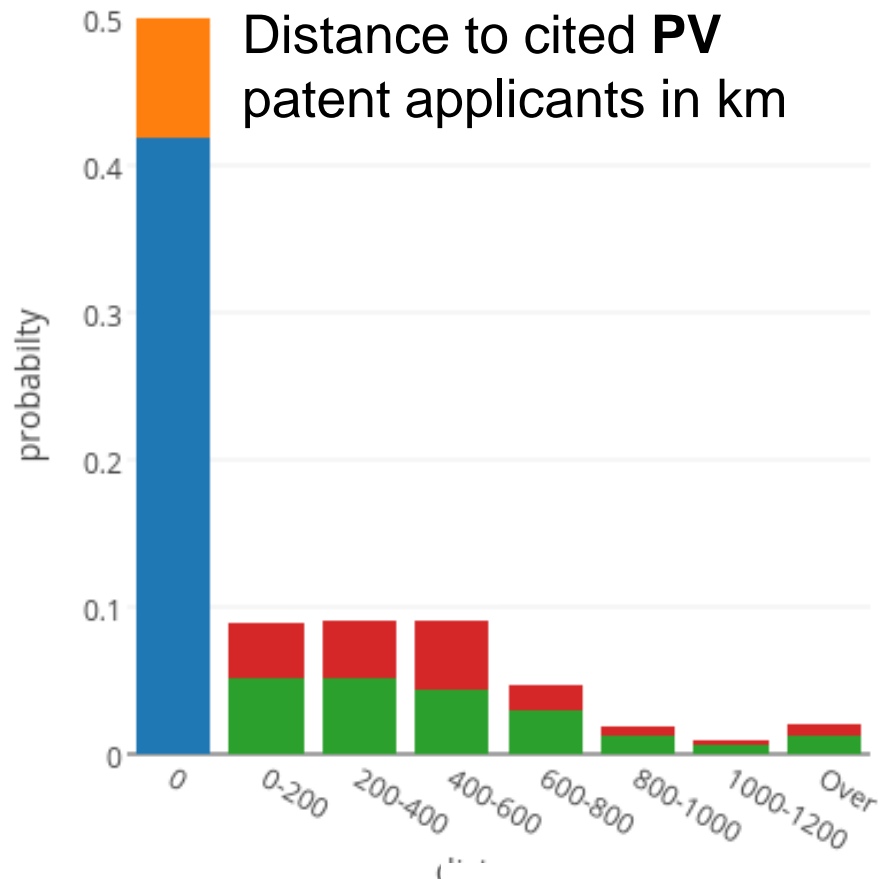
Electric Vehicles, proximity weighted RTA

2002-13

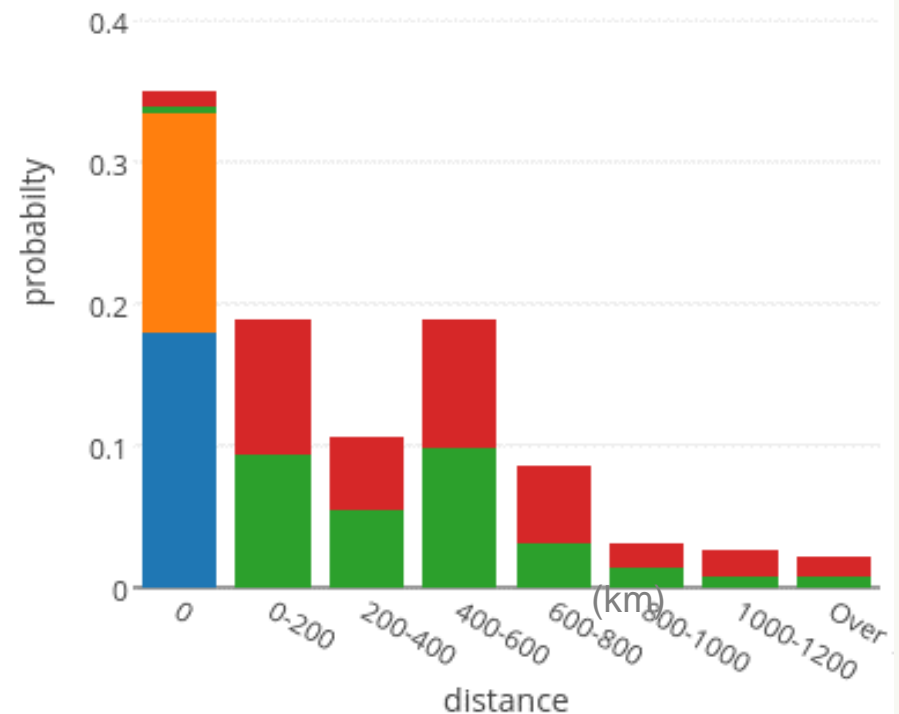


Source: Bruegel based on Patstat

# Technology spill-over seem to exist – and differ between technology



Distance to cited **electric vehicle** patent applicants in km



- Different Company - Different Technology
- Different Company - Same Technology
- Same Company - Different Technology
- Same Company - Same Technology