# Innovation, appropriation and new firm formation in European regions

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# Research context

- Field of entrepreneurship research defined as *"the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited"* (Shane and Venkataraman, 2000);

- Endogenous Entrepreneurship Hypothesis- Knowledge Spillovers Theory of Entrepreneurship (Audretsch 1995).

# Research context

- Knowledge spillovers:
  - geographical proximity;
    - tacitness of knowledge (Polanyi 1966) and crucial role of know-how (Von Hippel 1988) make geographical proximity  an important factor for knowledge spillovers (Kogut and Zander 1992);
  - cognitive proximity (Boschma 2005, van Ort et al. 2013).

# Research context

- Innovation, market rivalry and appropriation
  - Incumbents aim to shield knowledge and increase appropriation using various strategies (Belderbos and Sommers 2015);
  - Branding and trademark registrations as a strategy enhancing appropriation (Bosworth and Rogers 2001, Greenhalgh and Rogers 2006, Crass 2014, OHIM 2015);
  - Trademarking as a potentially effective strategy to complement patent protection (Rujas 1999, Llerena and Millot 2013, Thoma 2015)

# Research questions

- What is the impact of local knowledge stocks (from related and own industries) on emergence of new firms?

- To what extent does trademarking activity moderate the ralationship between incumbent innovation and new firm formation in the incumbents' industries?
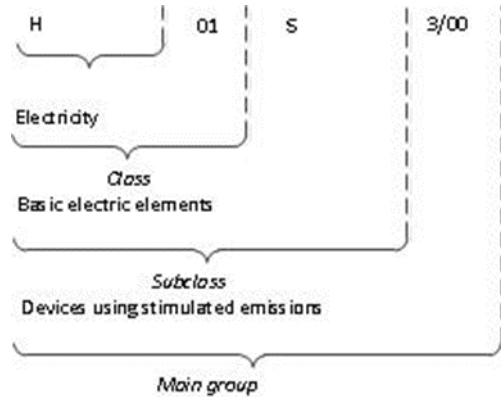
# Data- regions and industries

- Information on number of start-ups within 292 distinct manufacturing industries (NACE 4 digit levels);

- 1025 distinct NUTS 3 regions representing 12 Member States of the European Union (AT,BE,DE,DK,ES,FR,GB,HU,IT,LT,NL,PT);

- 9 years (2001:2009);

- 2 460 976 observations.

# Data- knowledge (patent applications) and trademark stocks

- Patent applications stocks;
  - $\mathrm{PS}_{trj} = \mathrm{PS}_{\mathrm{trj}-1} * 0.85 + \mathrm{P}_{trj}$

- Trademark stocks;
  - $\mathrm{TS}_{trj} = \mathrm{TS}_{trj-1} - \mathrm{Te}_{trj} + \mathrm{Ta}_{trj}$

- IP stocks aggregated over focal NUTS 3 and neighbouring regions located within 200 km from the NUTS 3 centroid;

- Incumbents' appropriation strategy measured via interaction between patent applications and trademark stocks.

# Research design- relatedness measure

H     01    S    3/00

Electricity

Class
Basic electric elements

Subclass
Devices using stimulated emissions

Main group
Lasers

3/09    ● Processes or apparatus for excitation e.g. pumping

3/091    ●● by optical pumping

3/094    ●●● by coherent light

Subgroup H01S 3/094 concerns thus "Processes or apparatus for excitation of lasers using optical pumping by coherent light"

$$TECH_{ij}^J = \frac{F_i F_j'}{(F_i F_i')^{1/2}(F_j F_j')^{1/2}}$$

|  | Sections | Classes | **Subclasses** | Groups | Subgroups |
|---|---|---|---|---|---|
| No of observations | 8 | 121 | **630** | 6904 | 59 621 |

# Research design- relatedness measure

| row.names | 100 | 110 | 111 | 113 | 114 | 115 | 116 | 119 | 121 | 124 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100 | 1.000000000 | 0.0000000000 | 0.1422952349 | 0.0000000000 | 0.0000000000 | 0.0000000000 | 0.0000000000 | 0.1091089451 | 0.000000e+00 | 0.000000e+00 |
| 2 | 110 | 0.000000000 | 1.0000000000 | 0.0478395283 | 0.0456701952 | 0.0000000000 | 0.2773500981 | 0.0000000000 | 0.2139802463 | 1.495372e-02 | 6.537205e-02 |
| 3 | 111 | 0.142295235 | 0.0478395283 | 1.0000000000 | 0.6314917603 | 0.0287479787 | 0.0000000000 | 0.0000000000 | 0.2262313805 | 3.099974e-03 | 2.913664e-01 |
| 4 | 113 | 0.000000000 | 0.0456701952 | 0.6314917603 | 1.0000000000 | 0.0000000000 | 0.1646662305 | 0.0329332461 | 0.5386612810 | 1.420513e-02 | 1.009117e-01 |
| 5 | 114 | 0.000000000 | 0.0000000000 | 0.0287479787 | 0.0000000000 | 1.0000000000 | 0.0000000000 | 0.0000000000 | 0.0771516750 | 0.000000e+00 | 0.000000e+00 |
| 6 | 115 | 0.000000000 | 0.2773500981 | 0.0000000000 | 0.1646662305 | 0.0000000000 | 1.0000000000 | 0.0000000000 | 0.7715167498 | 5.391639e-02 | 2.357023e-01 |
| 7 | 116 | 0.000000000 | 0.0000000000 | 0.0000000000 | 0.0329332461 | 0.0000000000 | 0.0000000000 | 1.0000000000 | 0.0000000000 | 0.000000e+00 | 0.000000e+00 |
| 8 | 119 | 0.109108945 | 0.2139802463 | 0.2262313805 | 0.5386612810 | 0.0771516750 | 0.7715167498 | 0.0000000000 | 1.0000000000 | 4.991687e-02 | 2.182179e-01 |
| 9 | 121 | 0.000000000 | 0.0149537151 | 0.0030999743 | 0.0142051330 | 0.0000000000 | 0.0539163866 | 0.0000000000 | 0.0499168744 | 1.000000e+00 | 2.541643e-02 |
| 10 | 124 | 0.000000000 | 0.0653720450 | 0.2913664334 | 0.1009117271 | 0.0000000000 | 0.2357022604 | 0.0000000000 | 0.2182178902 | 2.541643e-02 | 1.000000e+00 |

$$RP_{rit} = \sum_{j=1}^{n} w_{ij} P_{rjt}$$
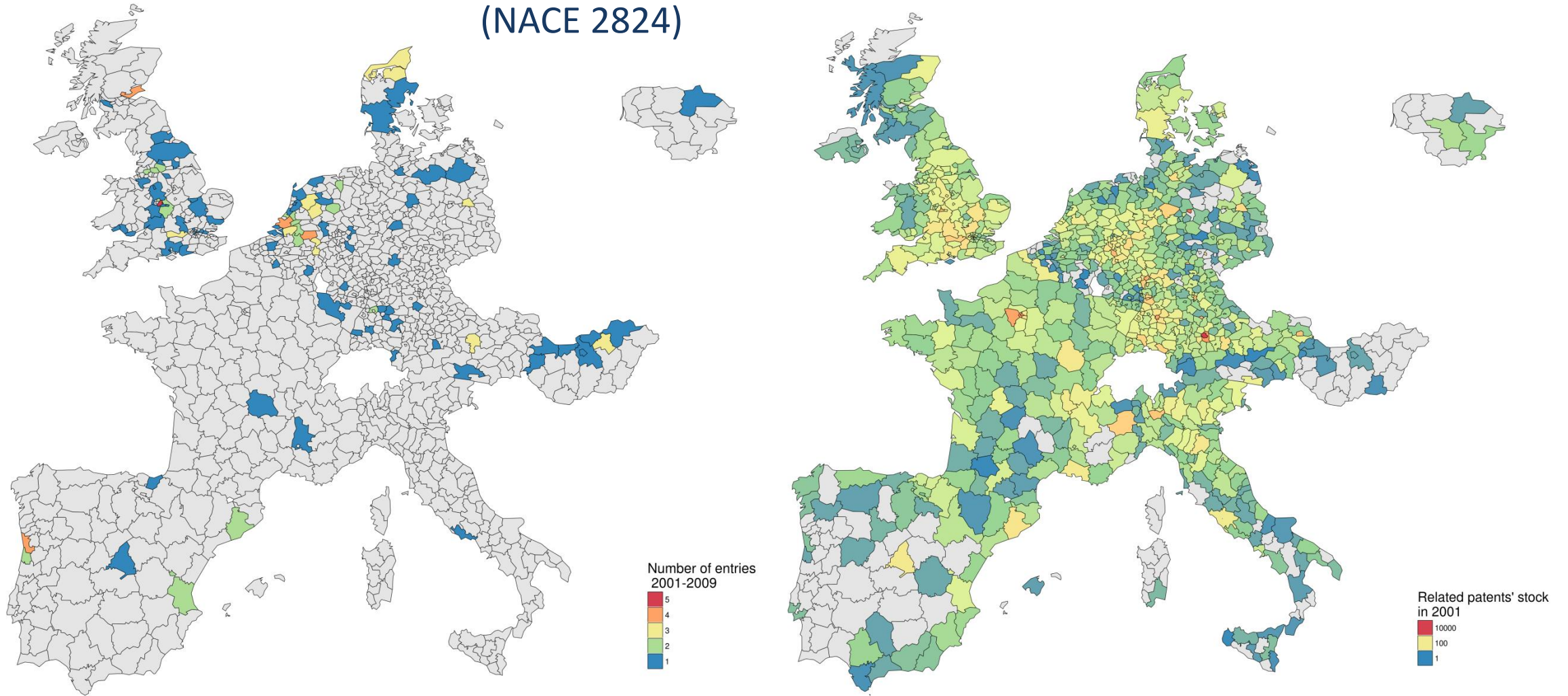
# Manufacture of power-driven hand tools (NACE 2824)
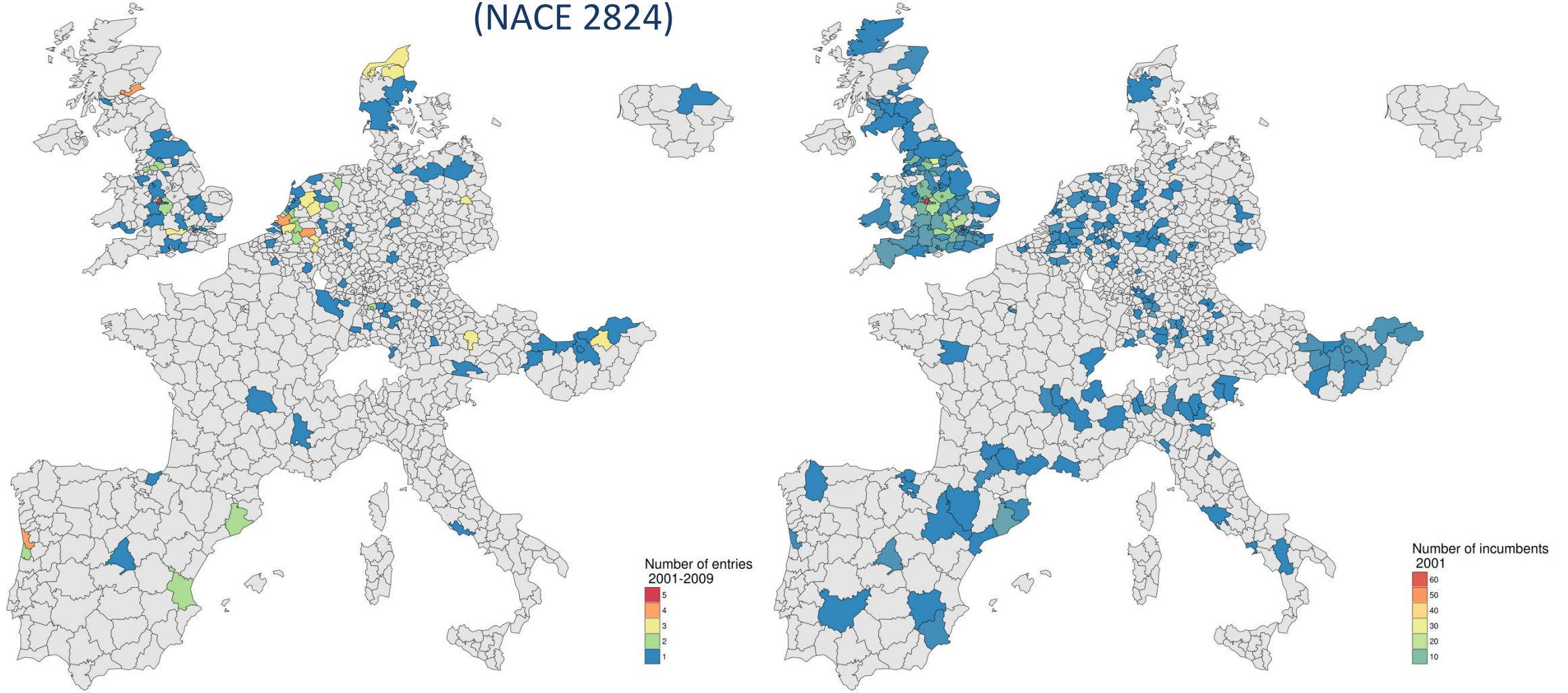


Number of entries
2001-2009

- 5
- 4
- 3
- 2
- 1

Number of incumbents
2001

- 60
- 50
- 40
- 30
- 20
- 10

Manufacture of power-driven hand tools
(NACE 2824)

Number of entries
2001-2009
5
4
3
2
1

Patents' stock
in 2001
10000
100
1

# Manufacture of power-driven hand tools
## (NACE 2824)



Number of entries
2001-2009

- 5
- 4
- 3
- 2
- 1

Related patents' stock
in 2001

- 10000
- 100
- 1

# Manufacture of power-driven hand tools
## (NACE 2824)



Number of entries
2001-2009
5
4
3
2
1

Trademarks' stock
in 2001
10
1

# Preliminary results
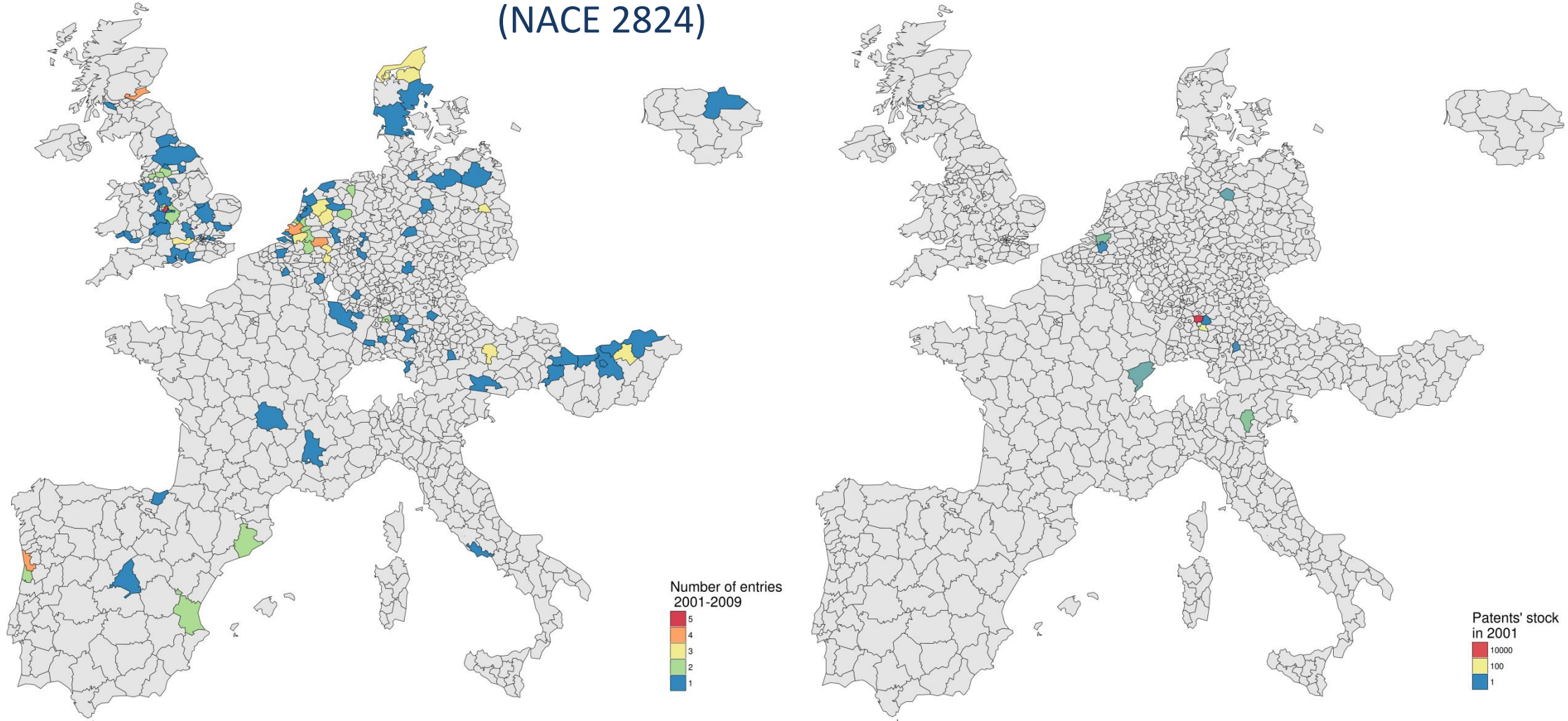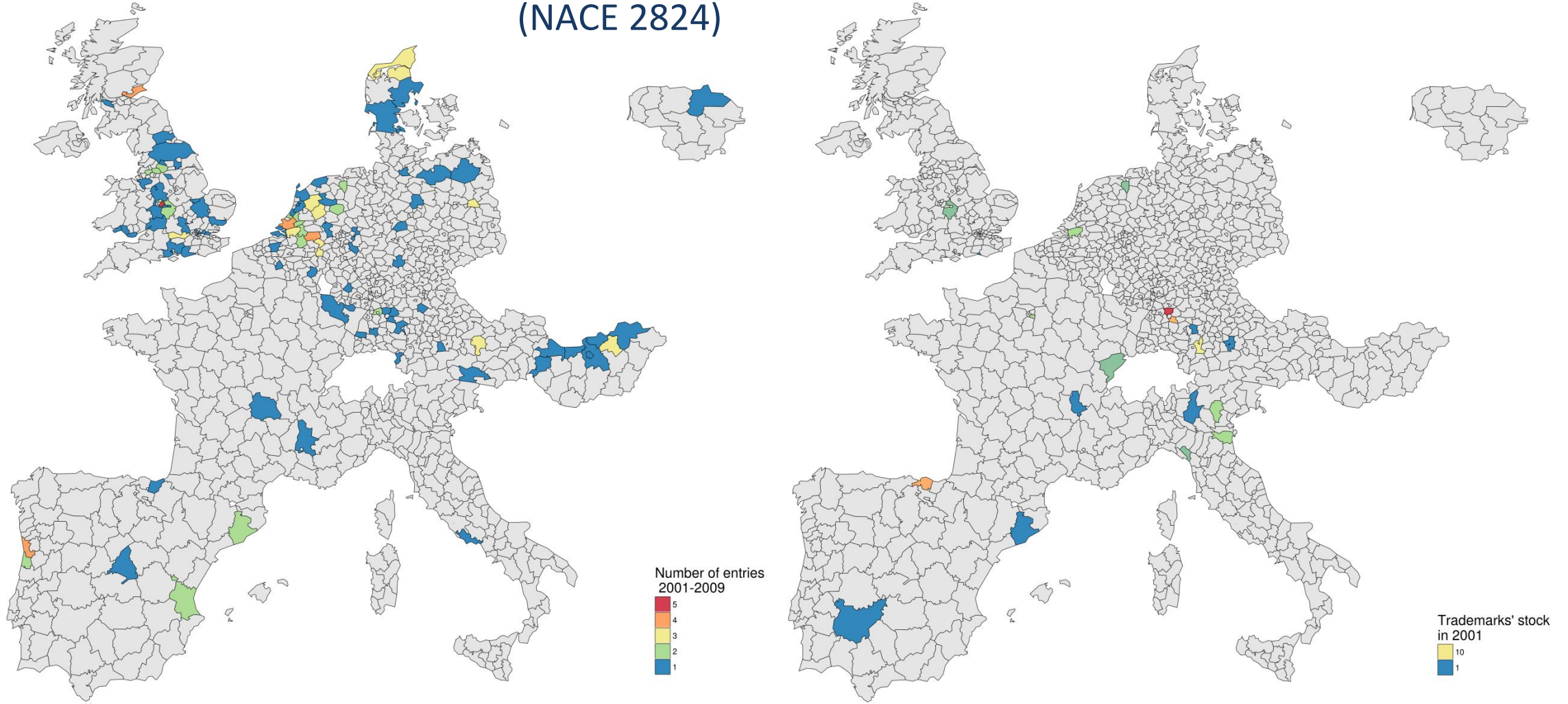
| Poisson regression with clustered standard errors and regional (NUTS 3), industry (NACE 2d) and year fixed effects<br>*Dependent variable: number of new firms in nace4d/NUTS3* | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| log of patent stock in related industries (lag 1) | 0.186*** | 0.186*** | 0.173*** |
| | (0.012) | (0.012) | (0.012) |
| log of patent stock in own industry (lag 1) | -0.056*** | -0.062*** | 0.035*** |
| | (0.007) | (0.008) | (0.012) |
| log of trademark stocks in own industry (lag 1) | | 0.011 | 0.028*** |
| | | (0.008) | (0.009) |
| interaction between patent and trademarks stocks (own industry) | | | -0.036*** |
| | | | (0.005) |
| share of new firms in patenting activity | 0.251*** | 0.252*** | 0.230*** |
| | (0.019) | (0.020) | (0.019) |
| log of incumbents' number (NACE/NUTS) | 1.084*** | 1.080*** | 1.075*** |
| | (0.006) | (0.007) | (0.008) |

# Preliminary results

| Poisson regression with clustered standard errors and regional (NUTS 3), industry (NACE 2d) and year fixed effects _Dependent variable: number of new firms in nace4d/NUTS3_ | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| log of population density | -0.493** | -0.499** | -0.442** |
| | (0.195) | (0.196) | (0.189) |
| unemployment level | -0.005 | -0.005 | -0.005 |
| | (0.003) | (0.003) | (0.003) |
| % of inhabitants with secondary and tertiary education | -0.010*** | -0.010*** | -0.009*** |
| | (0.003) | (0.003) | (0.003) |
| log of GDP per capita in the region (PPS) | -0.086 | -0.090 | -0.099 |
| | (0.095) | (0.096) | (0.097) |
| GDP per capita growth in the region (PPS) | 1.037*** | 1.035*** | 1.048*** |
| | (0.109) | (0.109) | (0.109) |
| Blau index | -0.660*** | -0.659*** | -0.629*** |
| | (0.167) | (0.168) | (0.170) |

Relationship between patent stocks and entry
for different levels of trademark stocks
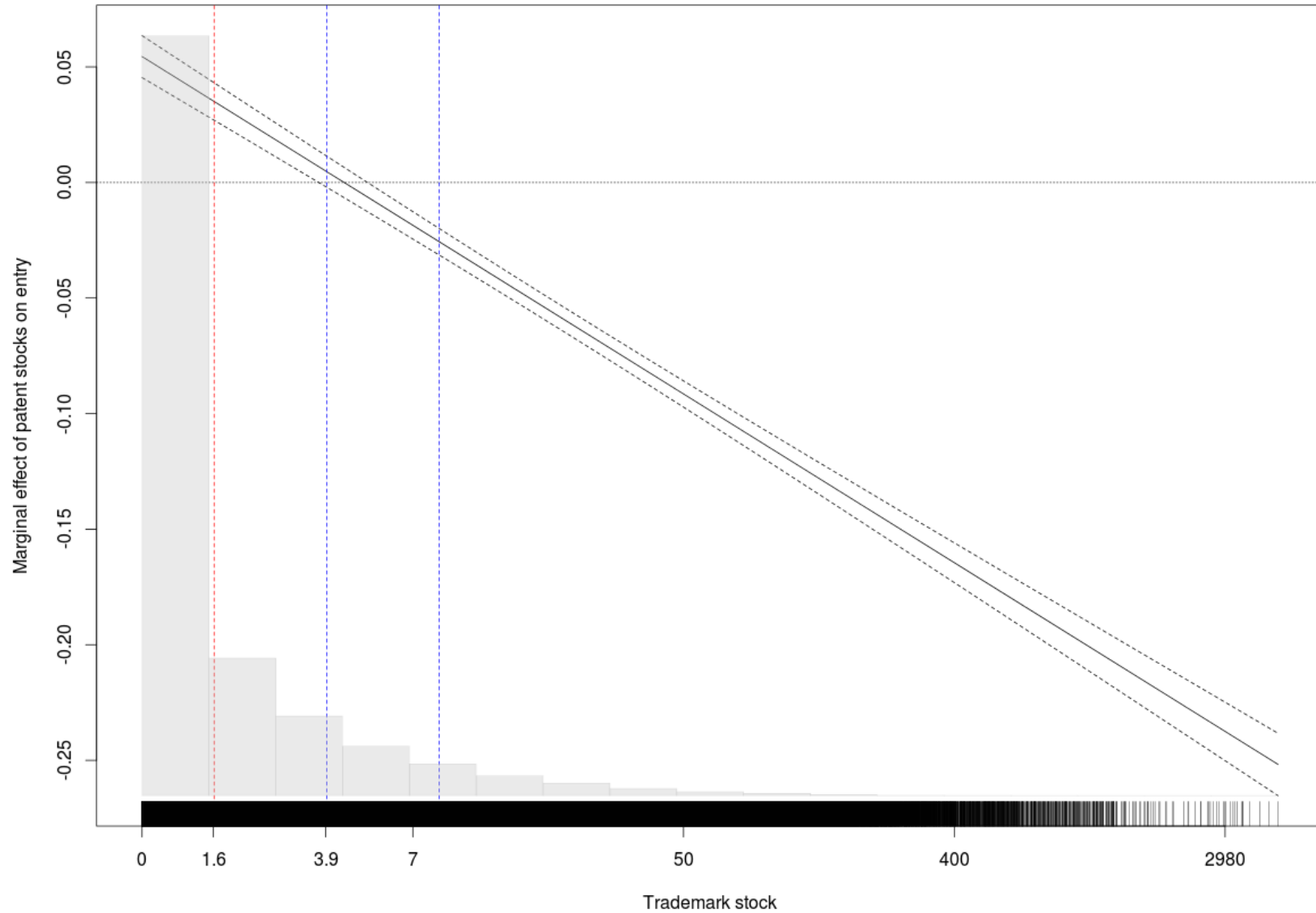
# Discussion

- Strength of knowledge spillovers from incumbents' innovation depends on:
  - The degree of market rivalry and technological relatedness between incumbent and potential recipient;
  - Appropriation strategies of incumbents.
- Therefore it is rather innovation from incumbents active on different market, but using similar technologies, that provides entrepreneurial opportunities for entrants to explore