The European Commission's science and knowledge service

Joint Research Centre

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The ERA of International R&D Investments

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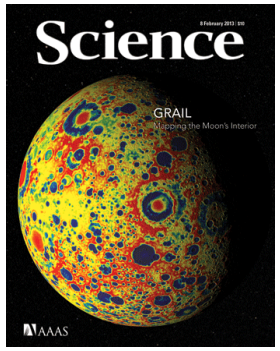
European Commission

Relevance and motivation

"We suggest moving from the current dominance of analyses based on country means to a study of IB activities where the **complex intermingling of different geographic scales (global, supra-regional, national and subnational)** is taken into account."

(Beugelsdijk and Mudambi 2013, *JIBS*)



"… despite decades of efforts to build a **European Research Area**, there has been little integration above global trends in patenting and publication. This analysis provides concrete evidence that **Europe remains a collection of national innovation systems**."

(Chessa et al. 2013, *Science*)

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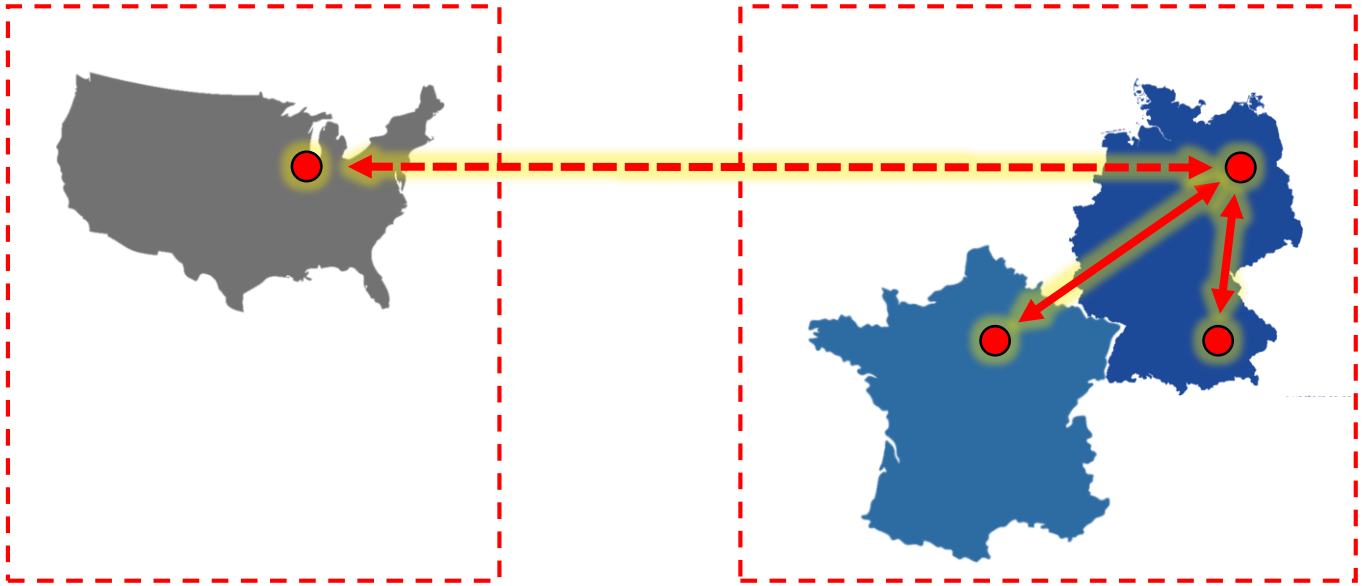
Research question

We study the relative importance of local, national and supranational boundaries in MNEs location choice of *Knowledge-Intensive (K-I*)* foreign investments worldwide.

Do *local territories* compete relatively more with other territories within the same countries and/or macro-areas (e.g. Europe or North America)?
Or, rather, does competition span national and supranational borders?

Example



* *K-I* investments – defined as those in R&D and DDT – are expected to be the more connected with innovation

Potential answers and policy implications

Different plausible answers with different policy implications:

- at one extreme, only local attributes matter ("truly" global competition) while national and supranational borders do not play any role

➔ policies effective in enhancing the attractiveness of a local area only to the extent that they *directly* improve its characteristics and appeal

- at the other extreme, both national and supranational borders play an important role in addition to local factors

➔ scope also for policies that promote the attractiveness of a nation or macro-area as a whole

A large number of intermediate scenarios lie in between these two extremes, with some national and supranational borders playing a role and some other not.

Regional integration blocs

- Regional integration – e.g. the EU, NAFTA, MERCOSUR, ASEAN – attracts FDI inflows in general

- Different forms (degrees) of integration may influence MNEs' decision making differently – i.e.:

NAFTA	**EU**
free trade area	Four freedoms + Innovation Union / ERA
No additional measures	Support mechanisms (structural funds, FP research funding, etc.)

- Gap in literature on the effect of regional integration on MNE's location choices for K-I FDI

Literature

Two interrelated streams of literature on:

1. the role of local and national factors in FDI location choice (Basile et al. 2009, Crescenzi et al. 2016)

2. inward K-I FDI determinants (Siedschlag et al. 2013, Belderbos et al. 2016, Castellani and Lavoratori 2018a and 2018b …)

We bring into the picture supranational borders, focusing on K-I investments, using a novel set of local destinations at the city level.

Contribution

Contribution and novelty of present study:

- ✓ assess the role of supranational boundaries
- ✓ assess the role of national borders, which has not been yet studied for K-I investments
- ✓ novel and wider set of local destinations that cover a larger share of K-I investments

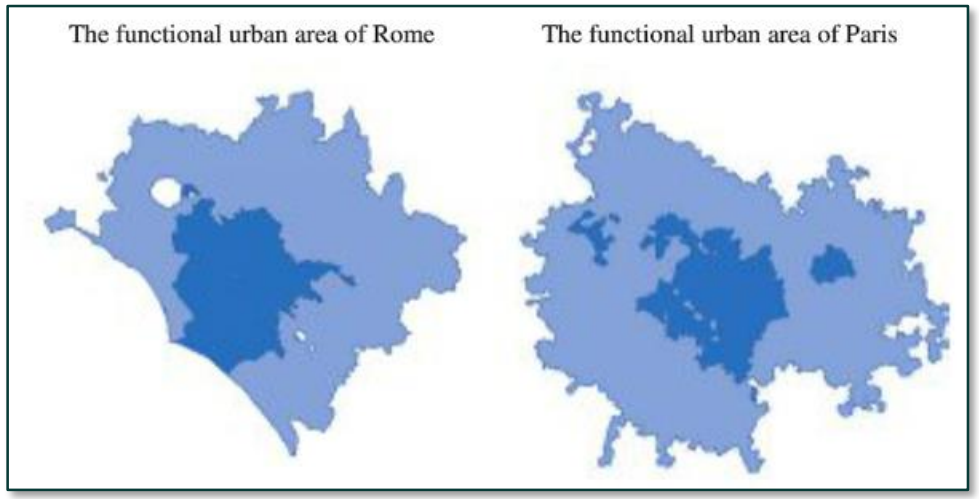
The geographical unit of analysis: FUAs

Established consensus on the fact that:

- MNEs choose specific territories: large geographical units (countries) are too coarse to provide an accurate picture
- administrative borders are unlikely to capture global and local economic activities and interactions

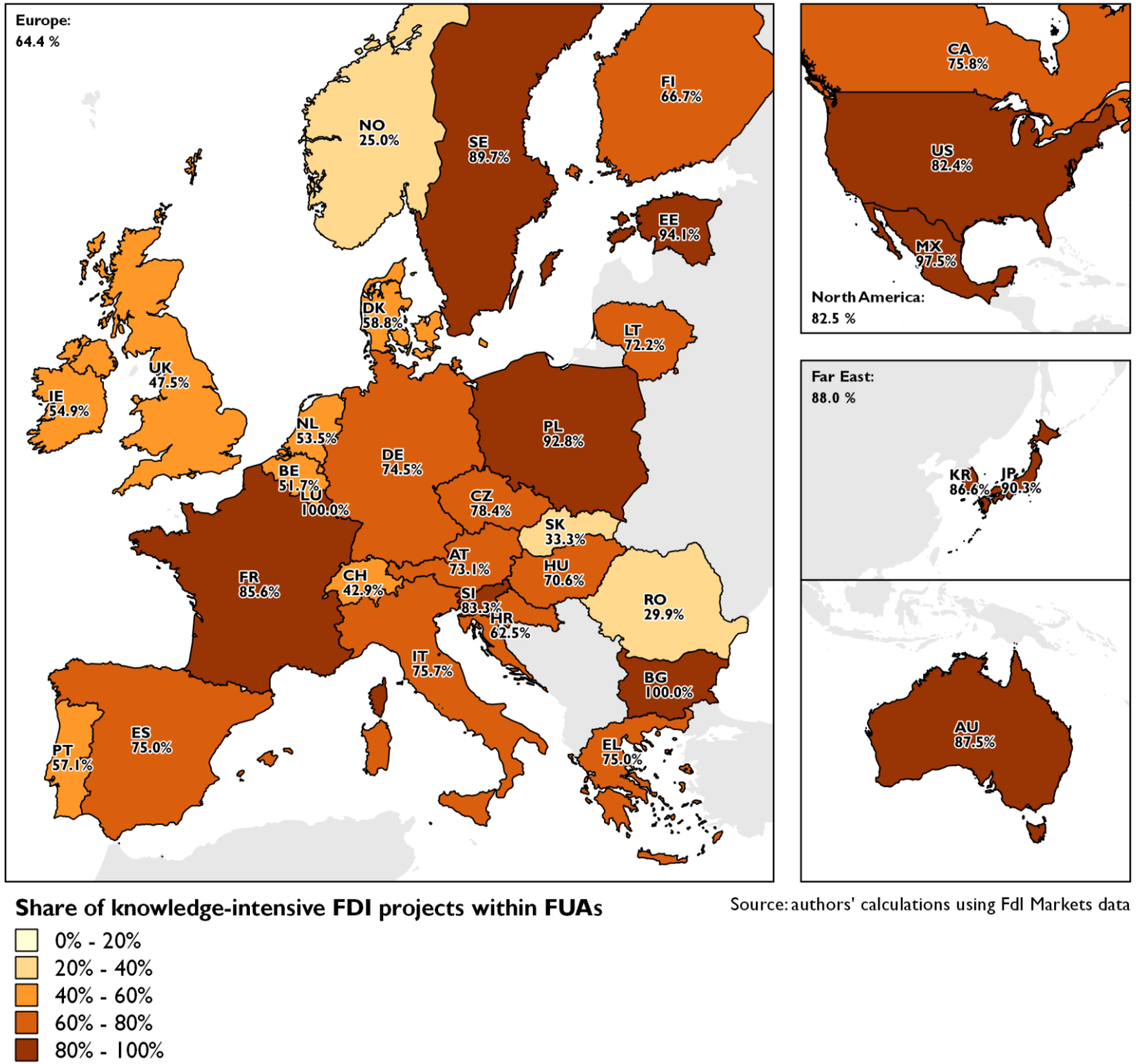
We use the concept developed by the EU and OECD of Functional Urban Areas (FUAs), which are metropolitan areas defined on the basis of density and commuting patterns.

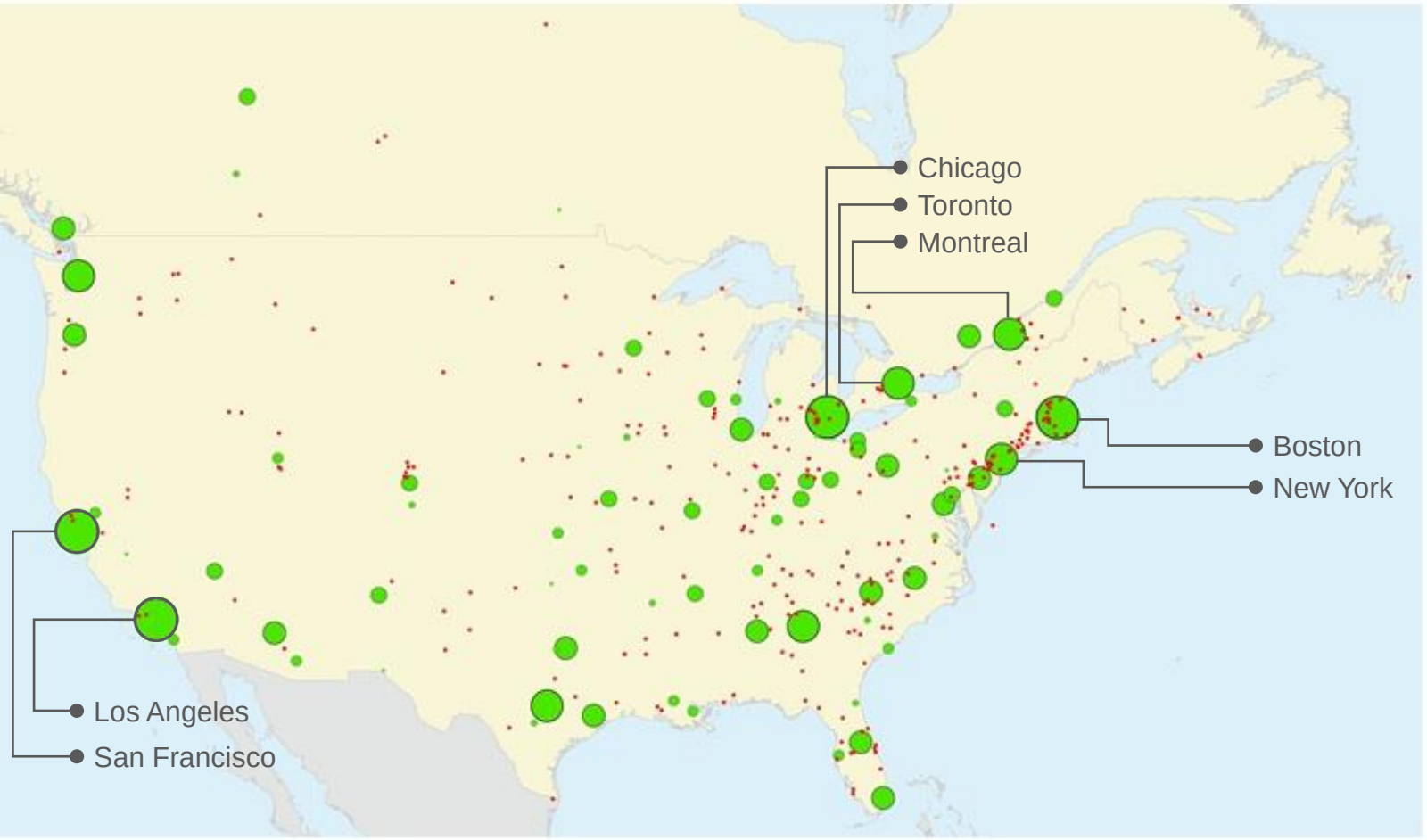
By focusing on FUAs with 500k+ population, we account for a large portion of K-I FDI worldwide.



Most MNEs' knowledge-intensive investments go FUAs

- Europe: 64.4%
- North America: 82.5%
- Far East (AU, KR, JP): 88.0%

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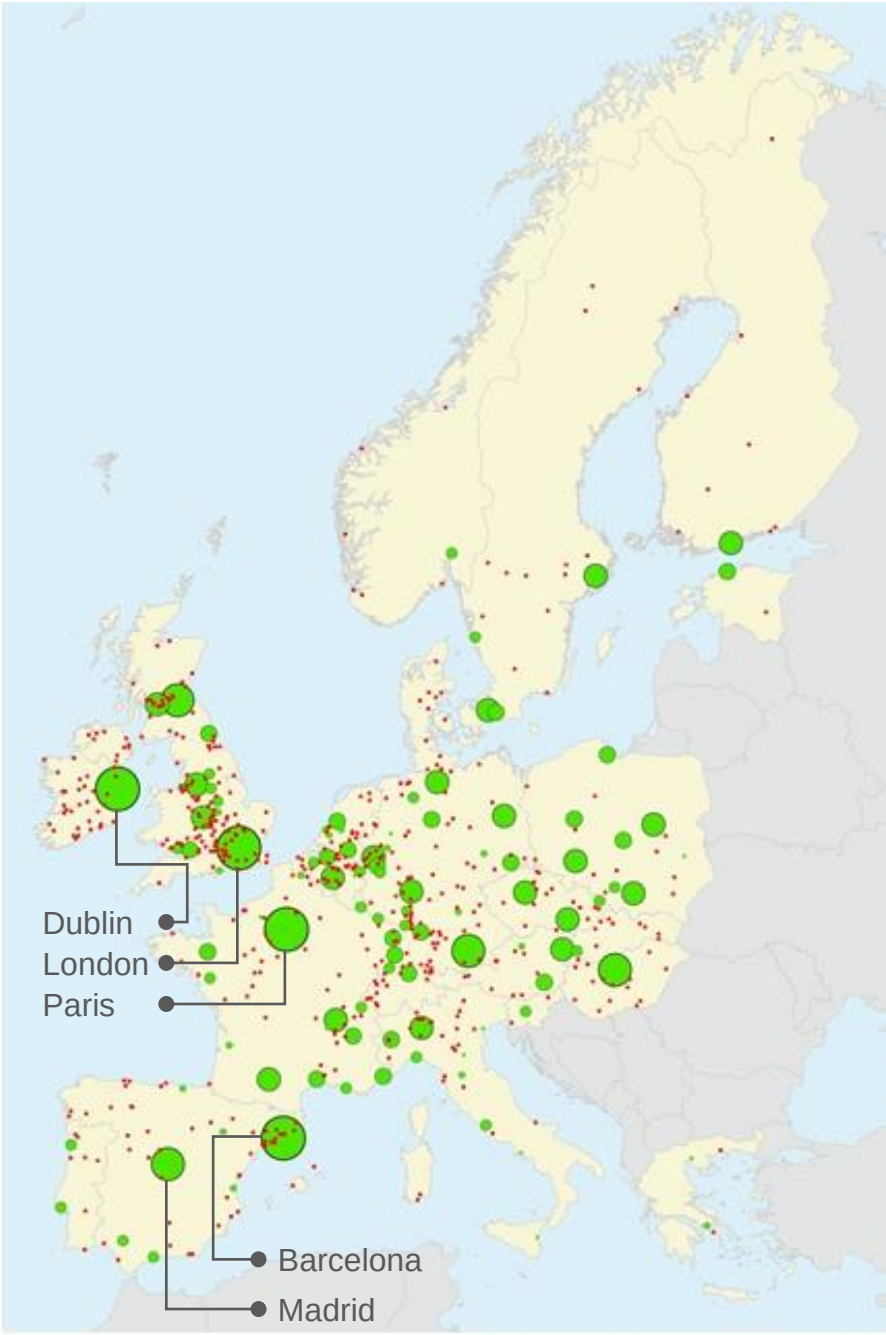
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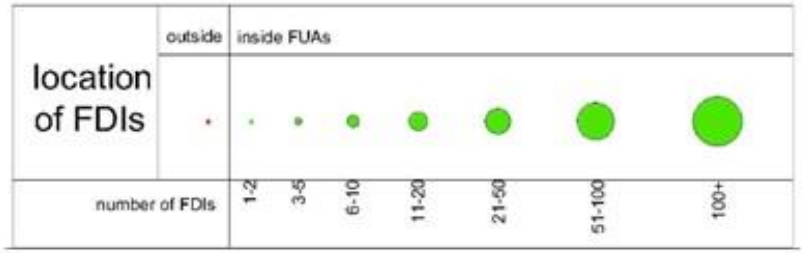

location of FDIs
outside
inside FUAs
number of FDIs
1-2
3-5
6-10
11-20
21-50
51-100
100+

The econometric model

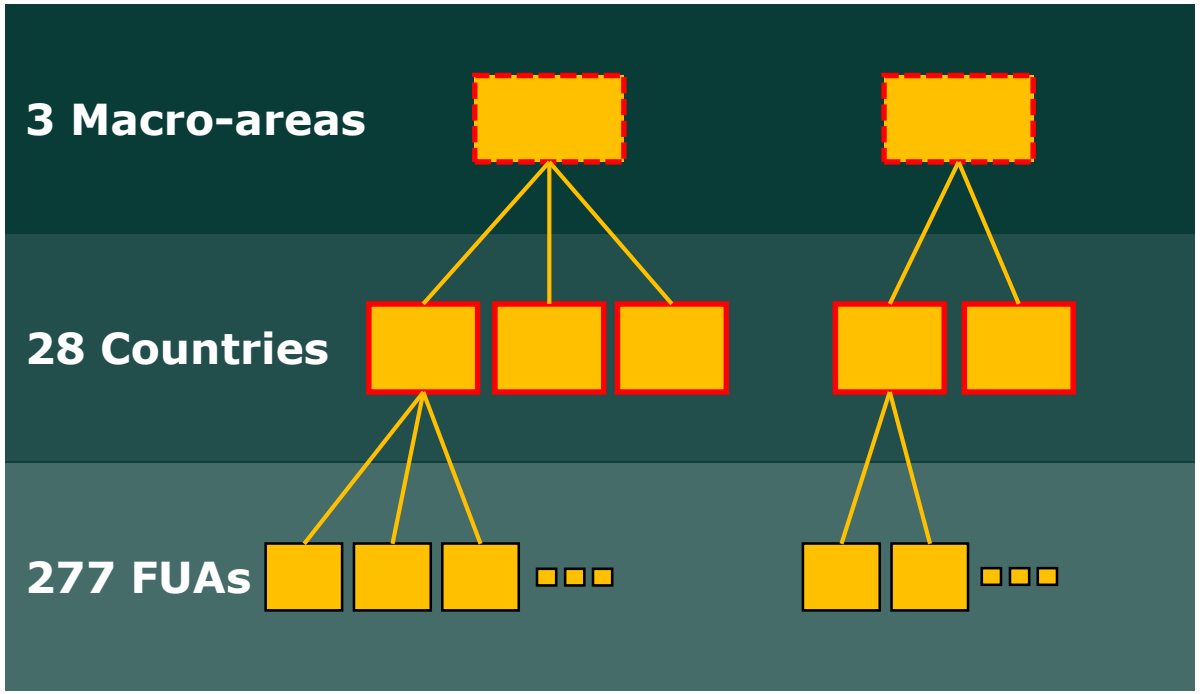
Nested logit regressions used to model the probability a MNE chooses a specific location out of a set of potential locations

FUAs grouped into nests considering nations and supra-national groups of nations: nesting structure

Inclusive Values (IVs) parameters capture the correlation among alternatives within the same nest:

The nesting structure

Macro-area and country-level heterogeneity controlled for by supranational and national nests (conceptually equivalent to ‘macro-area’ and ‘country’ fixed effects)



- Different nesting structure tested
- Separate analyses run considering vs. ignoring supra-national nests, and including vs. excluding countries in the Far East (Australia, Japan and South Korea)
- 3 macro-areas (Europe, North-America, Far East) defined according to geographic proximity and assessed against presence of trade agreements (EU/EFTA vs. NAFTA) and supra-national program specifically aimed at fostering knowledge exchanges

Inclusive Values (IVs)

Inclusive Values (IVs) parameters capture the correlation among alternatives within the same nest

They have different implications according to the value they take:

- IVs between 0-1: locations within the same nest are correlated, related nest matters
- IVs equal to 1: locations within the same nest are not correlated, related nest does not matter
- IVs larger than 1 are not compatible with firm rational behaviour

Data and sample

Project-level data on 2,520 FDI in R&D and DDT from 2009 to 2015 from fDi Markets database provided by the Financial Times

combined with

information on potential determinants of local attractiveness at the FUA-level from a variety of sources:

Variables	**Sources**
industry-specific patent applications	OECD PATSTAT
publications	Leiden Ranking
agglomeration (past FDI, 2003-08)	fDi Markets
Past K-I FDI by MNE in the FUA	fDi Markets
air passengers (connectedness)	Eurostat & national sources
corporate taxation	OECD Tax Database & national sources
geographical and cultural proximity	CEPII / Authors' construction
Usual controls (i.e., GDP/capita, unemployment rate)	OECD Metropolitan Database

Results (1)

- All IVs are consistent with rational behavior of MNEs in the case of the nesting structure with Europe and North-America supra-national nest
- Both one-level nesting structures that ignore supranational borders are not consistent with MNEs profit maximizing behavior
- The inclusion of Far East is not supported by the data

	Europe and North America				Europe, North America and Far East			
	Only countries		Countries and macro-areas		Only countries		Countries and macro-areas	
(Selected) Countries IVs								
Czech Republic	1.717***	(0.267)	1.291	(0.219)	1.829***	(0.260)	1.659***	(0.246)
France	1.009	(0.071)	0.764***	(0.082)	1.006	(0.068)	0.906	(0.077)
Germany	1.037	(0.046)	0.772***	(0.077)	1.050	(0.043)	0.941	(0.068)
Italy	0.745**	(0.101)	0.573***	(0.090)	0.728***	(0.099)	0.662***	(0.098)
Netherlands	0.786*	(0.125)	0.587***	(0.104)	0.805	(0.126)	0.722**	(0.119)
Poland	1.472***	(0.091)	1.097	(0.123)	1.493***	(0.089)	1.340***	(0.113)
UK	1.143***	(0.053)	0.861*	(0.085)	1.127**	(0.051)	1.015	(0.074)
Canada	1.034	(0.073)	0.591***	(0.093)	1.033	(0.070)	0.760**	(0.118)
Mexico	1.264**	(0.110)	0.740*	(0.146)	1.368***	(0.093)	1.049	(0.183)
United States	1.047	(0.041)	0.746***	(0.085)	1.023	(0.037)	0.899	(0.074)
Australia	-	-	-	-	1.144	(0.105)	0.989	(0.126)
Japan	-	-	-	-	0.615***	(0.062)	0.532***	(0.068)
South Korea	-	-	-	-	0.710***	(0.095)	0.613***	(0.091)

Results (2)

- IVs smaller than 1 in the case of the European macro-area, and in the majority of countries, and, conversely, equal to one in the case of the North American macro-area, Czech Republic and Poland

- both national and supranational borders play a significant role in the attraction of K-I FDI in Europe, while only national factors are considered important by MNEs in North America

- signal of stronger integration with respect to knowledge flows in Europe than in North America, at least in the perception of MNEs' decision-makers

	Europe and North America	
Macro-areas IVs		
Europe	0.723***	(0.073)
North America	0.937	(0.133)
Log-likelihood	-7,276.877	
FUAs	225	
FDIs	1,649	
Observations	327,437	

Robust standard errors clustered by MNE in parentheses. The symbol (*) denotes confidence levels for the hypothesis that *IV* parameters are equal to 1: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

Implications and debate

- Simple one-level nesting structures ignoring supranational borders are not consistent with MNEs profit maximizing behaviour in a setting that includes countries from different macro-areas

- In North America, only national and policies are effective in promoting FDI attractiveness; supra-national factors are, by contrast, not considered by MNEs when choosing the location of Knowledge-Intensive foreign greenfield investments

- In Europe, supranational factors are also considered by MNEs in their location decisions. There is therefore scope for supranational policies aimed at enhancing the appeal of Europe as a whole. This finding is consistent with:
  - ✓ the view that Europe is seen by MNEs as a more in integrated area than North America,
  - ✓ the speculation that programs specifically aimed at promoting the supranational integration in terms of research and innovation (such as the ERA) are more effective at achieving integration than free trade agreements (such as the NAFTA).

Thanks

Any questions?

You may contact me me at giacomo.damioli@ec.europa.eu

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	Coefficients	Standard errors
Patents in previous 3 years	0.265***	(0.034)
Publications in top1000 universities	0.024*	(0.013)
Agglomeration in K-I activities, same industry	0.234***	(0.047)
Agglomeration in K-I activities, other industry	0.120***	(0.030)
Agglomeration in non-K-I activities, same industry	0.116***	(0.030)
Agglomeration in non-K-I activities, other industry	0.038*	(0.020)
MNE previous K-I FDI	1.491***	(0.189)
Air passengers	0.047***	(0.016)
Local corporate tax rate	-0.663***	(0.134)
Unemployment rate	0.240***	(0.081)
Per-capita GDP	0.178	(0.131)
Distance	-0.081*	(0.044)
Same language as in MNE HQ: English	-0.006	(0.083)
Same language as in MNE HQ: French	0.753***	(0.196)
Same language as in MNE HQ: German	0.483***	(0.169)
Same language as in MNE HQ: other	1.080***	(0.256)

Robust standard errors clustered by MNE in parentheses. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.