

# ESPON IRiE

Interregional Relations in Europe



## Trade of goods and services in Europe

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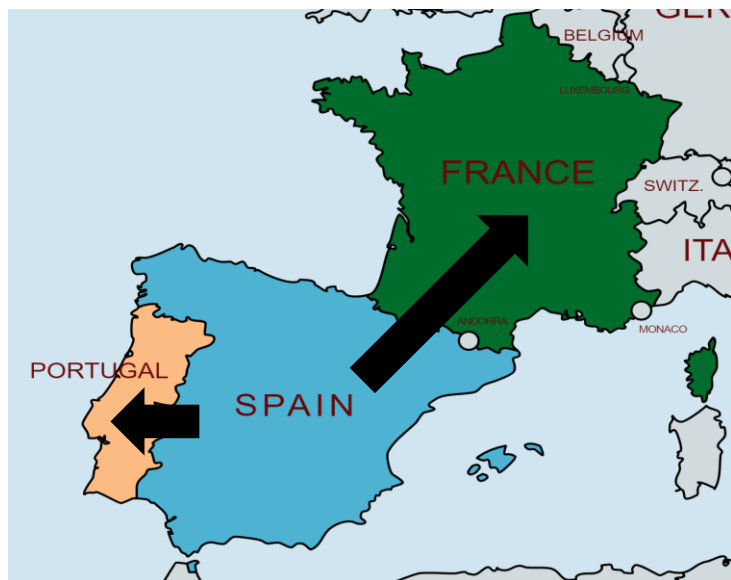
# 1

## Introduction

- What do we know about trade within the EU?

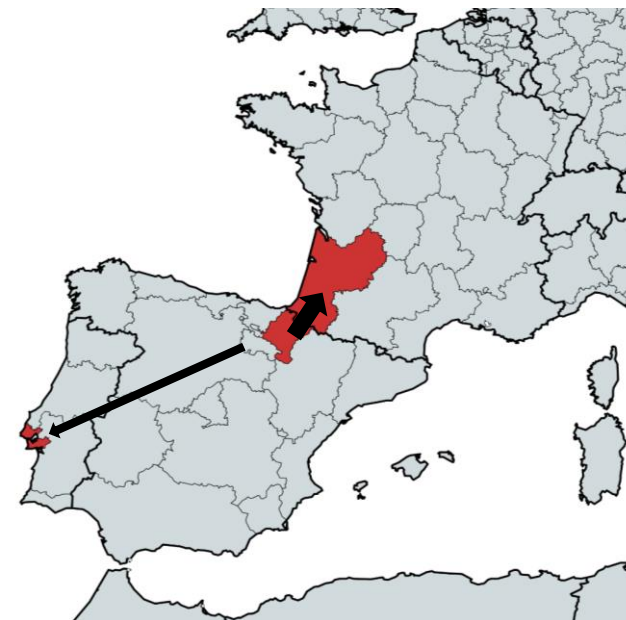
### Before IRIE Project

#### Country-to-Country (Nuts 1:1)



### After IRIE Project

#### Region-to-Region (Nuts 2:2)



# 2

## Trade of Goods



The IRIE-Project offers 3 outputs on trade of goods:



### Task 1.2.a. Trade of Goods:

- 2010-2018.
- All Nuts 2 regions in EU27+Norway, Switzerland, Iceland, Liechtenstein.
- All transport modes
- Products: 14 (NST)

Nuts 2:2



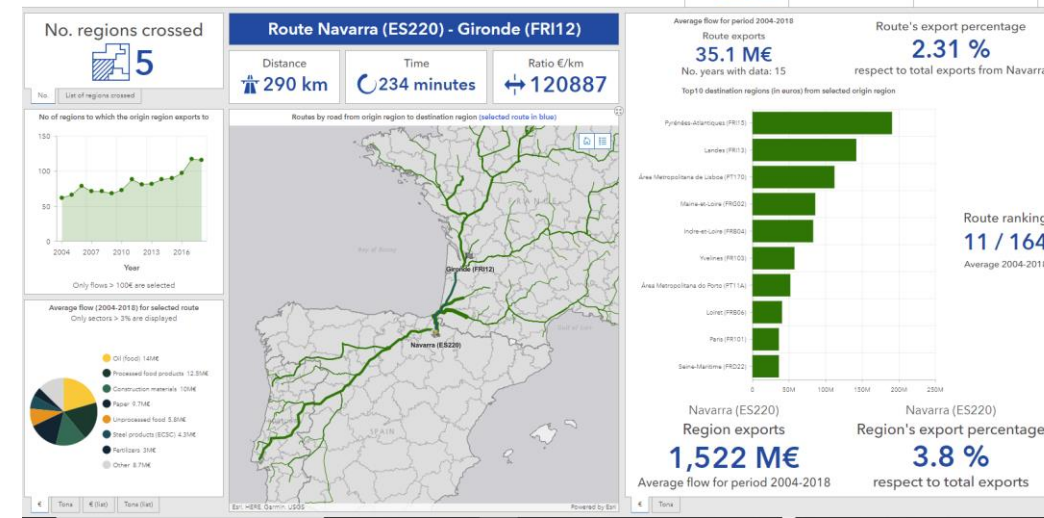
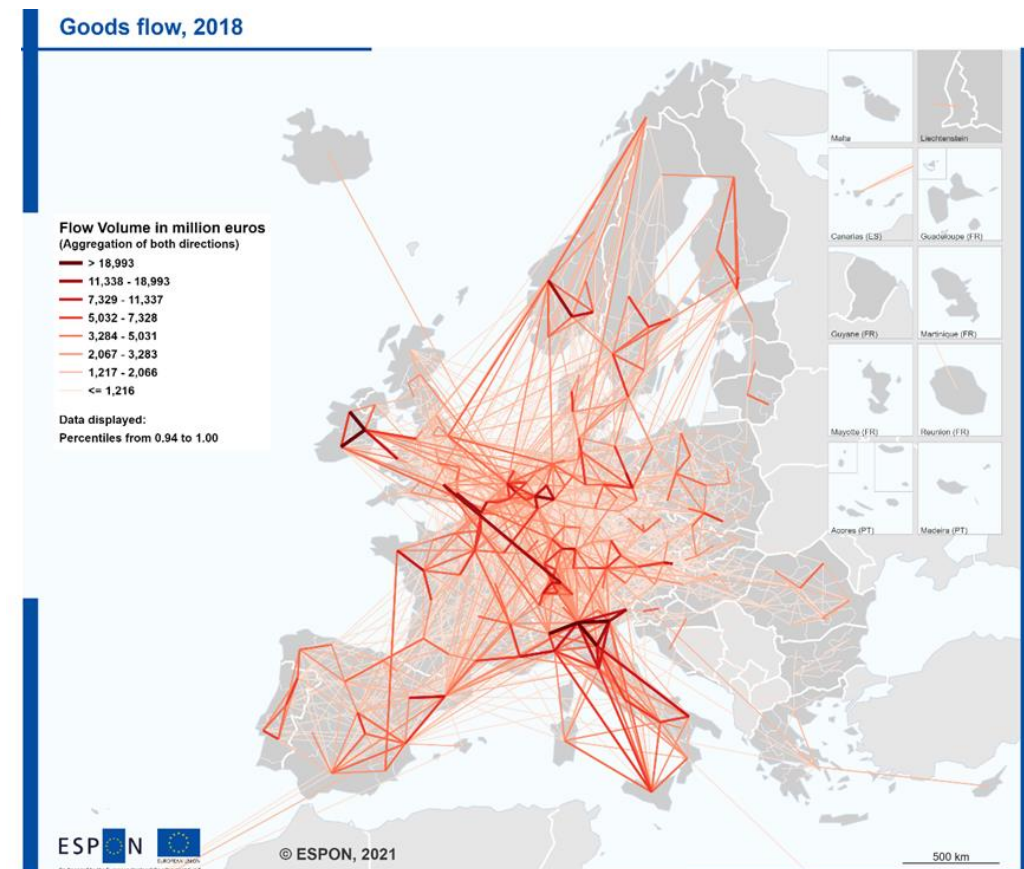
### Case Study: Spain, France and Portugal

- 2004-2018.
- All Nuts 3 regions of these provinces
- Just road
- Products: 30 products

Nuts 3:3



### A new EUREGIO-2017 Input-Output Table (ESPON-JRC)



## 2.1. Trade of Goods: methodology

**ESPON IRiE**



### C2C Trade Data (UN-CEPII-BACI)

- Nuts 1 (all countries).
- € and Tons.
- 2010 to 2018.
- 10.000 HS products.



### C2C Trade Data (Eurostat-Comext)

- Nuts 1 (EU countries).
- € and Tons.
- 2010 to 2018.
- 14 NST products.
- 5 transport modes



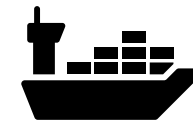
### Eurostat ERFT microdata

- Nuts 2 (ESPON countries).
- Tons; 2010 to 2017.
- 14 products (NST/R).



### Eurostat Train Statistics

- Nuts 2 (ESPON countries).
- Tons; 2010 to 2017.
- No detail by product.



### Eurostat Ship Statistics

- By port (ESPON countries).
- Tons; 2010 to 2018.
- No detail by product.



### Eurostat Aircraft Statistics

- By airport (ESPON countries).
- Tons; 2010 to 2018.
- No detail by product.

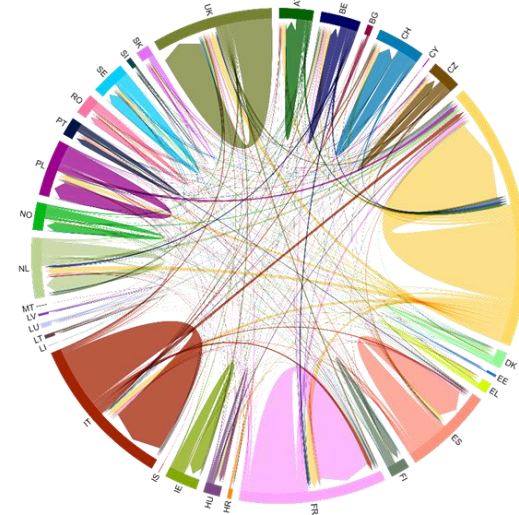


## 2.2. Trade of goods: results

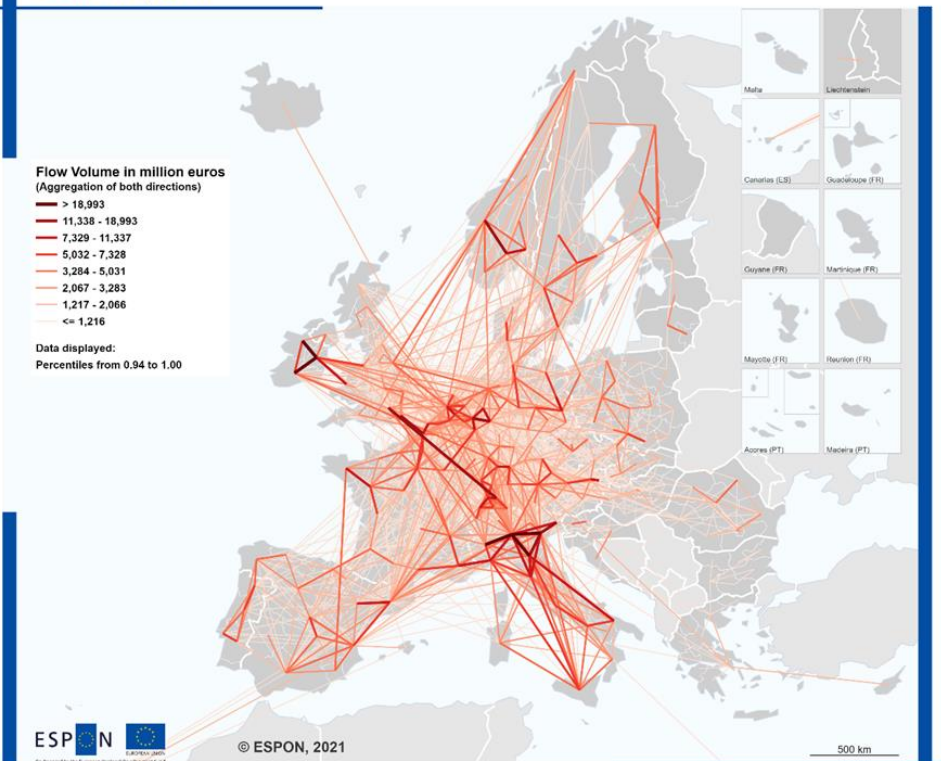
### Visualization

- FlowMapper + Online Tools.

Goods flow, 2018



Goods flow, 2018



### Regional Typologies

- Cluster Analysis: 7 indicators

Indicator	Definition	Units
1. Connectivity	Number of destination regions	Nº regions
2. Intensity	Total international exports	Th. M. euros
3. Weighted Intensity	Total international exports as share of total trade	%
4. Interregional balance	Ratio between the region international exports share and the country international exports share	%
5. Network Selectivity	Share of exports to the main destination region.	%
6. External Influence	Ration between the international exports and the imports.	%
7. Send-Receive Balance	Trade balance. Exports – Imports.	Th. M euros

### Drivers and Barriers

- Econometrics: Gravity equation.

$$T_{ijt} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 INTRA_{ij} + \beta_4 INTER_{ij} + \beta_5 CONTIG_{ij} + \beta_6 DIST_{ij} + \beta_6 X_{ij} + \mu_{it} + \mu_{jt} + \varepsilon_{ijt}$$

## 2.2. Trade of goods: results

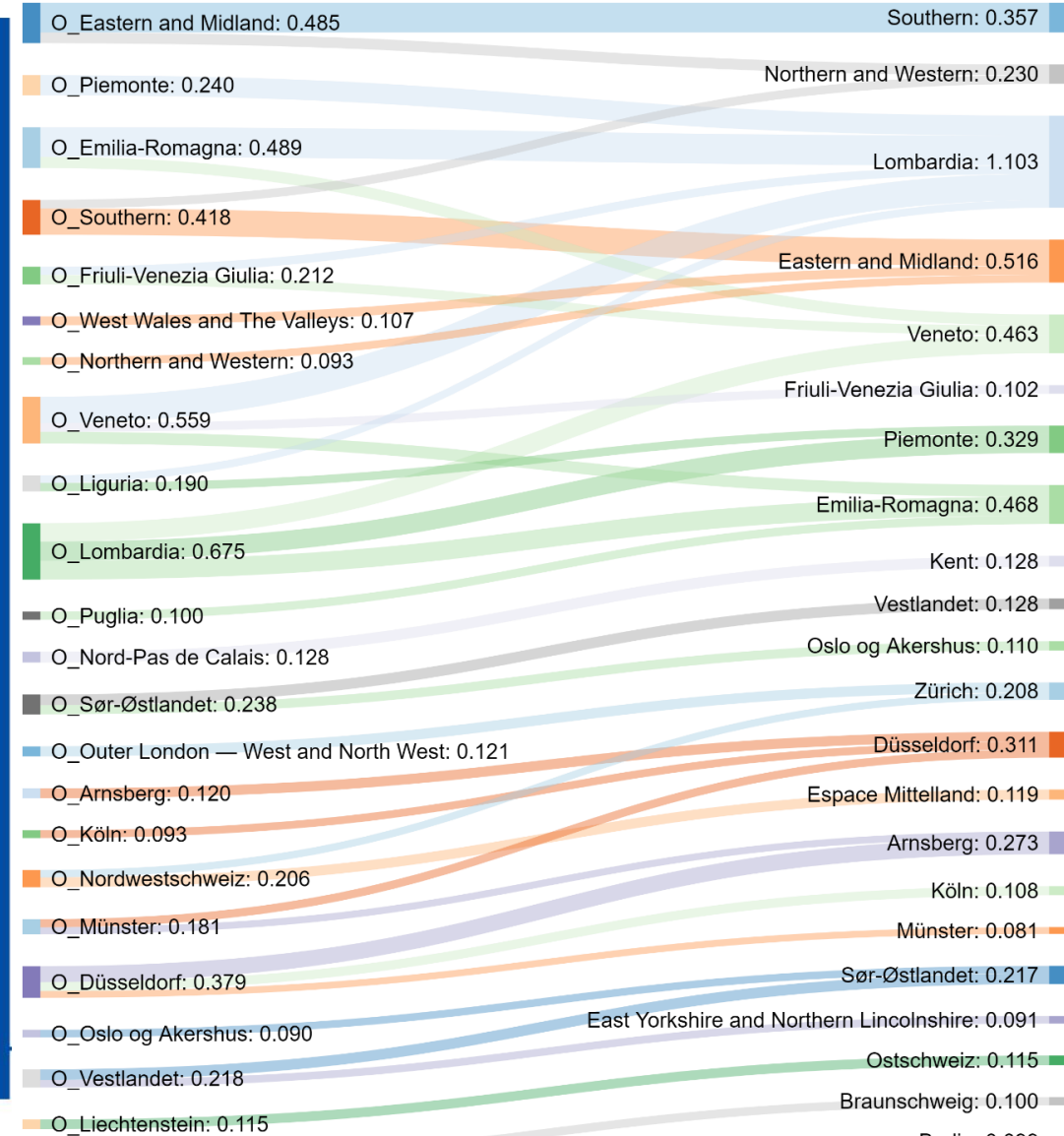
Goods flow, 2018

Flow Volume in million euros  
(Aggregation of both directions)



Data displayed:  
Percentiles from 0.94 to 1.00

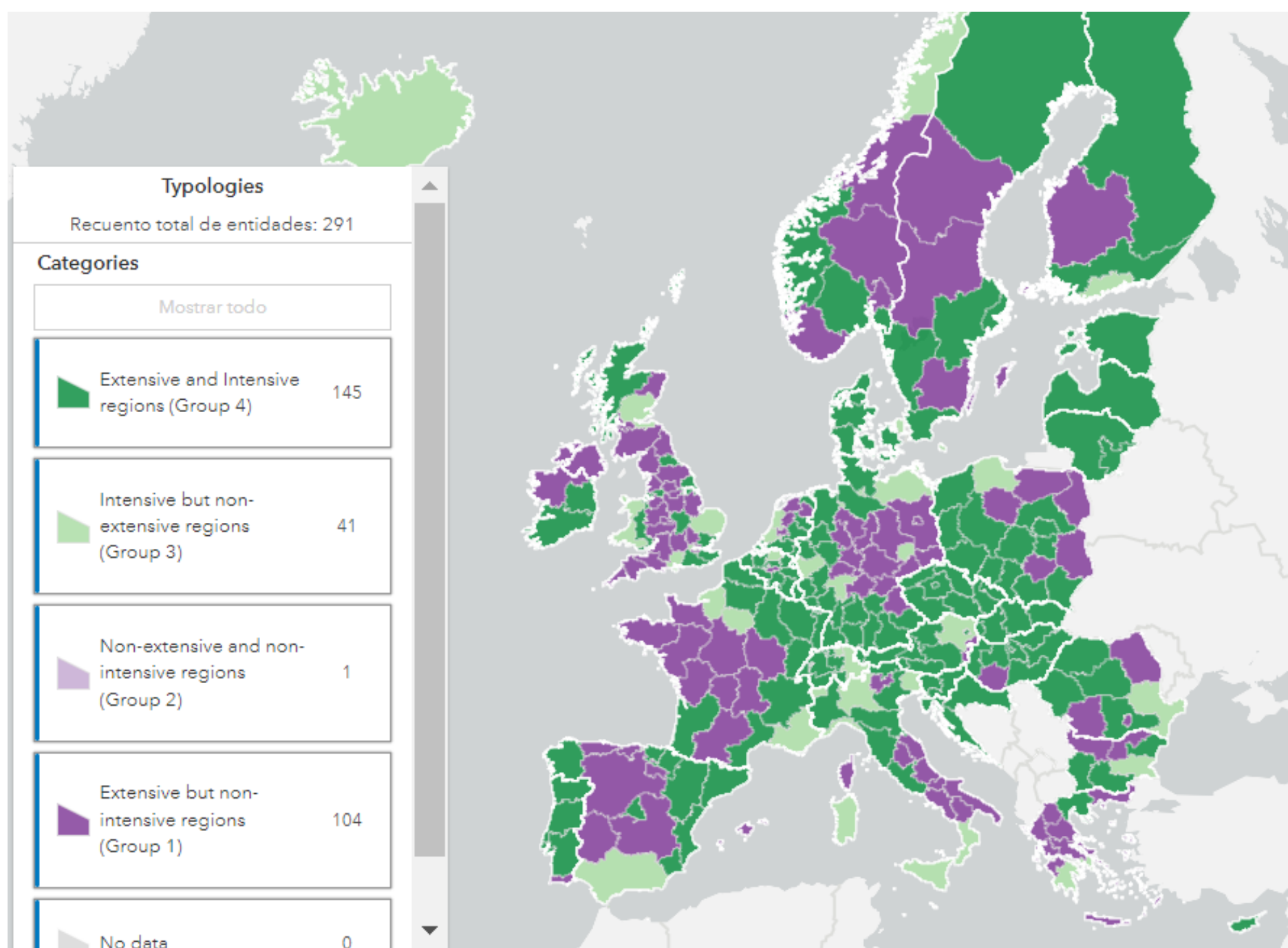
Sankey diagram with the main bilateral-flows.  
R2R. ROW and Intra-regional excluded. Average  
figures 2010-2018. % over €.



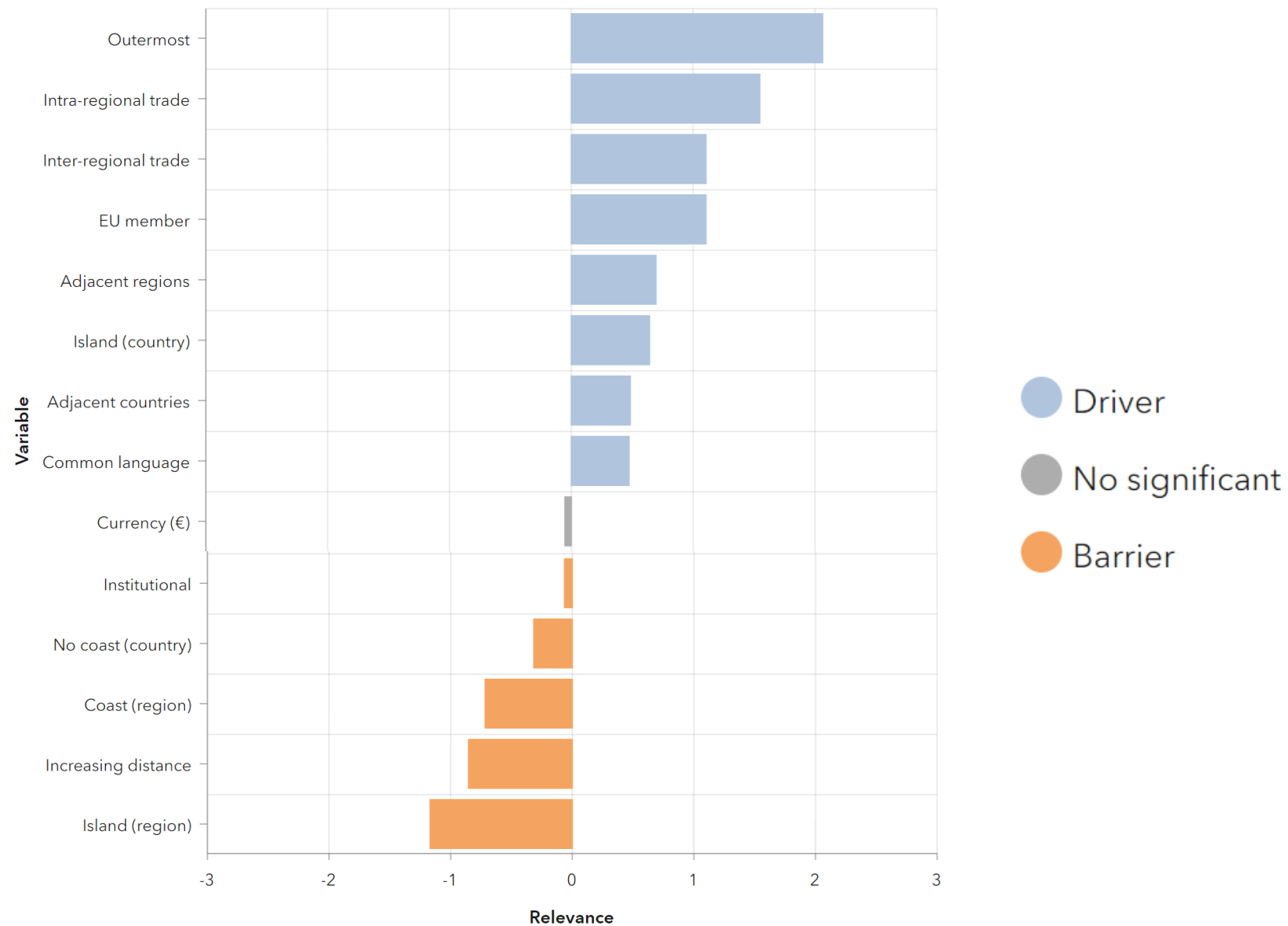
2.2.

## Trade of goods: results

**Cluster analysis:  
4 typologies.**



## 2.2.

Trade  
of  
goods:  
resultsGravity model. European Nuts 2 Regions. Panel: 2010-2018.  
Trade of goods from region “i” to region “j” in year “t”.



# 3

## Trade of Services

- **Aim:**
  - To produce region-to-region matrixes of different service sectors within and between European countries.
  - The flows cover 2010-2018 and are split by 12 service sectors based on the EBOPS-2010 classification.
- **Modes of service delivery:**
  - Mode 1: Cross-Border Provision
  - Mode 2: Consumption Abroad
  - Mode 4: Producer Presence
- **Data Sources:**
  - Inter-national flows for 12 service sectors reported by WTO-UNCTAD and OECD (BATIS), compatible with the FIGARO Input-Output national-sectoral totals.
  - Regionalization based on inter-regional indicators for each sector.



# 3.1.

## Trade of Services: Methodology



- **Mode 1 (Cross-border provision):** services supplied telephone.



- **Mode 2 (Consumption abroad):** tourism.



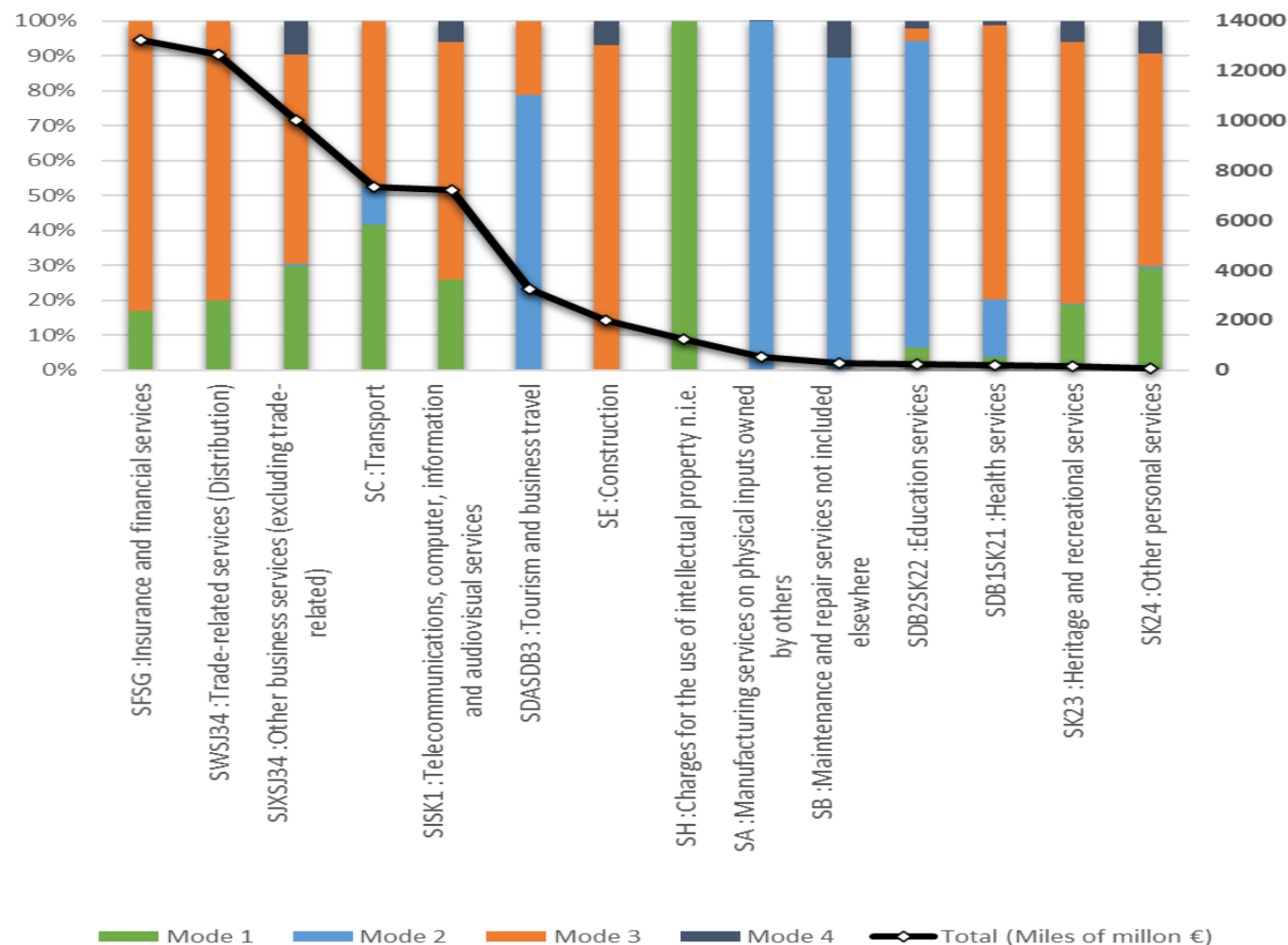
- **Mode 3 (Commercial presence):** Trans-national firms.



- **Mode 4 (Producer presence):** architect travelling abroad.

ESPON countries export of services by mode and EBOPS.

Share in % and Th. of million Euros, 2017.



### 3.1.

## Trade of Services: Methodology > Input Data

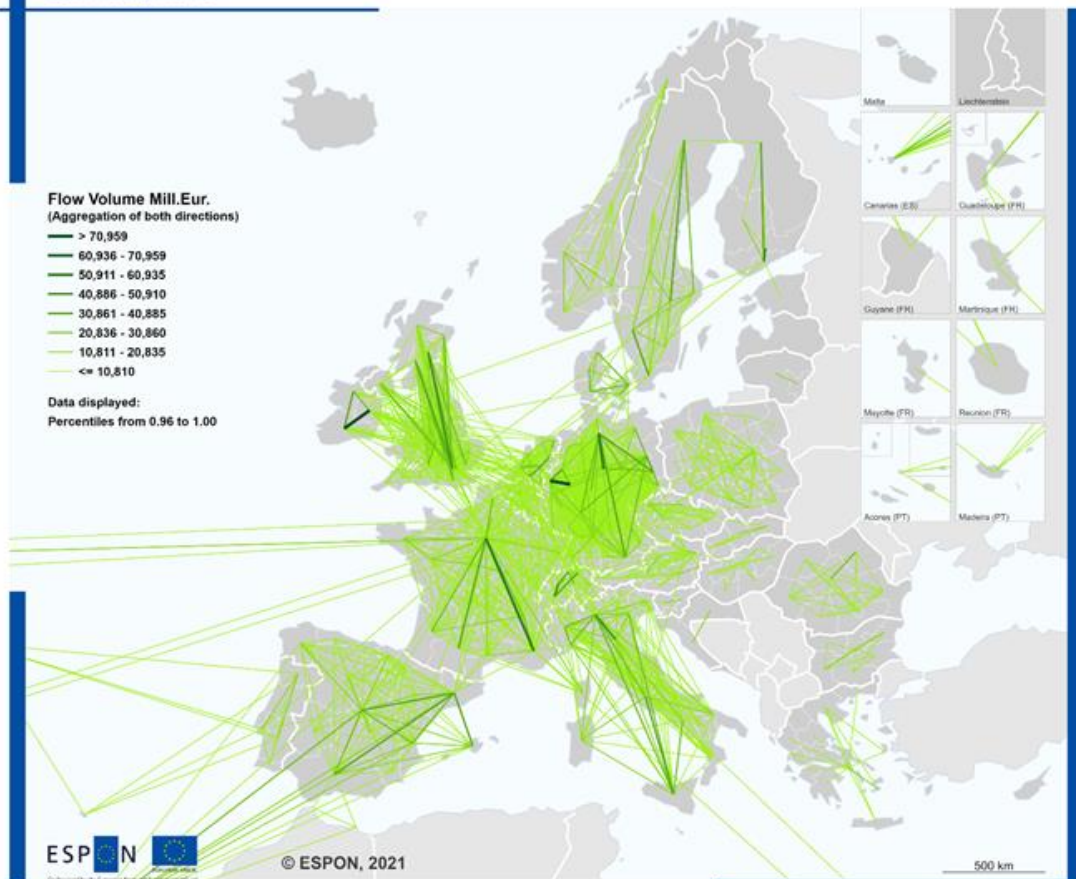
- C2C flows of services by EBOPS sectors and years: WTO-UNCTAD-OCDE and Eurostat.
- FIGARO IO Tables (JRC): sector-country-year total outputs of constrain.

Mode	Inter-regional Indicators
<b>Mode 1. Cross-Border Provision:</b>	<ul style="list-style-type: none"> <li>• Facebook: the social connectedness index</li> <li>• “Mail and parcels” by road (ERFT-NST15)</li> <li>• Transport flows: freight.</li> </ul>
<b>Mode 2: Consumption Abroad</b>	<ul style="list-style-type: none"> <li>• Flows of people by Air.</li> <li>• Flows of people by Ship.</li> <li>• Flows of people by Train.</li> </ul>
<b>Mode 4: Producer Presence</b>	<ul style="list-style-type: none"> <li>• Interregional labour flows employed in service sectors: (Labour Force Survey, from Eurostat),</li> </ul>

# 3.2.

## Trade of Services: Results

Services, 2018



Regional level: NUTS 2 (2016)  
Source: ESPON IRIE (S&W FlowMapper), 2021  
Origin of data: Cepreid  
© EuroGeographics for the administrative boundaries

The main Inter-regional flows. All service sectors.  
2010 vs 2018. Millions of €.

2010		2018	
	Region to Region		Region to Region
1	DEA1 (Düsseldorf) - DEAS (Arnsberg)	1	IE05 (Southern) - IE06 (Eastern and Midland)
2	DE60 (Hamburg) - DE91 (Braunschweig)	2	DEA1 (Düsseldorf) - DEAS (Arnsberg)
3	FRLO (Provence-Alpes-Côte d'Azur) - FR10 (Ile-de-France)	3	DE60 (Hamburg) - DE91 (Braunschweig)
4	FR10 (Ile-de-France) - FRLO (Provence-Alpes-Côte d'Azur)	4	SE33 (Övre Norrland) - SE12 (Östra Mellansverige)
5	IE05 (Southern) - IE06 (Eastern and Midland)	5	CH03 (Nordwestschweiz) - CH02 (Espace Mittelland)
6	FI1C (Etelä-Suomi) - FI1B (Helsinki-Uusimaa)	6	FI1C (Etelä-Suomi) - FI1B (Helsinki-Uusimaa)
7	IE05 (Southern) - IE04 (Northern and Western)	7	IE05 (Southern) - IE04 (Northern and Western)
8	DE40 (Brandenburg) - DE30 (Berlin)	8	ITH5 (Emilia-Romagna) - ITC4 (Lombardia)
9	UKI7 (Outer London — West and North West) - UKM7 (Eastern Scotland)	9	FR10 (Ile-de-France) - FRLO (Provence-Alpes-Côte d'Azur)
10	UKM7 (Eastern Scotland) - UKI7 (Outer London — West and North West)	10	FI1B (Helsinki-Uusimaa) - FI1D (Pohjois- ja Itä-Suomi)
11	FI1B (Helsinki-Uusimaa) - FI1D (Pohjois- ja Itä-Suomi)	11	FRLO (Provence-Alpes-Côte d'Azur) - FR10 (Ile-de-France)
12	ES51 (Cataluña) - ES61 (Andalucía)	12	UKI7 (Outer London — West and North West) - UKM7 (Eastern Scotland)
13	ES30 (Comunidad de Madrid) - ES61 (Andalucía)	13	DE40 (Brandenburg) - DE30 (Berlin)
14	DE60 (Hamburg) - DE40 (Brandenburg)	14	CH02 (Espace Mittelland) - CH01 (Région lémanique)
15	CH04 (Zürich) - CH01 (Région lémanique)	15	UKM7 (Eastern Scotland) - UKI7 (Outer London — West and North West)
16	DK03 (Syddanmark) - DK02 (Sjælland)	16	CH01 (Région lémanique) - CH02 (Espace Mittelland)
17	UKM8 (West Central Scotland) - UKI7 (Outer London — West and North West)	17	DE60 (Hamburg) - DE40 (Brandenburg)
18	UKI7 (Outer London — West and North West) - UKM8 (West Central Scotland)	18	CH01 (Région lémanique) - CH04 (Zürich)
19	ES51 (Cataluña) - ES30 (Comunidad de Madrid)	19	ES51 (Cataluña) - ES53 (Illes Balears)
20	ITC3 (Liguria) - ITC1 (Piemonte)	20	SE33 (Övre Norrland) - SE11 (Stockholm)



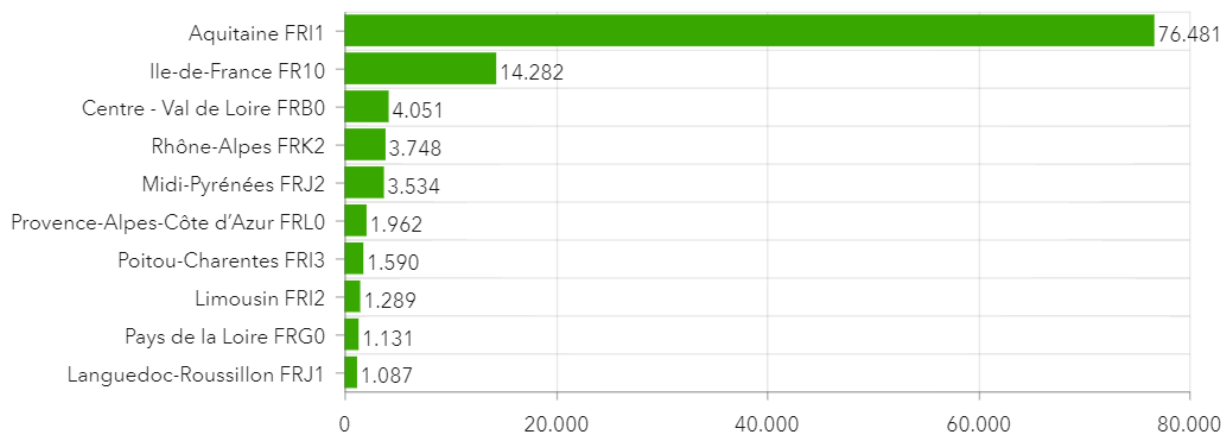
# 3.2.

## Trade of Services: Results

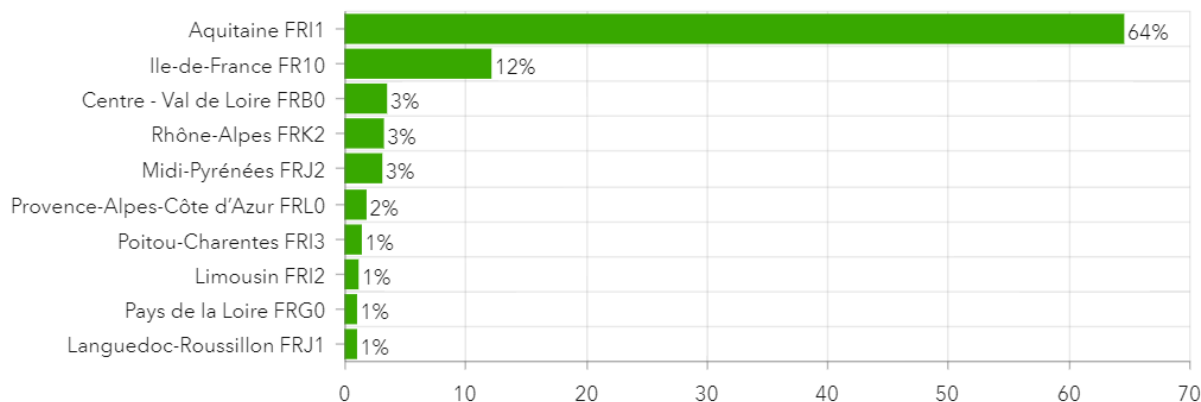
### Example: Aquitaine (FRI1). Services. Main Outgoing Flows

Trade of services. Outgoing flows from Aquitaine FRI1

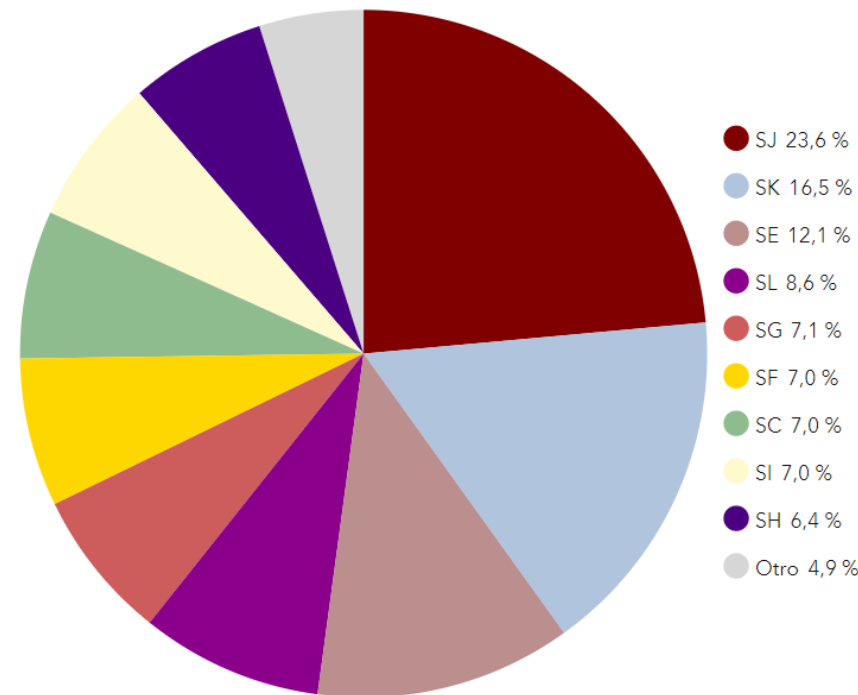
Top10 destination regions for selected origin. Annual average (M€)



Top10 destination regions for selected origin. Percentage of total outgoing flows



Trade of services from selected origin by sectors



#### Sectors

**Sector SA:** Manufacturing services on physical inputs owned by others

**Sector SB:** Maintenance and repair services not included elsewhere

**Sector SC:** Transport

**Sector SD:** Travel

**Sector SE:** Construction

**Sector SF:** Insurance and pension services

**Sector SG:** Financial services

**Sector SH:** Charges for the use of intellectual property n.i.e.

**Sector SI:** Telecommunications, computer, and information services

**Sector SJ:** Other business services

**Sector SK:** Personal, cultural, and recreational services

**Sector SL:** Government goods and services n.i.e.

Outgoing flows from origin region

**1.067.891 M€**

Total 2010-2018

Outgoing flows from origin region

**118.655 M€**

Annual average

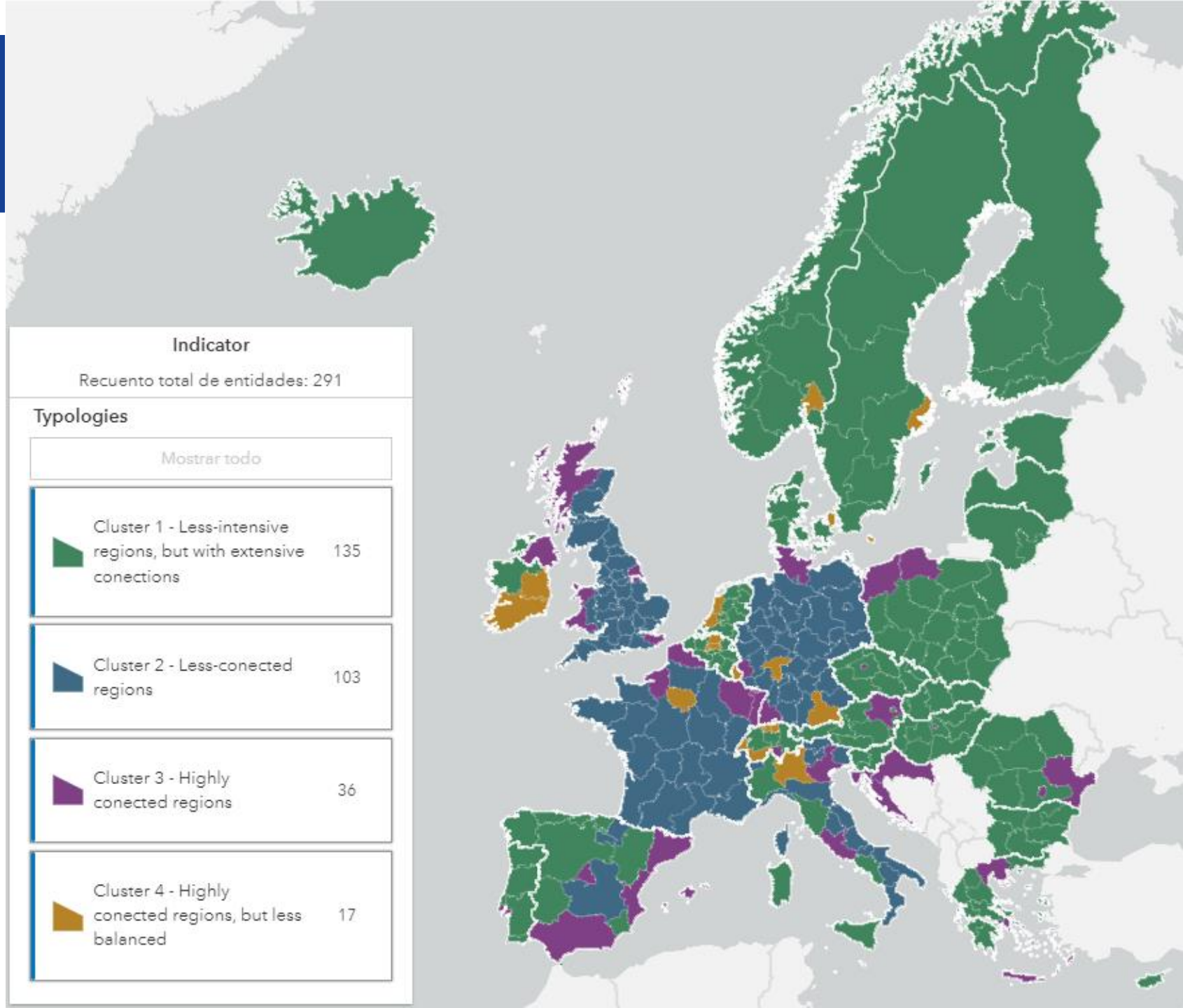
Outgoing

Incoming

## 3.2.

# Trade of Services: Results

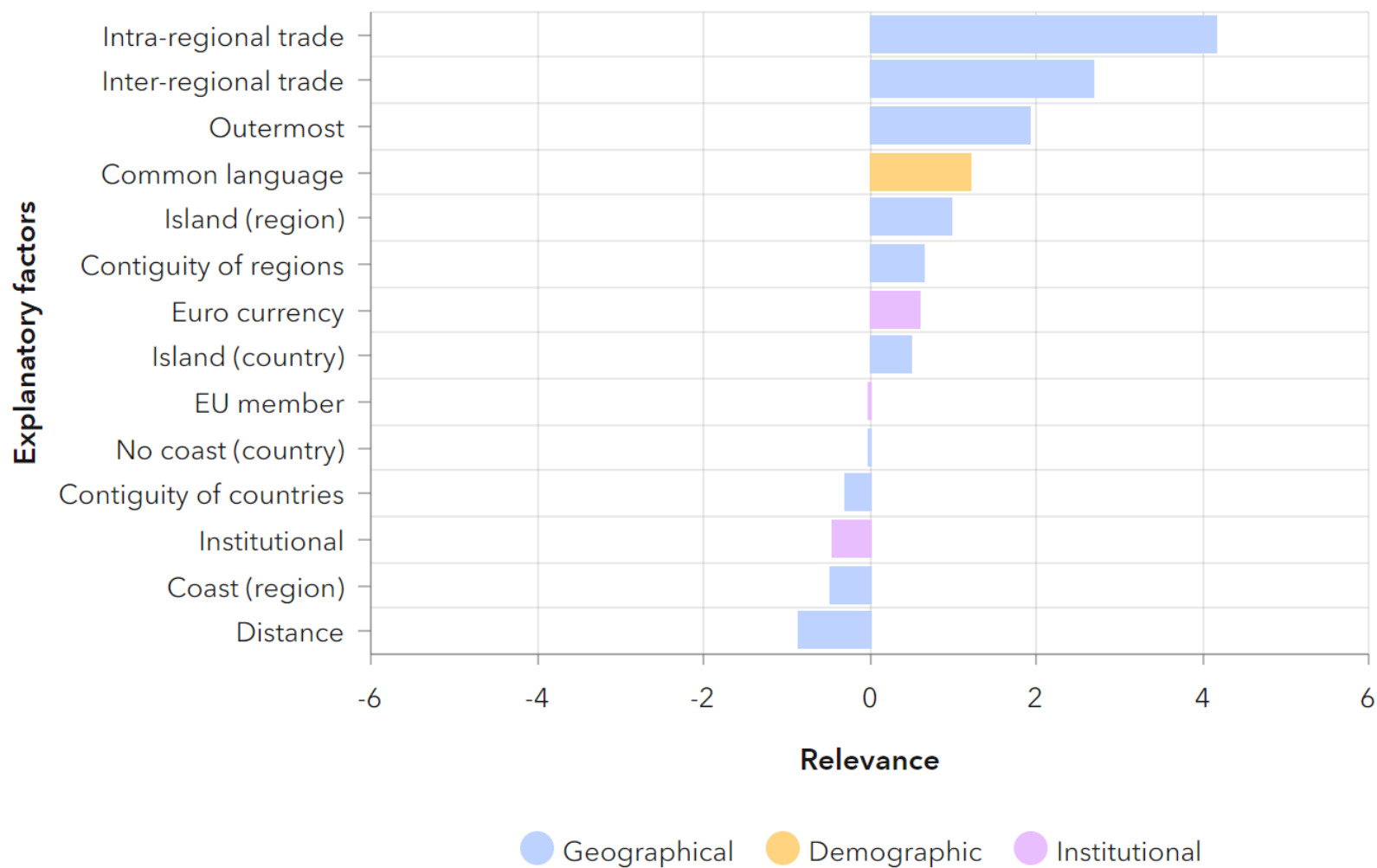
**Cluster analysis:  
4 typologies.**



## 3.2.

## Trade of services: results

**Gravity model. Nuts 2 Regions. Panel: 2010-2018.**  
**Trade of Services from region “i” to region “j” in year “t”.**



- We estimate the first ever comprehensive dataset of region to region (NUTS2) flows of goods and services between and within European countries, in totals and with sectoral detail (14+12). **Goods (4 transport modes) ; Services (3 modes of delivery).**
- The flows allow new analysis: identify interlinkages, dependencies, typologies...
- Results:
  - Trade of goods and services follows the **gravity equation: GDP, distance, contiguity...**
  - **Goods: High openness** is certain small Eastern-European countries (Slovakia, Slovenia, Czechia, Hungary, etc.),...
  - **Goods and Services: large interregional flows** between the largest countries and regions, but also within Ireland and Italy (concentration).
    - **“Home bias”** within countries and within regions:
      - The **intra-national flows** of each country are much larger than any international bilateral flows.
      - The **intra-regional trade** is also very relevant.
      - Home bias is larger in services than in goods.



# // Thank you

## Annex for the discussion (if needed)

# 5 Analysing trade of goods

Gravity equation. All goods. NUTS 2. PPML. 2010-18.

Border effect

Intra	Inter
5	3
22	6



$$T_{ijt} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 INTRA_{ij} + \beta_4 INTER_{ij} + \beta_5 CONTIG_{ij} + \beta_6 DIST_{ij} + \beta_7 X_{ij} + \mu_{it} + \mu_{jt} + \varepsilon_{ijt}$$

Variable	Definition	Source
Ln(GDPi)	Log of Gross domestic Product of the origin NUTS2 region	Eurostat and CEPII
Ln(GDPj)	Log of Gross domestic Product of the destination NUTS2 region	Eurostat and CEPII
Intra	Intra-regional trade dummy	Own elaboration
Inter	Inter-regional trade dummy.	Own elaboration
LnDist	Log of distance (in km)	JRC and CEPII.
Contig	Contiguity dummy variable. Takes value 1 if the partners are adjacent NUTS2 regions.	Own elaboration
Contig_c	Contiguity dummy variable. Takes value 1 if the partners belong to adjacent countries.	CEPII
ComLang	Common language dummy variable. Takes value 1 if the partners use the same common language.	CEPII and own elaboration
EU	European Union dummy variable. Takes value 1 if both partners are EU members.	Own elaboration
EUM	Euro dummy variable. Takes value 1 if euro is the official currency for both partners.	Own elaboration
Island	Island dummy variable. Takes value 1 if the NUTS2 region of origin or destination are an island.	Own elaboration
Coast	Dummy variable. Takes value 1 if the NUTS2 region of origin or destination are regions with coast.	Own elaboration
Inst	Difference in the quality of institution of both NUTS2 partners	European quality of government index (Charron et al., 2014).
Out	Dummy variable. Takes value 1 if the NUTS2 region of origin or destination is an outermost region.	Own elaboration
Island_c	Island dummy variable. Takes value 1 if the origin or destination country is an island	CEPII and own elaboration
Nocoast_c	Dummy variable. Takes value 1 if the origin or destination country are inland countries.	CEPII and own elaboration

Dep. variable	Trade flow (log euros) OLS M1	Trade flow (euros) PPML M2	Trade flow/(GDPi*GDPj)				
			PPML M3	PPML M4	PPML M5	PPML M6	PPML M7
Ln(GDPi)	0.423*** -0.004	0.438*** -0.042					
Ln(GDPj)	0.551*** -0.006	0.706*** -0.023					
Intra	2.247*** -0.104	3.048*** -0.122	3.106*** -0.222	2.730*** -0.231	2.693*** -0.229	1.616*** -0.152	1.548*** -0.142
Inter	1.792*** -0.033	1.410*** -0.078	1.693*** -0.148	1.440*** -0.154	1.406*** -0.152	1.156*** -0.093	1.106*** -0.085
LnDist	-0.802*** -0.0116	-0.185*** -0.044	-0.495*** -0.067	-0.491*** -0.058	-0.495*** -0.058	-0.838*** -0.041	-0.851*** -0.039
Contig	1.694*** -0.0327	1.650*** -0.06	1.432*** -0.093	1.200*** -0.079	1.196*** -0.079	0.714*** -0.053	0.699*** -0.051
Contig_C	0.387*** -0.016	0.558*** -0.047	0.647*** -0.07	0.858*** -0.063	0.846*** -0.063	0.500*** -0.046	0.479*** -0.043
ComLang	-0.125*** -0.024	-0.016 -0.054	0.138 -0.111	0.463*** -0.091	0.484*** -0.091	0.450*** -0.058	0.476*** -0.055
EU	0.588*** -0.016	-0.242*** -0.075	1.066*** -0.172	0.498* -0.295	0.800** -0.328	0.740*** -0.26	1.104*** -0.221
EUM	-0.028*** -0.01	-0.117 -0.073	-0.971*** -0.12	-0.009 -0.066	-0.027 -0.063	-0.033 -0.054	-0.054 -0.052
Island	-0.058*** -0.014	0.0983 -0.104	0.126 -0.2	-0.316* -0.174	-0.317* -0.174	-1.192*** -0.103	-1.164*** -0.101
Coast	-0.077*** -0.01	0.258*** -0.066	0.11 -0.119	-0.081 -0.158	-0.081 -0.158	-0.713*** -0.085	-0.711*** -0.085
Inst	-0.028*** -0.006	-0.256*** -0.045	-0.184*** -0.027	-0.136*** -0.026	-0.135*** -0.026	-0.0626*** -0.019	-0.0580*** -0.019
Outermost	0.443*** -0.023	-1.365*** -0.349	-0.757** -0.38	-0.33 -0.422	-0.328 -0.422	2.099** -0.954	2.059** -0.972
Island_c	-0.510*** -0.011	-0.612*** -0.102	-1.513*** -0.121	0.311** -0.139	0.296** -0.139	0.658*** -0.09	0.639*** -0.09
Nocoast_c	0.012 -0.01	-0.006 -0.06	0.202* -0.117	-0.252** -0.101	-0.240** -0.096	-0.324*** -0.06	-0.313*** -0.057
Constant	-3.260*** -0.133	-7.081*** -0.582	3.073*** -0.543	3.602*** -0.466	3.356*** -0.472	6.469*** -0.351	6.250*** -0.339
Observations	793,584	793,584	796,554	796,554	796,554	796,554	793,584
R2 / Pseudo R2	0.478	0.776	0.763	0.82	0.821	0.872	0.878

## 5

## Results. Trade of Services

Gravity equation. OLS &amp; PPML.

Total services. 2010-18. Units: Mill. of €.

$$S_{ij}^{eukt} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 INTRA_{ij} + \beta_4 INTER_{ij} + \beta_5 CONTIG_{ij} + \beta_6 DIST_{ij} + \beta_7 X_{ij} + \mu_{it} + \mu_{jt} + \varepsilon_{ijt}$$

Dep. Var	$S_{ij}^{eukt}$ Eq.(19).	$S_{ij}^{eukt}$ Eq.(20)	$\frac{S_{ij}^{eukt} GDP_t}{GDP_{it} GDP_{jt}}$ Eq.(21)
Estimator	OLS	PPML	PPML
VAR/Model	M1	M2	M3
Ln(GDP <sub>i</sub> )	0.450***		
Ln(GDP <sub>j</sub> )	0.470***	0.291***	
Intra	5.279***	5.894***	4.161***
Inter	3.194***	3.625***	2.680***
Ln(Dist <sub>ij</sub> )	-0.524***	-0.225***	-0.879***
Contig_r	1.227***	0.662***	0.627***
Contig_c	-0.275***	0.314***	-0.306***
Comlang_off	0.366***	0.612***	1.202***
EU	-0.217***	-0.533***	-0.0269
UEM	0.111***	0.320***	0.593***
Island	0.615***	0.543***	0.956***
Coast	0.0582***	-0.288***	-0.488***
Inst	0.00153	-0.180***	-0.450**
Outermost	0.00140	-0.221	1.902***
Island_c	0.197***	0.375***	0.476***
Nocoast_c	0.0874***	-0.0157	-0.0366
Constant	-4.379***	1.687***	6.272***
Observations	790,916	790,916	792,396
R <sup>2</sup> /Pseudo R <sup>2</sup>	0.720	0.918	0.988
Year FE	YES	YES	YES
Country FE	NO	NO	NO
Contry-Year FE	NO	NO	NO
Region FE	NO	YES	YES
Region-Year FE	NO	YES	YES



# 5

## Explanations for the home bias in G&S trade

- External barriers to trade (**the SEM is incomplete**):
  - Non-tariff barriers (language barriers; labelling; standards; red-tape; public procurement;...)
  - Economies of agglomeration: clusters...
  - Historical inertia: the persistence of borders...
  - New barriers pop-up every year: COVID-19; EU Green Deal; BREXIT...

