



THE LONDON SCHOOL  
OF ECONOMICS AND  
POLITICAL SCIENCE ■



# Patents, trade and foreign direct investment in the European Union

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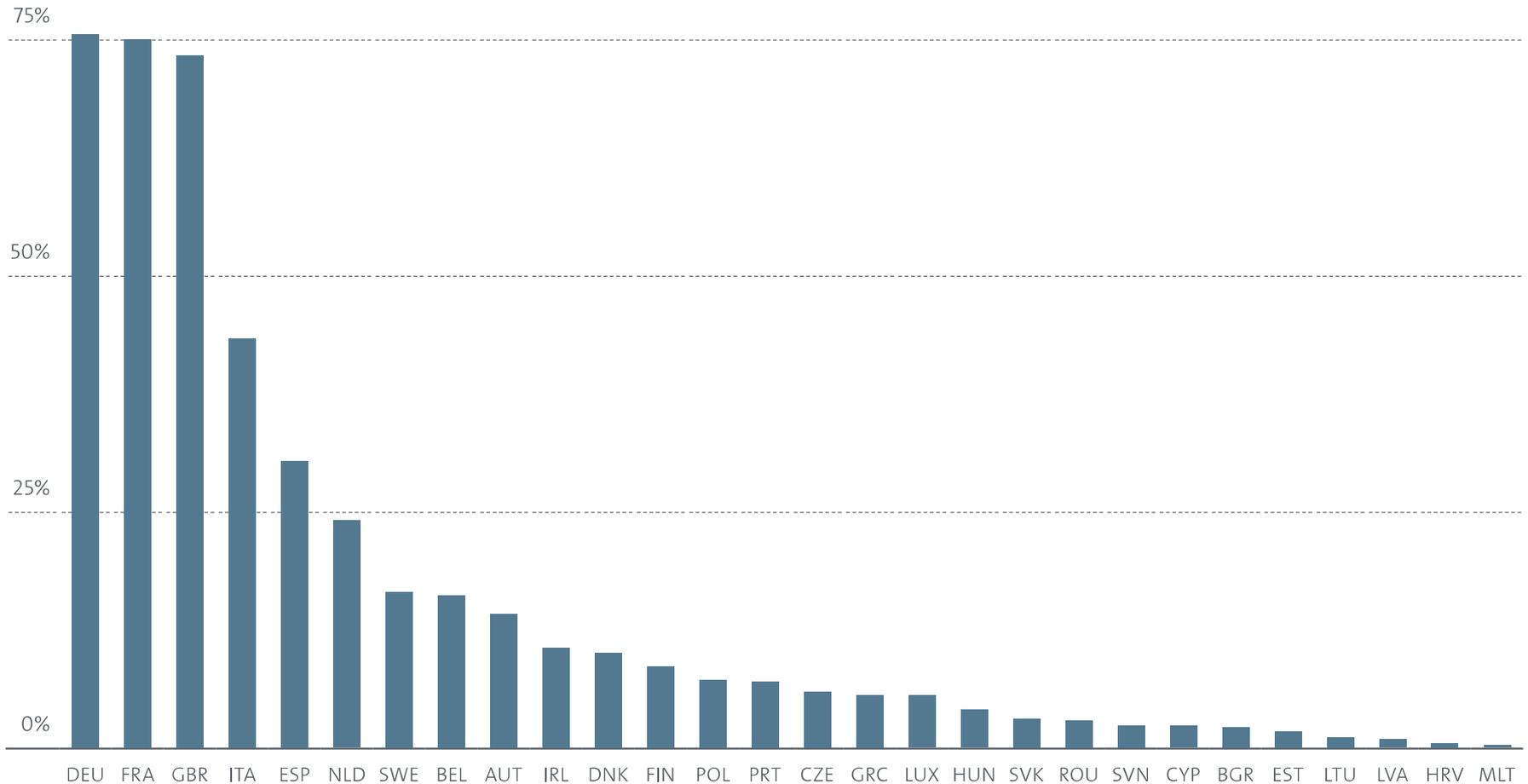
IPSDM conference 2017

# Patents and the European Single Market

- European single market largely viewed as success, but still incomplete
- European patent system:
  - Centralized examination of European applications at EPO
  - Validation in the 28 national offices
  - Litigation in each country
- No EU-wide market for technologies

# Limited protection across EU

National validations of granted EP patents  
2005-2014, excluding domestic inventions:



# Potential consequences of fragmentation

- Access to foreign technology key to productivity growth (e.g. Keller, 2010)
- Technology transferred through international trade, foreign direct investment, joint ventures, and licensing
- All these channels are responsive to patent protection in middle and high-income countries (e.g. Fink & Maskus, 2005)

# Objectives of the study

1. Assess the role played by the *current* European patent system in supporting trade and foreign direct investment in the European Single Market
  - In particular in high-tech manufacturing industries that intensively use intellectual property rights
2. Infer potential benefits of a better harmonization of the European patent system

# Data: High-IP trade & FDI

- Sources:
  - Trade: BACII from UN COMTRADE, country-pair-year-product flows
  - Bilateral FDI: BvD Zephyr, all deals between firms (acquisition, capital increase, minority stake)
- Identifying *high-IP* trade and investment flows
  - Use Delgado et al (2013) classification and correspondance tables to turn into HS products and NACE codes

# High-IP industries

## Biopharmaceuticals

Medicinal & pharmaceutical products

## Analytical Instruments (AI)

Optical instruments

Laboratory instruments

Process instruments

## ICT

Office machines

Computers & peripherals

Communications equipment

Electrical & electronic components

## Medical Devices

Diagnostic substances

Medical equipment & supplies

## Chemicals

Organic chemicals

Chemically based ingredients

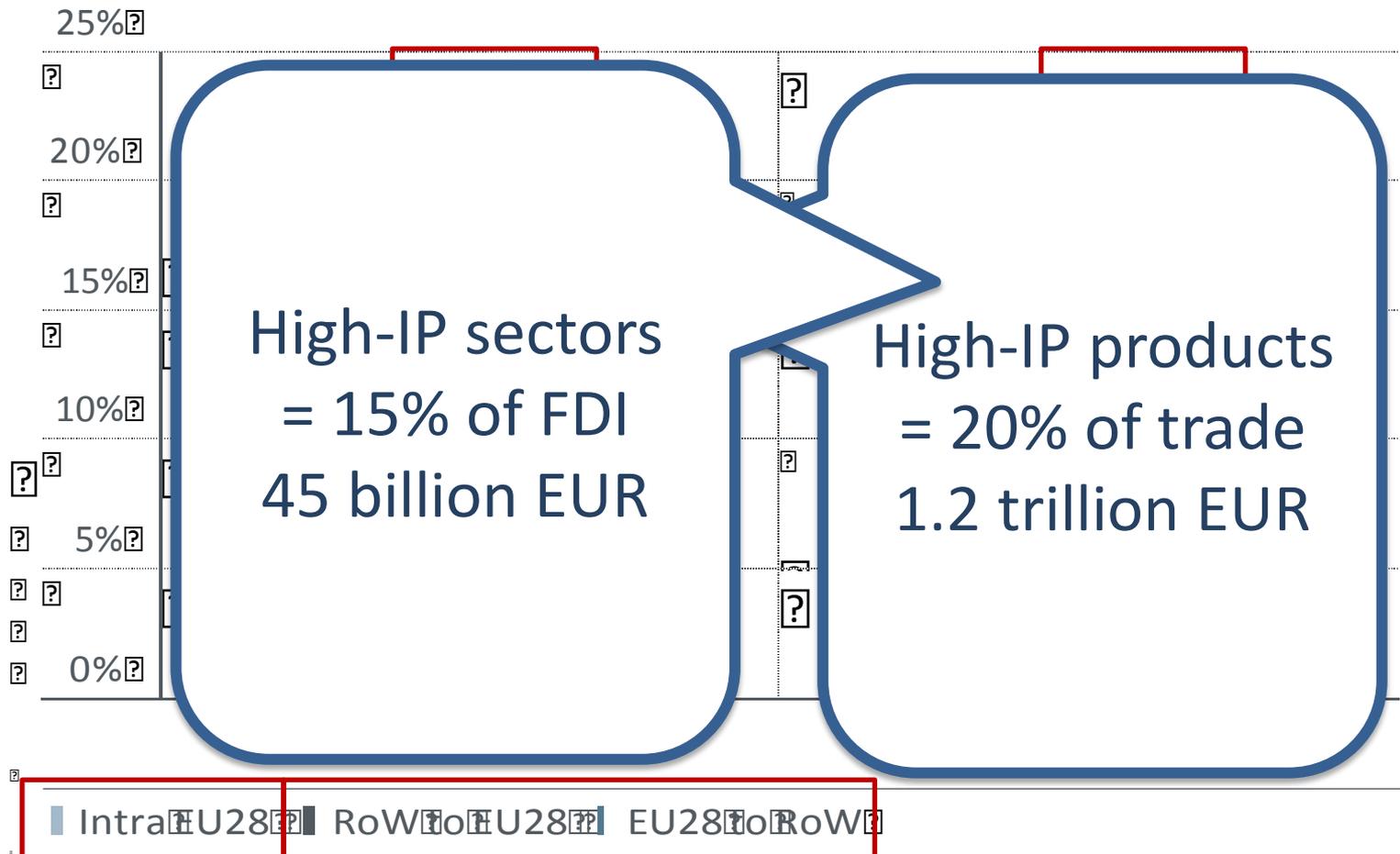
## Production Technology (PT)

Materials & tools

Process & metalworking machinery

General industrial machinery

# Proportion of high-IP industries in EU trade and FDI



Source: Comtrade, Zephyr of Bureau van Dijk, Delgado et al. (2013)

# Econometric analysis

- Analyse the impact of patent protection on incoming trade and FDI flows in EU countries

$$F_{ijt} = \exp\{\beta_1 Patentprotection_{jt-1} + \beta_2 X_{ijt-1} + \gamma_{ij}\} + u_{ijt}$$

- $F_{ijt}$  is the flow of trade or the flow of FDI from source country  $i$  to EU28 country  $j$ , in year  $t$
- Controls for GDP, GDP per capita, Schengen, EEA, Tariffs, NTB, Eurozone, barriers to FDI
- Country-pair and year fixed effects

# Measuring patent protection

- Product of two different indices (Hu and Png, 2013; Maskus and Yang, 2013):
  - Park index: composite indicator of patent protection
    - 5 dimensions: extent of coverage, membership in international agreements, enforcement mechanisms, duration of protection and restrictions on patent rights.
  - Index of legal systems and property rights in country  $j$  in year  $t$  (from Fraser Institute's Economic Freedom of the World Annual Report).

# Trade results

	(1)	(2)	(3)	(4)
	Total Trade	High-IP	High-IP EU origin	High-IP Other origin
<i>Patent protection</i>	0.0058 (0.0032)	0.0223*** (0.0063)	0.0132* (0.0073)	0.0405*** (0.0108)
Log GDP <sub>i</sub>	0.6178*** (0.0299)	0.8169*** (0.0694)	0.9056*** (0.1394)	0.9072*** (0.0807)
Log GDP <sub>j</sub>	-1.5302*** (0.3274)	-2.0112*** (0.499)	-2.4781*** (0.7787)	-2.6812** (1.0915)
Log GDPCAP <sub>j</sub>	1.9493*** (0.3122)	2.0112*** (0.499)	3.0589*** (0.7200)	2.5279*** (1.0643)
TARIFFS (0-10)	-0.0343		-0.0189	0.01210
NTBAR				
Both EEA members	(0.0238)	(0.0407)	(0.0421)	(0.1355)
Both in the Eurozone	0.0340 (0.0238)	0.0345 (0.0436)	0.0339 (0.0410)	
Both in Schengen	-0.0036 (0.0148)	-0.0438 (0.0237)	-0.0543** (0.0273)	-0.0160 (0.0406)
<b>Observations</b>	<b>43,945</b>	<b>43,945</b>	<b>6448</b>	<b>33822</b>
<b>Number of country-pairs</b>	<b>4,091</b>	<b>4,091</b>	<b>598</b>	<b>3136</b>

No impact of IPF on total trade

Strong impact in high-IP products

Larger impact on non-EU exporters

# FDI results

	(5)	(6)	(7)	(8)
	Pooled	High-IP	High-IP EU origin	High-IP Other origin
<i>Patent protection</i>	-0.008 (0.057)	0.223*** (0.078)	0.141** (0.061)	0.248* (0.13)
Log GDP <sub>i</sub>	-0.469 (0.623)	0.704 (0.583)	-6.345** (3.008)	2.652 (2.296)
Log GDP <sub>j</sub>	-5.507 (6.18)	0.033 (0.02)	-5.945 (19.443)	8.878 (22.669)
Log GDPCAP <sub>j</sub>	7.597 (6.478)	0.033 (0.02)	14,509 (20.818)	-11.163 (22.431)
Freedom of FDI and movement of capital	-0.053		0.757**	0.272
Labour regulations (0 - 10 flexible)				
Business regulations (0 - 10 flexible)			(0.653)	(0.453)
EEA member	-0.007 (0.57)	-0.03 (0.977)	-0.136 (1.127)	
Eurozone	0.137 (0.618)			
Schengen	0.35 (0.382)	2.026*** (0.657)	2.613*** (0.578)	-0.617 (0.557)
<b>Observations</b>	<b>1917</b>	<b>922</b>	<b>381</b>	<b>171</b>
<b>Number of country-pairs</b>	<b>381</b>	<b>176</b>	<b>76</b>	<b>38</b>

No impact on total

Strong impact on high-IP sectors (larger than trade)

Larger impact on non-EU investors

# Assessing the impact of patent harmonisation

- Patent protection influences trade and FDI flows to EU countries
  - in High-IP industries only
- What would be the impact of patent harmonization in Europe?
- Define harmonization as EU-wide alignment of the index of patent protection on the maximum value observed in EU Member States

# Simulated impact of a harmonization of patent protection in the EU

Country	(1)	(2)	(3)
	% increase in Park index	% increase in high-IP trade	% increase in high-IP FDI
Austria	+ 8%	+ 6%	+ 69%
Bulgaria	+ 20%	+ 9%	+ 98%
Cyprus	+ 49%	+ 24%	+ 263%
Czech Republic	+ 20%	+ 5%	+ 53%
Greece	+ 20%	+ 5%	+ 53%
Hungary	+ 20%	+ 5%	+ 53%
Lithuania	+ 20%	+ 5%	+ 53%
Malta	+ 21%	+ 5%	+ 186%
Poland	+ 17%	+ 10%	+ 106%
Portugal	+ 8%	+ 5%	+ 57%
Romania	+ 17%	+ 9%	+ 96%
Slovak Republic	+ 8%	+ 4%	+ 49%
Spain	+ 8%	+ 5%	+ 57%
Sweden	+ 3%	+ 2%	+ 27%
United Kingdom	+ 3%	+ 2%	+ 26%
<b>Average: impacted countries *</b>		<b>+ 5%</b>	<b>+ 29%</b>
<b>Average: all EU countries *</b>		<b>+ 2%</b>	<b>+ 15%</b>

+5% high-IP trade (15 bn EUR)

+29% high-IP FDI (1.8 bn EUR)

+10%

+106%

\* The weighted average for FDI does not include Cyprus, Greece and Malta due to missing values.

# Key messages

- Incoming trade and FDI flows in high-tech manufacturing industries are sensitive to patent protection in EU countries
- The single market for technologies is yet to be realized
  - Incoming high-IP trade and FDI flows could increase by 5% and 29% as a result of an alignment of EU countries on the best existing standard of patent protection
  - Thereby enhancing technology transfer into and within Europe and leading to productivity growth
- The Unitary Patent should remove most currently existing limitations

**To download the study:**

**[www.epo.org/publications](http://www.epo.org/publications)**

# The Unitary Patent and Unified Patent Court

- European patent for the entire territory of the participating EU Member States:
  - Avoid complex and costly national validation procedures, same protection in all jurisdictions
  - No need to translate patent specifications
  - No need to pay validation fees to national patent offices and associated representation costs
  - Single renewal payment for all the participating MS = Germany + France + Netherlands + UK
- Unified Patent Court (UPC): unified specialist court to hear cases in relation to European patents through a harmonised approach to patentability and patent infringement

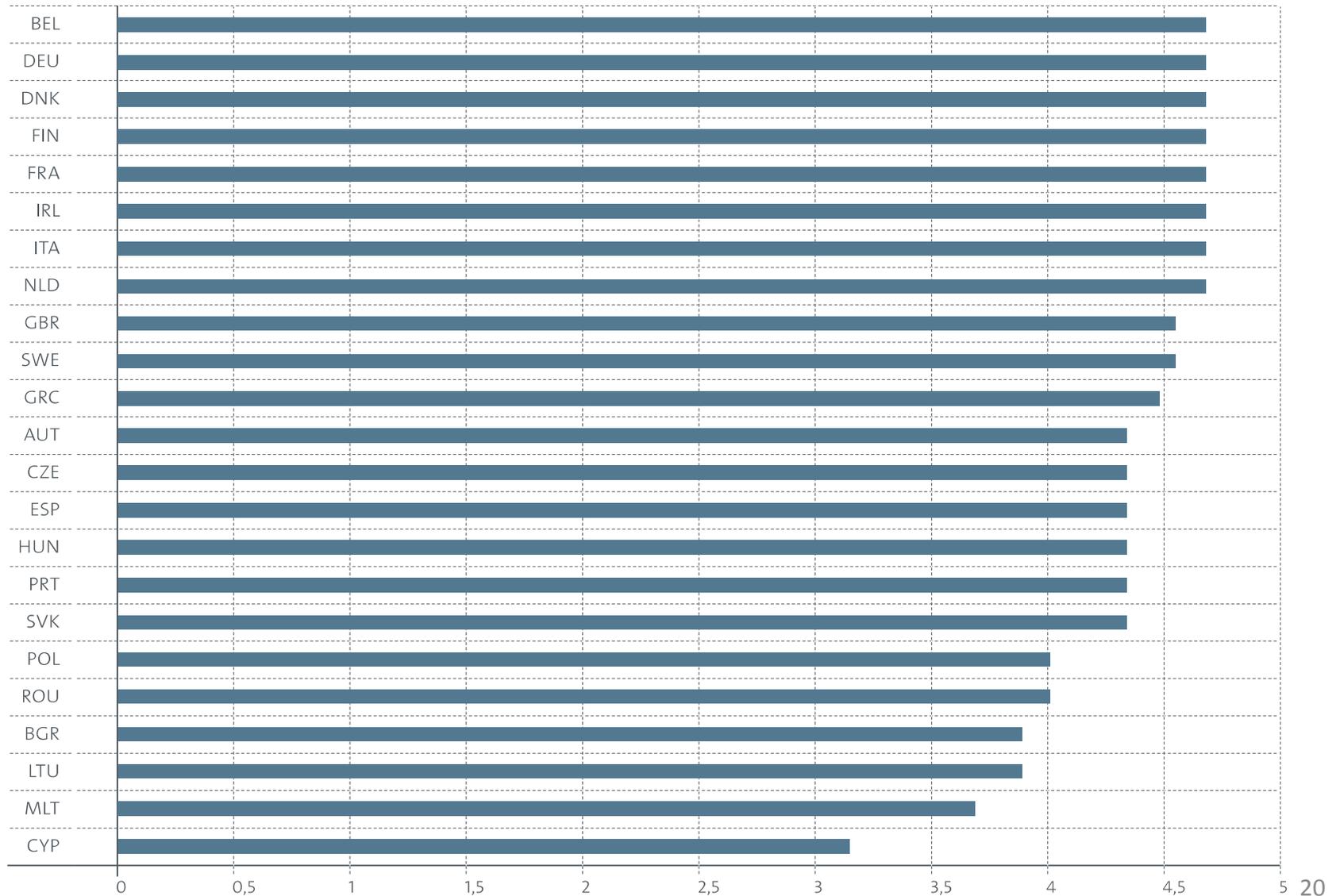
# The Unitary Patent

- Applicants will be able to obtain a European patent with unitary effect for the entire territory of the 26 participating EU Member States
  - avoid complex and costly national validation procedures
  - uniform protection throughout the 26 States
- Unified Patent Court will enable the Europe-wide enforcement and revocation of Unitary Patents and European patents

# Limitations of the European system

- Validation requirements for EPO-granted patents still cause high costs (translation, fees, representation)
  - These costs increase with the number of countries
- Infringement actions before national courts:
  - Level of patent protection differs across countries
  - Cost and uncertainty of parallel litigation
- Applicants only validate in a few large countries

# Patent protection in EU MS in 2010



# Low-IP industries

Food & live animals

Crude materials, inedible, except fuels

Mineral fuels, lubricants & related materials

Animal & vegetable oils, fats and waxes

Prefabricated buildings

Apparel and accessories

Prefabricated buildings

Travel goods

Manufactured goods by material

Leather

Cork & wood

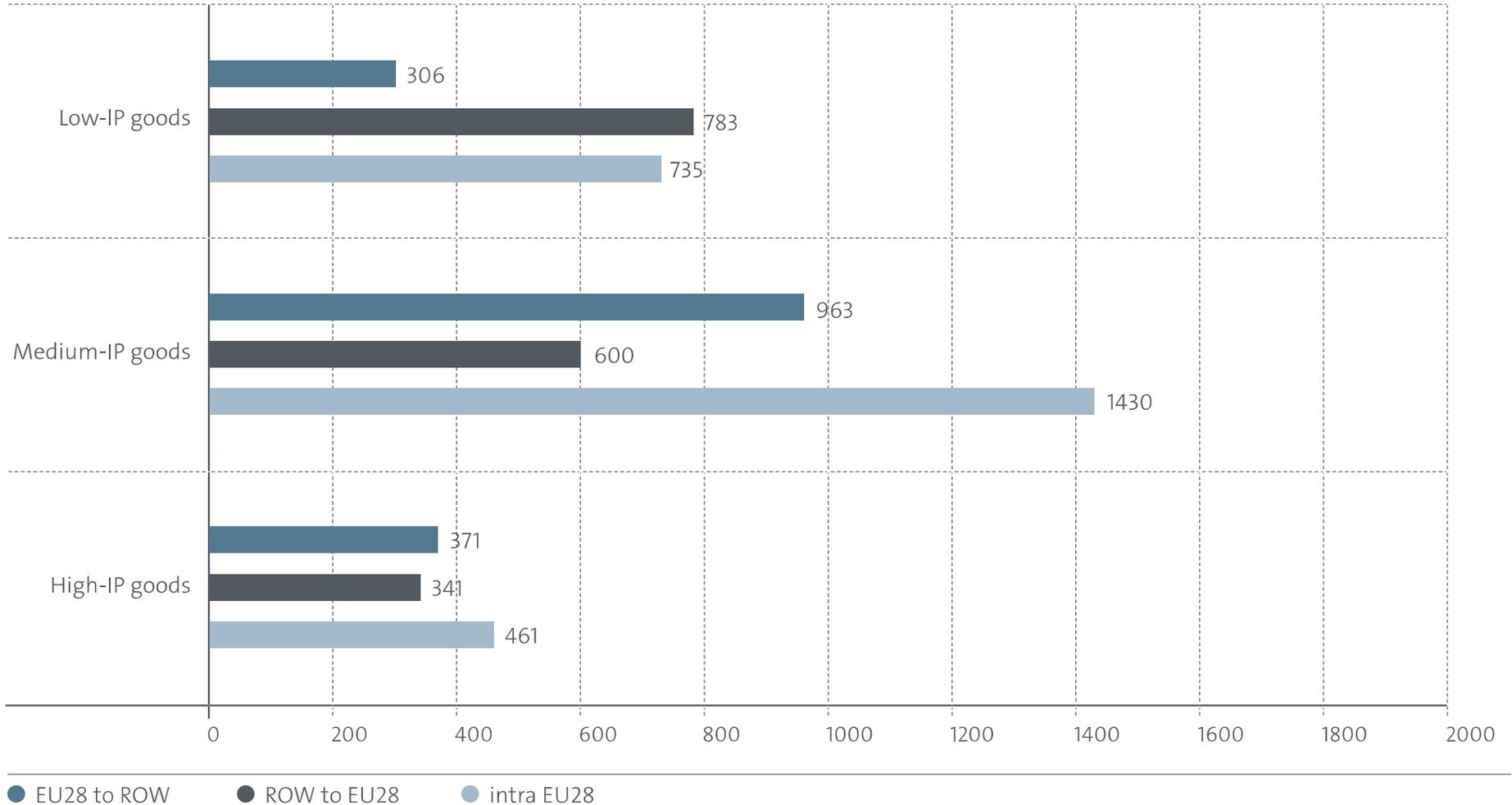
Textiles

Non-metallic minerals

Non-ferrous metals

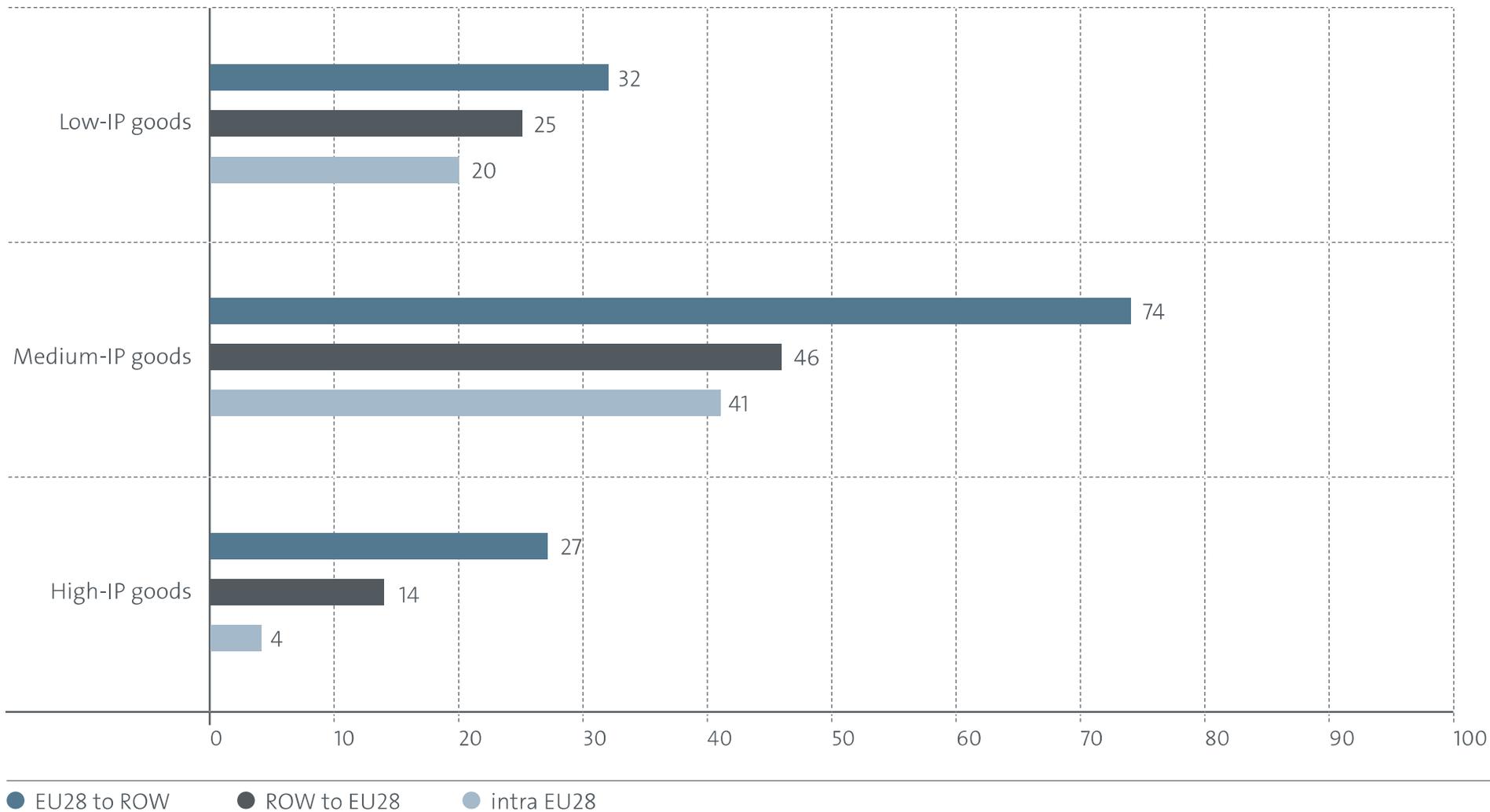
Metals

# Trade flows in Low, Medium and High-IP goods in the EU in 2014

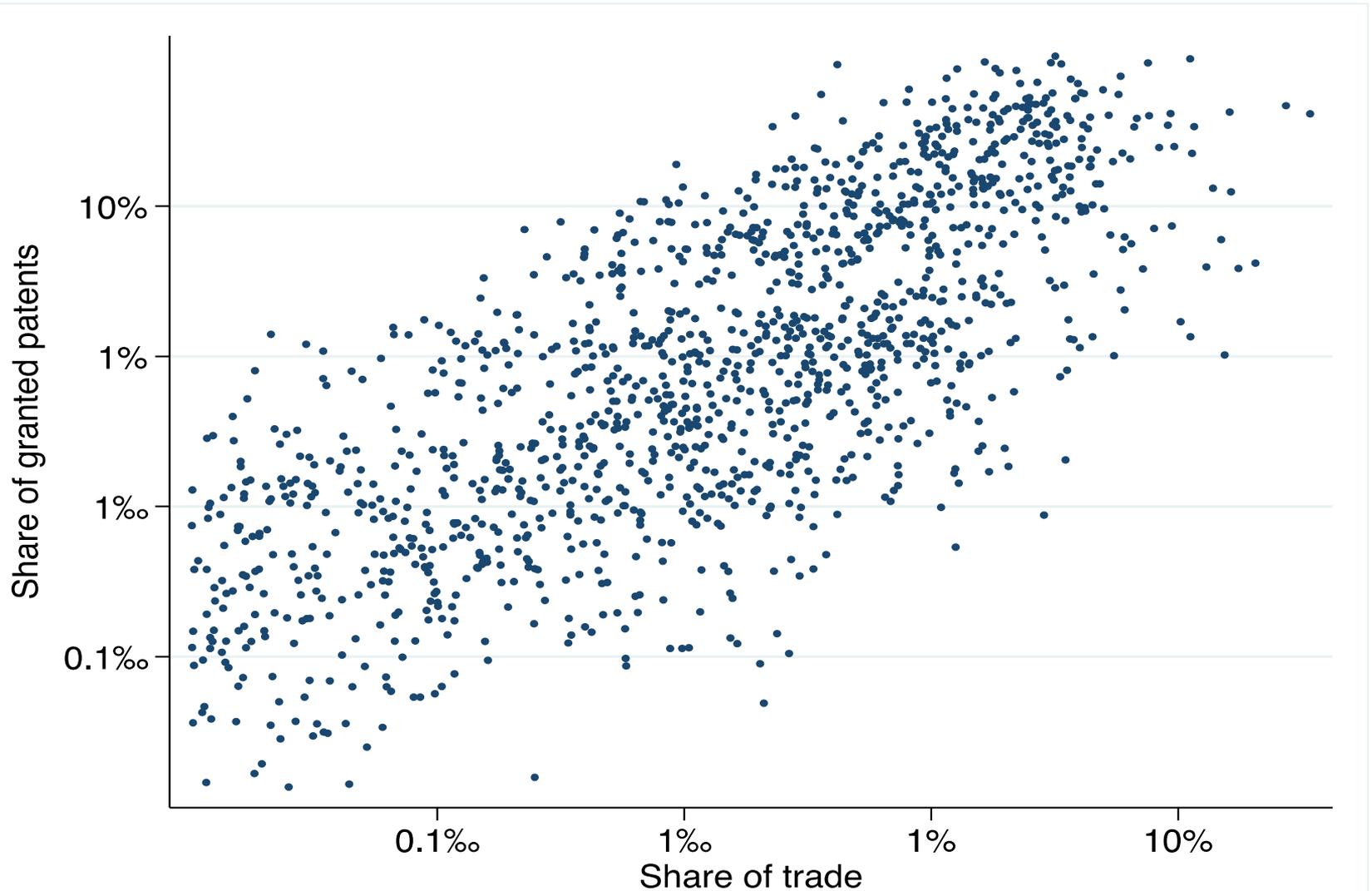


Source: UN COMTRADE, Classification of goods into high/medium/low-IP is based on Delgado et al. (2013)

# FDI by Low, Medium and High IP manufacturing industries in the EU28



# Origin of trade in patent-sensitive industries and patents across EU



# Limitations

- Analysis focused of the strength of patent protection, but other factors also important
  - Costs of obtaining multiple national patents
  - Cost and uncertainty of parallel litigation in Europe
  - Taking into account these factors would likely amplify the potential gains of harmonisation
- Economic activities supported by the patent system are not considered in the study:
  - R&D investments
  - Within-country technology transfer
  - IP services