Patent law, SPC and pharmaceutical FDI: Evidence from a cross-country study

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EU Single Market Strategy 2015

[...] consult, consider and propose further measures, as appropriate, to improve the patent system in Europe, notably for pharmaceutical and other industries whose products are subject to regulated market authorisations [...] (COM(2015)550 final)

- research exemptions incl. Bolar provision
- supplementary protection certificate (SPC):
  - a unitary SPC title
  - manufacturing waiver

- timeline: November 2017

Firm level data on pharmaceutical FDI

1. firm-level FDI data from FT fDi Markets
   - annoucend greenfield FDI since 2003
   - data at project level: sourcing firm, receiving country
   - FDI ativity: R&D, manufacturing, headquaters, IT ect.

   $\rightarrow$ 2,863 FDI projects in pharamcetucical sector

2 "Innovator" v. "imitator"
   - ORBIS: ORBIS-PATSTAT link, ownership structure
   - PATSTAT: pharma patent (A61K, excl. cosmetics)
   - de Pastors SPC: owner of patent on NCE

Data structure: Example

fDi Markets		ORBIS	PATSTAT	AdP SPC
Investing Company	Year	GUO[1]	Pharma Families[2]	NCE[3]
Novartis Vaccines	2009	Novartis	1967	1
Krka Farma	2012	Krka	85	0
Brill Pharma	2013	Bristol Laboratories	0	0

$\rightarrow$ innovator (NCE & non-NCE), imitator

[1] Global ultimate owner

[2] Number of pharamceutical patent families

[3] New chemical entity

$9.8bn pharmaceutical FDI annually

Table: Capital & jobs by pharmaceutical FDI activity, 2003-2014

	Capital invested		Jobs created	
	Volume	Share	Number	Share
Manufacturing	73,058	**62%**	143,219	**49%**
R&D	22,588	**19%**	54,710	**19%**
Headquarters	6,781	6%	22,444	8%
Design & testing	5,843	5%	12,622	4%
Sales & marketing	5,005	4%	33,684	11%
Logistics & distribution	2,560	2%	12,113	4%
Business services	1,258	1%	6,606	2%
Other	1,311	1%	7,705	3%
Total	118,405	100%	293,103	100%

Note: The value of capital in million US dollars.
Source: FT fDi Markets

FDI in manufacturing and R&D

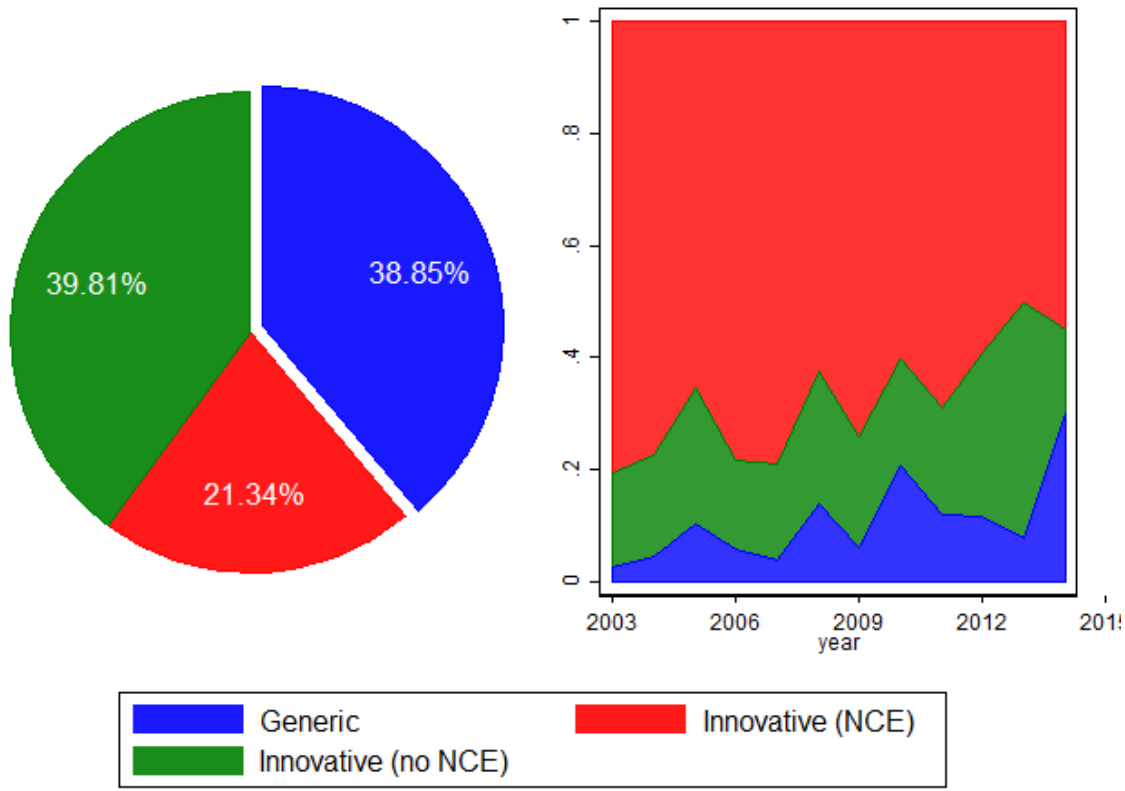
Table: Share of pharma FDI by sourcing & receiving region

	Receiving						
	Africa	Asia	Aust	Europe	N Am.	S Am.	Total
Asia	0.5%	3.9%	0.0%	2.0%	3.1%	0.1%	9.6%
Aust	0.0%	0.4%	0.0%	0.0%	0.2%	0.0%	0.6%
Europe	1.2%	13.4%	0.3%	20.0%	9.8%	2.3%	47.1%
N Am.	0.2%	9.4%	0.0%	19.2%	12.7%	0.4%	41.8%
S Am.	0.0%	0.1%	0.0%	0.6%	0.1%	0.0%	0.8%
Total	1.9%	27.2%	0.3%	41.8%	25.8%	2.9%	100.0%

Source: FT fDi Markets

FDI in manufacturing and R&D: Company type

Figure: Companies in the sample (left) and value of FDI (right)



Hypothesis

H1: Patent protection affects differently imitators and innovators

Regression framework

$$log\ FDI_{Gen,jt} = \alpha + \gamma\ Gen + \theta\ PatStrength_{j,2000} \times Gen + \delta_t + \nu_j + \delta_t \times \nu_j + \epsilon_{Gen,jt}$$

- $PatStrength_{j,2000}$: strength of patent protection in country j
- Gen: dummy equals 1 if the investment by imitator (generic)

H1: $\theta < 0$

Data & PatStrength measures

Data

- pharmaceutical greenfield FDI
- manufacturing and R&D projects
- generic $\rightarrow$ company with no pharma patents

PatStrength measures

- Ginarte and Park Index (Ginarte & Park, 1997)
- Pharmaceutical IP Protection Index (Liu & La Croix, 2015)
- SPC regime (dummy variable)
  - three countries in 1990 (KR, JP, US)
  - 57 countries in 2014
  - 75% are developed economies

Results

Table: Dependent variable: *log* $FDI_{Gen,jt}$

	PatStrength measures		
	GPI	PIPP	SPC
$PatStrength_{j,2000} \times Gen$	-0.875***	-0.945***	-1.697***
	(0.204)	(0.219)	(0.499)
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Country × year FE	YES	YES	YES
Observations	1,368	1,368	1,368
R-squared	0.724	0.732	0.722

This table reports least-squares estimates. The sample period is 2003-2014. There are 57 FDI receiving countries. Generic investment is defined as an investment by a company with no pharmaceutical patents. Standard errors, adjusted for clustering at the country level reported in parenthesis. *** Significant at the 1 percent level, ** at the 5 percent level, * at the 1 percent level.

Magnitude of the effects

Counterfactual increase in protection:

- GPI: median (RO, MX) $\rightarrow$ top (US)
- PIPP: median (RO, TH) $\rightarrow$ top (US)
- SPC: 0 (PL, CA) $\rightarrow$ 1 (AT, CH, NL)

	Differential effect
GPI	-64%
PIPP	-89%
SPC	-81%

- with increasing patent protection imitators invest less compared to innovators

Conclusions

Previous literature focused on potential gains of stronger patent protection in attacting FDI (e.g. Javorcik, 2004) but

- not all frms are innovators
- not all activities are equally affected by patent protection

For FDI in pharma sector we found that

- stronger patent protection affects differently imitators and innovators
- not clear if net effect of stronger patent protection on FDI is positive or negative
- work-in-progress

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