Technology-Driven FDI by Emerging Multinationals in Europe

Roberta Rabellotti

Department of Political and Social Sciences

Università di Pavia

The world cloud of my research

Access to credit Africa Argentina Brazil Caribbean Catch up Chile China Clusters Colombia Competitiveness Credit Developing Countries Economic growth Emerging Countries Europe FDI Footwear Industry Gender Globalization Global Value Chain Growth ICT India Industrial development Industrial districts Industrial policy Innovation Innovation Systems Italy Knowledge Latin America Local Development Mexico Microcredit MNEs Multinationals Nicaragua Patents Small and Medium Enterprises South Africa South Korea Textile Industry Wind Energy Wine industry
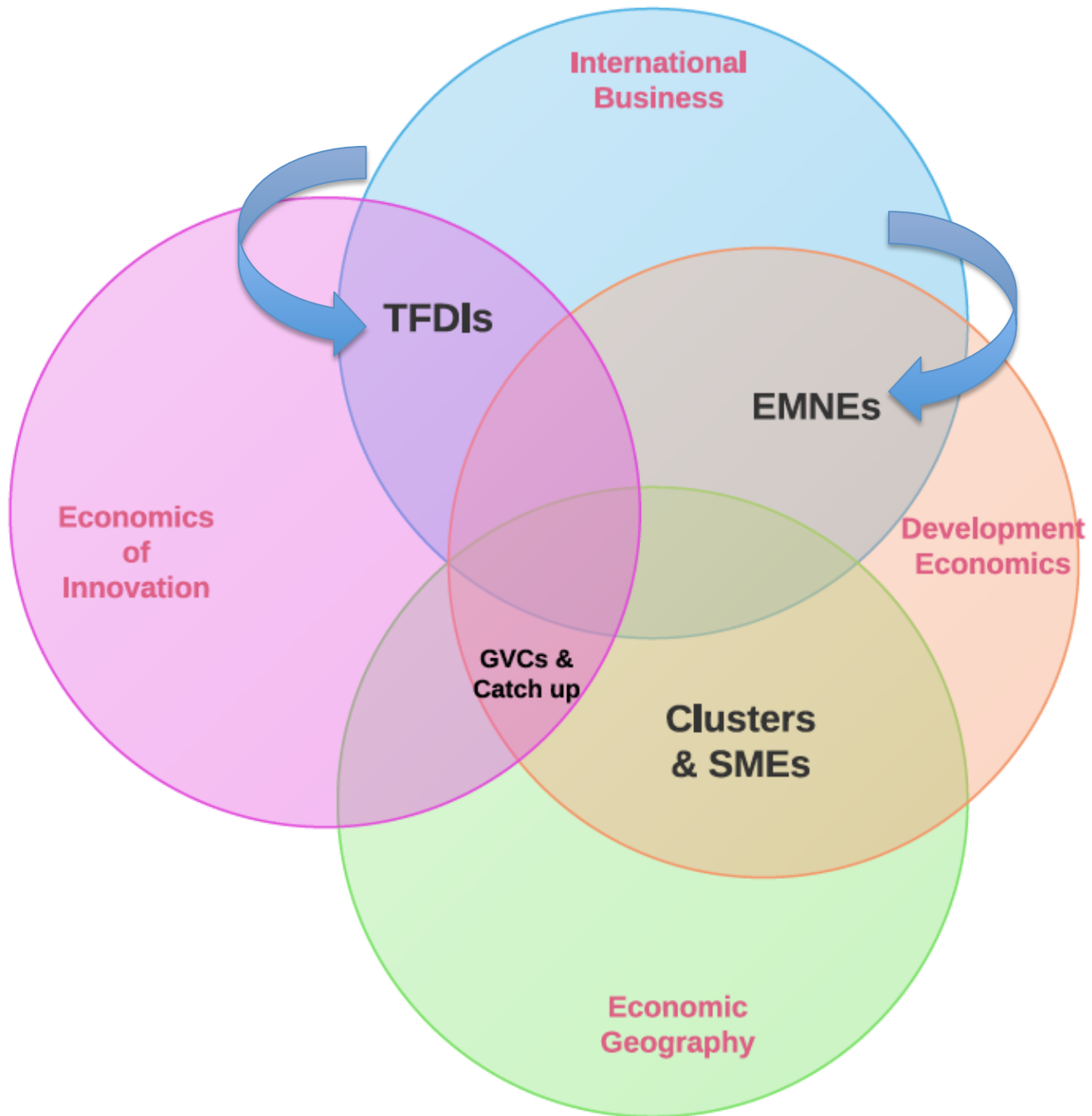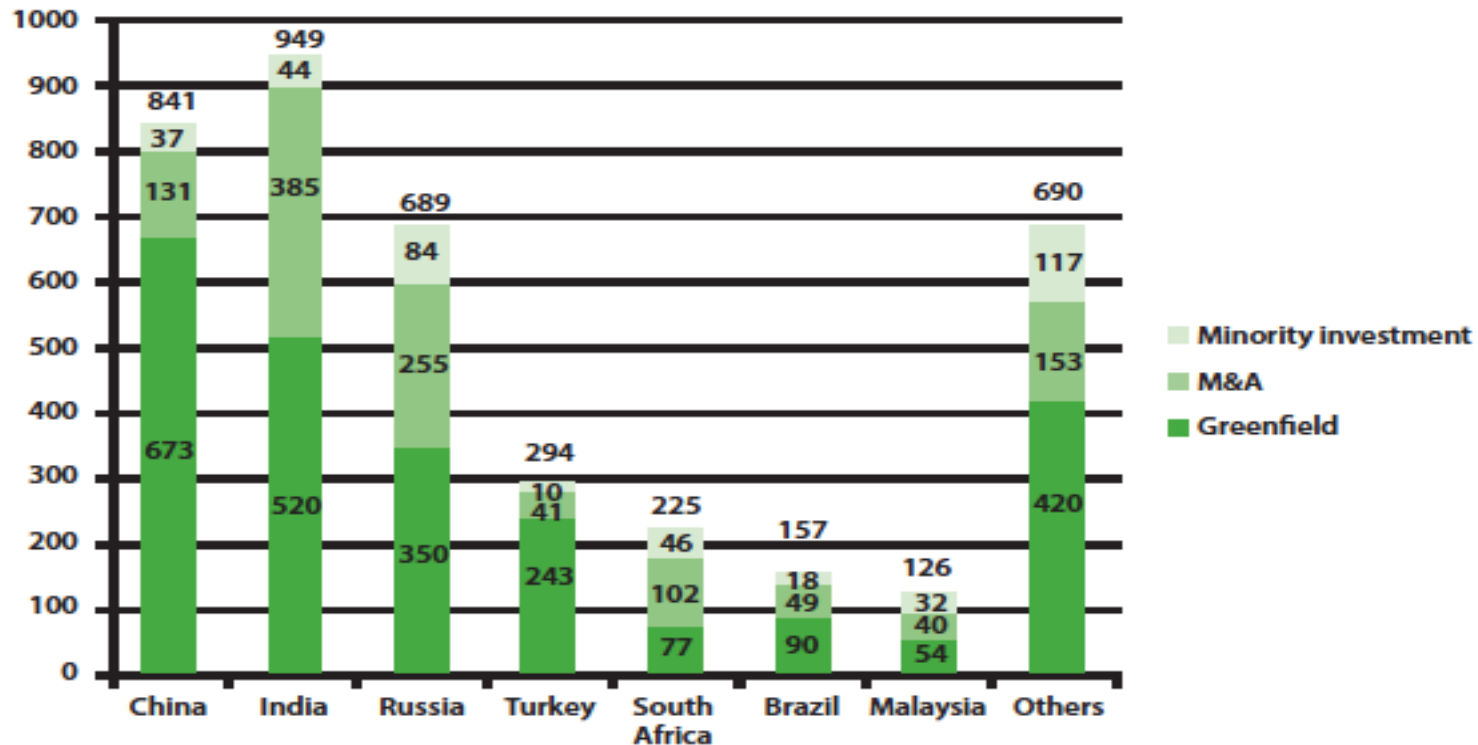
EMENDATA
Emerging Multinationals Events and Networks DATAbase

- **Greenfield investments** (*fDiMarket*s - FT) + **M&As** (*Zephyr* - BvD and *SDC Platinum* – Thomson Reuters) (+ minority investments) from EMNEs;

- EMENDATA provides information at the level of the a) **single deal**, b) the **investing company** and c) the **global ultimate owner (GUO)**;

- Information include: a) entry mode; b) sector of specialization of the investing company and of the subsidiaries; c) activities undertaken by the subsidiaries; d) location of the subsidiaries; e) number of jobs created; f) financial information about the investors and the subsidiaries; g) patents of the investors and the subsidiaries;

- Period: 2003-2011 (updating at 2013);

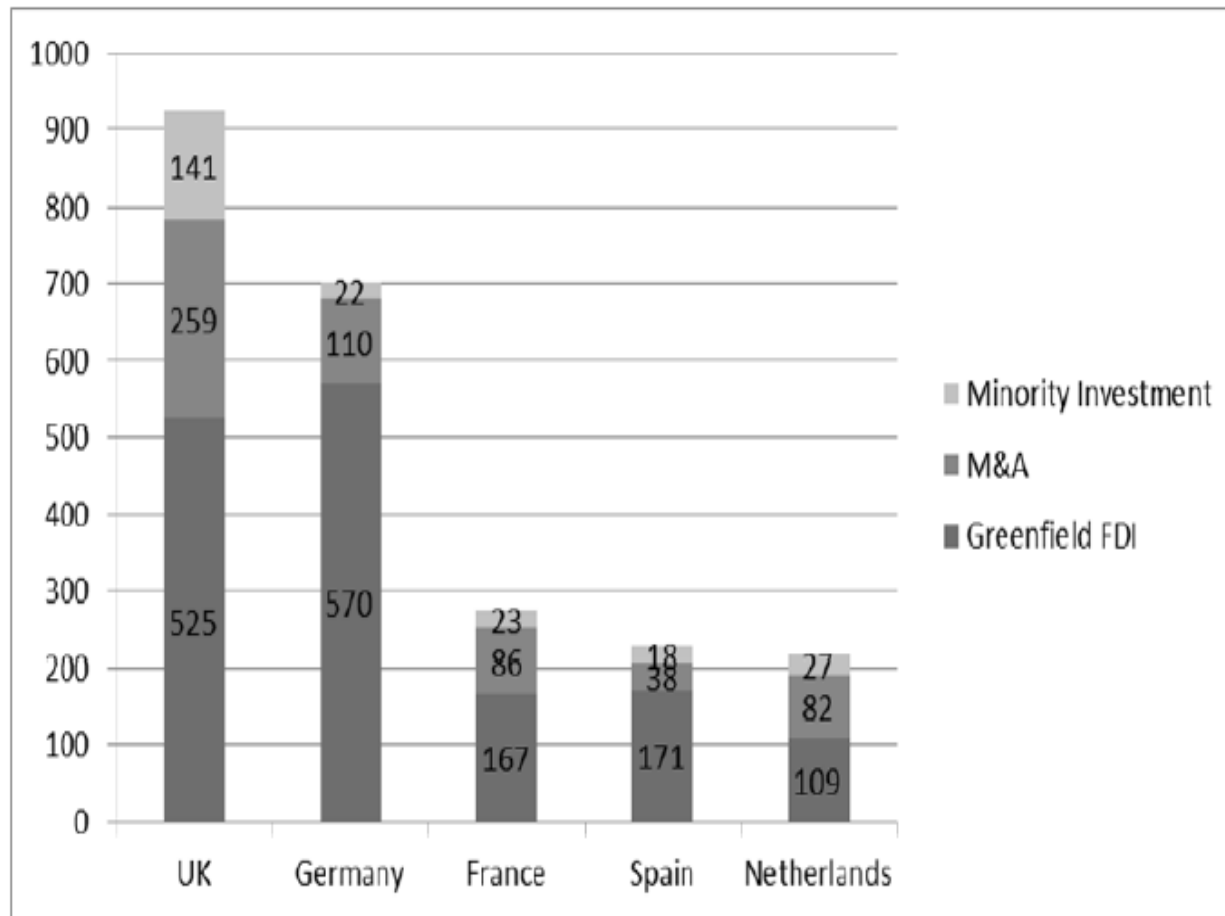- Focus on EU-27: 3,971 deals.

EMNEs in Europe:
From where do they come from?

Figure 1 - Emerging countries FDI to Europe by entry mode (2003-2001) (# deals)
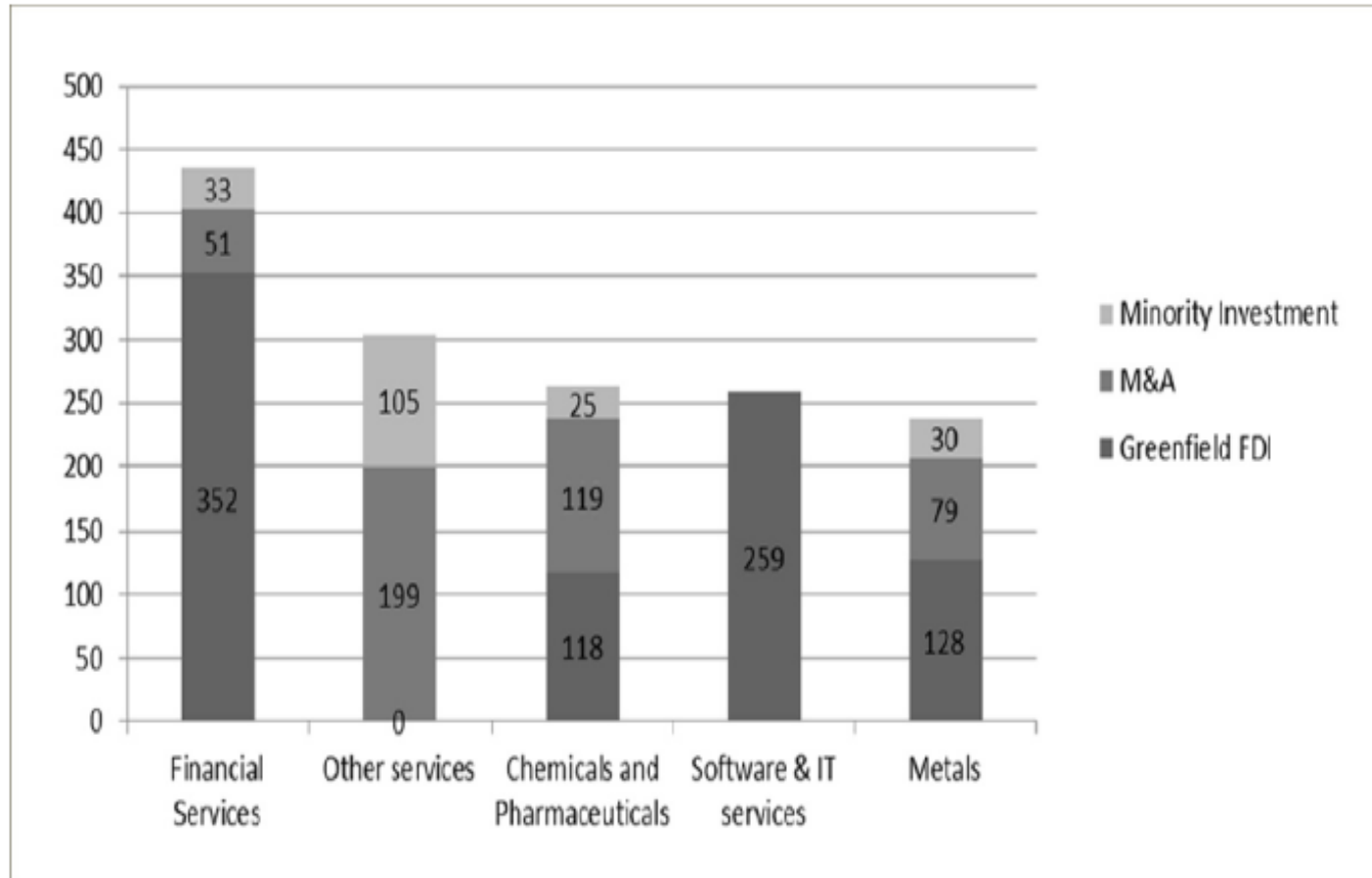
Source: EMENDATA

Where do they go?

Source: EMENDATA (based on Table A3.3, Annex 2)

In which industries they do specialize in?

Source: EMENDATA (based on Table A3.4, Annex 2)

Focus on Brazilian, Chinese and Indian investments
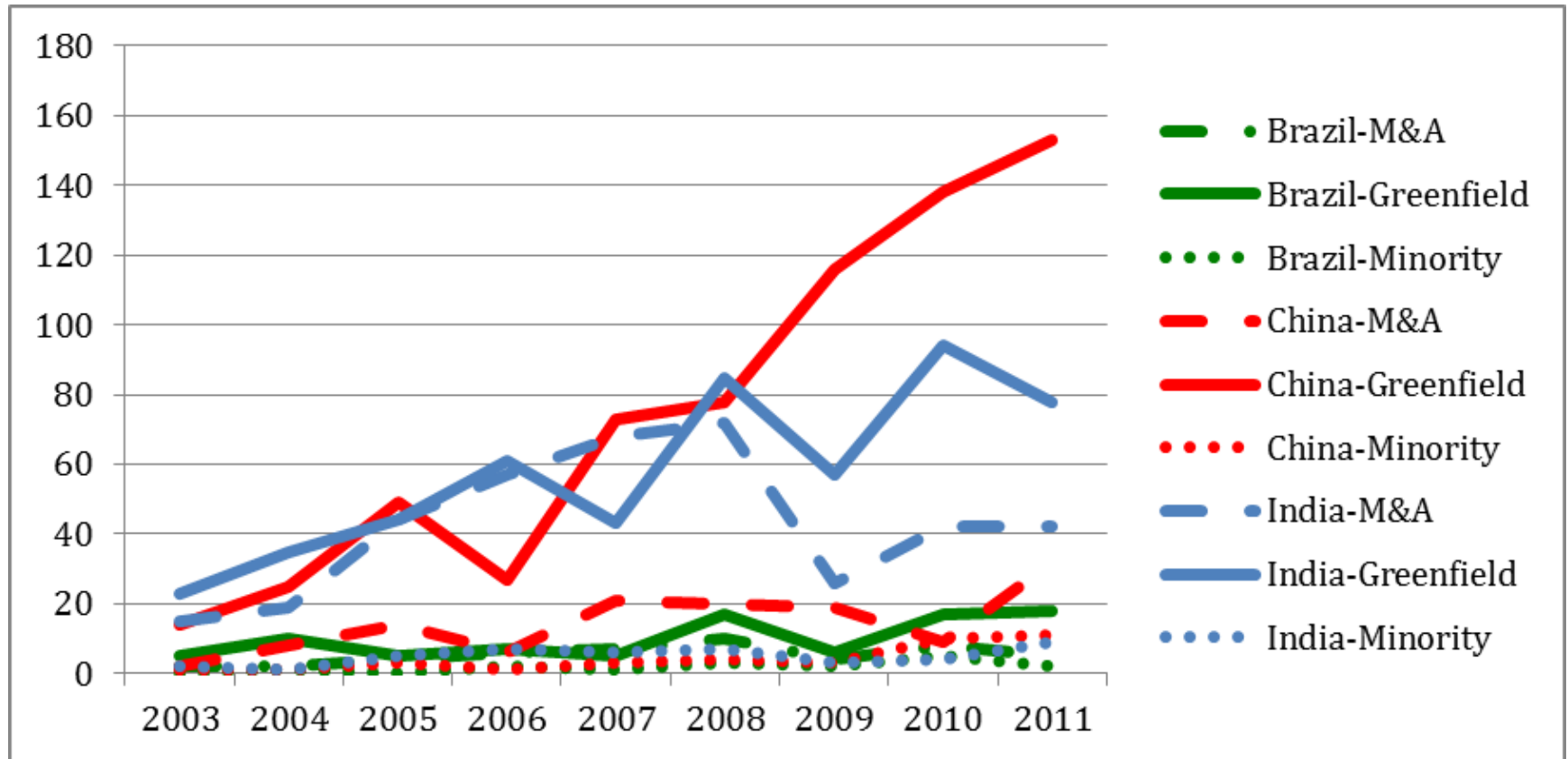
Main country destinations and sectorial specialization of BIC MNE investments in the EU-27
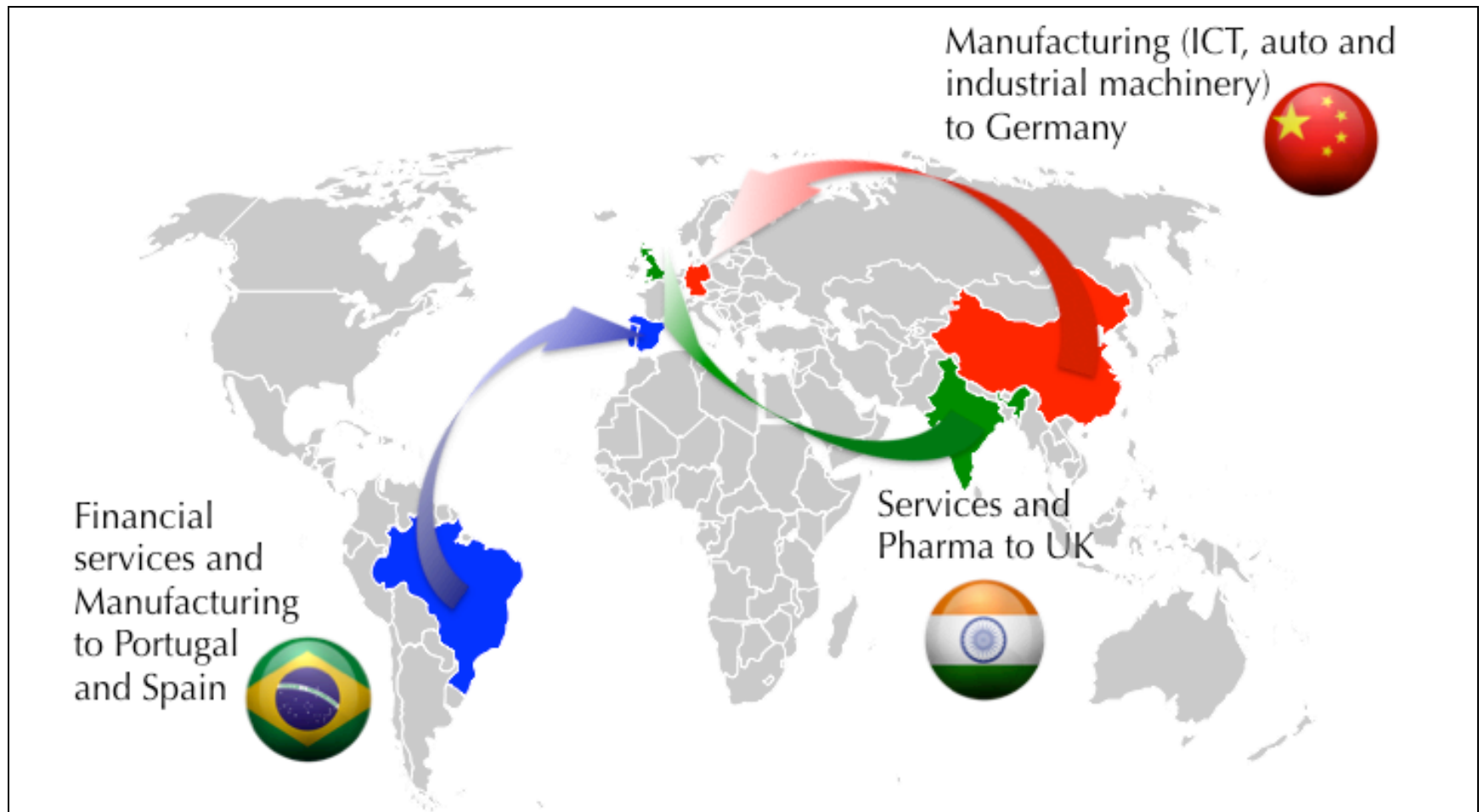
Who are the top investors?

Host Country Perspective

Home Country Perspective

Motivation: Strategic-asset seeking

Location Drivers

Local Innovative Capabilities

Impact on investors'performance

Impact on host regions

Impact on investors' technological capabilities

Some findings

① **On location drivers:** Crescenzi R., Pietrobelli C., Rabellotti R., 2015, The location strategy of multinationals from emerging countries in the EU regions, *LEQS Papers* 93-2015 London School of Economics forthcoming in *European and Planning Studies*;
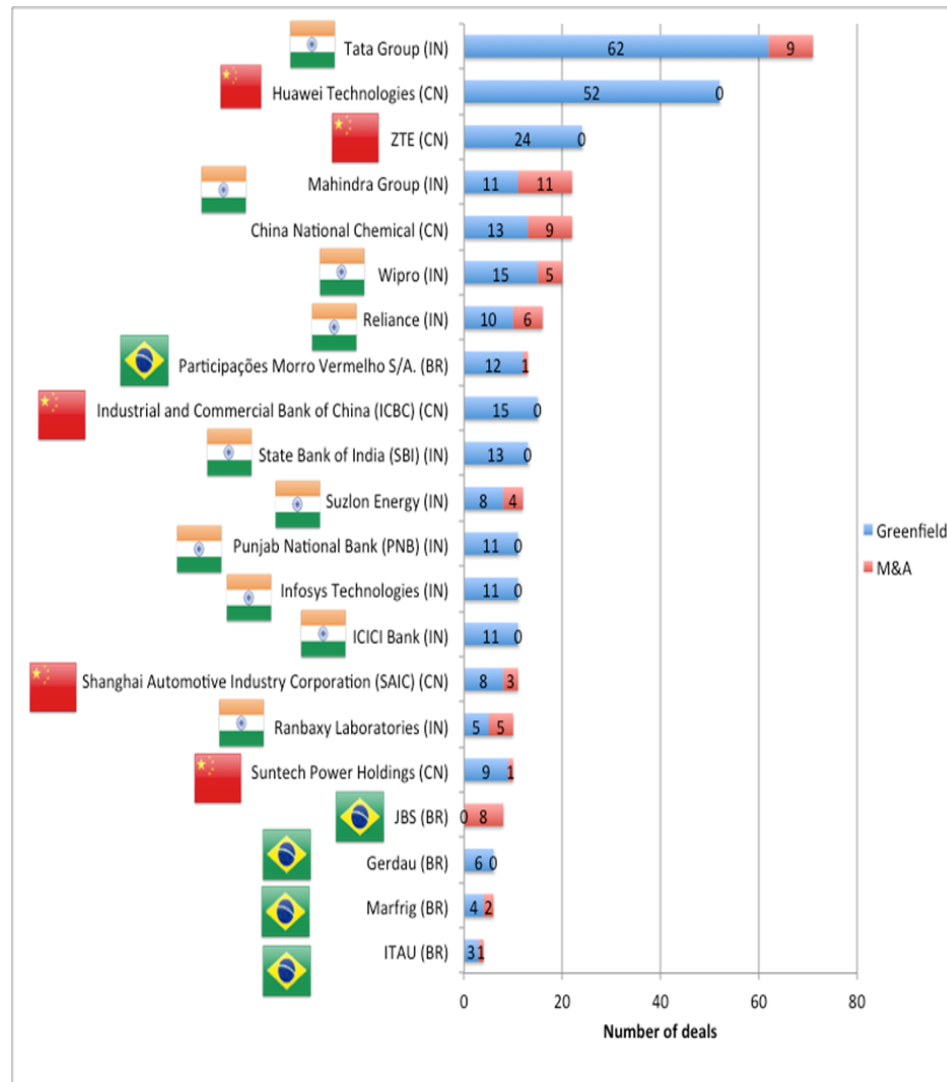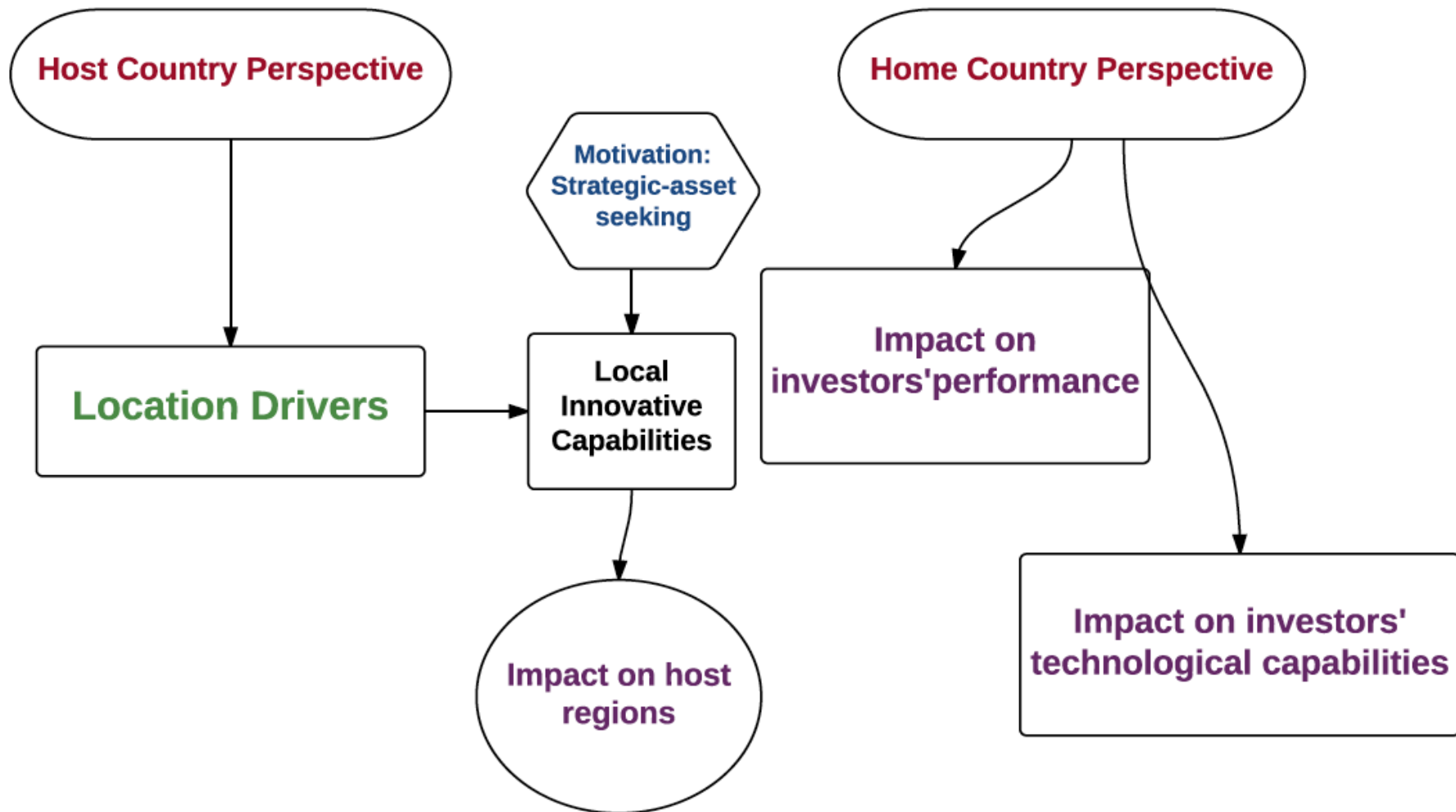
② **On the impact on host regions**: Giuliani E., Gorgoni S. and Guenther C.,Rabellotti R., 2014, "Emerging-market MNEs investing in Europe. A typology of subsidiary global–local connections", *International Business Review,* 23: 680-691;

③ **On the impact on investors' technological capabilities**: Giuliani E., Martinelli A. and Rabellotti R., 2015, Is Co-Invention Expediting Technological Catch Up? A Study of Collaboration between Emerging Country Firms and EU inventors, forthcoming in *World Development*;

④ **On the impact on investors 'performance**: Cozza C., Sanfilippo M.and Rabellotti R., 2015, The Impact of Outward FDI on the Performance of Chinese Multinationals, forthcoming in *China Economic Review*.

Location Strategies of Multinationals from Emerging Countries in the EU Regions

Riccardo Crescenzi, Carlo Pietrobelli & Roberta Rabellotti

Forthcoming in European Planning Studies

Research questions

- What are the characteristics of the destination areas that matter the most for EMNEs strategic asset seeking investments?

- Are local attraction factors and spatial behaviours of EMNEs different from the location drivers of AMNEs investments?

- Do EMNEs primarily target countries or specific regions/sub-national units?

Data & Methodology

- Only greenfield investments from 2003 to 2008: 22,065 deals undertaken by MNEs from the entire world into the EU25 NUTS1/2 regions;

- EMNEs (EME) include India, China, Russia, Turkey, Hong Kong, Brazil, Mexico, South Africa, Thailand and Chile (robustness checks with other groupings).

- Regional data from Eurostat;

- Nested Logit Model: testing the nested decision structure of the investment decision
  a) choosing a country *i* and
  b) selecting a region *j* in the chosen *i* country.
  Therefore, also shedding light on the relative importance of national vs. regional location factors.

Investment location drivers

The probability of a certain region to be chosen as a destination of a foreign investment is estimated as a function of:

- Two key dimensions of <u>regional innovative dynamism:</u>

  a) Innovation output intensity measured by *Patent Intensity* to capture the extent to which MNEs expect to benefit from localised knowledge spillovers from indigenous firms;

  – Existence of socio-economic conditions favourable to innovation measured by the *Social Filter* (Principal Component Analysis);

- The <u>agglomeration of foreign investments</u> measured by:

  a) Total pre-existing investments in the region;

  b) Investments in the <u>same sector</u> in the region;

  c) Investments in the <u>same activity</u> in the region;

- Control variables:

  – Regional GDP per capita;

  – Regional unemployment.

Empirical findings

Dissimilarity parameters measure **the 'weight' the investor ascribes to regional (1) vs national (0) drivers**

Table 4 — The location determinants of MNEs in the EU regions: A summary

	Source of foreign investment		
Determinants of foreign investments	EU-25	NA	EMC
Strategic asset-seeking*			
• → Hard drivers (patents)	(+)	(+)	(+) Only for NON-PRODUCTION FDI
• → Soft drivers	(+)	(+) Only without full country controls)	Never significant
Agglomeration*			
• # of FDI	(-)	Not significant.	Not significant
• Same Function	(+)	(+)	……(+)
• Same Sector	(+)	(+)	(+) Only for PRODUCTION FDI
Dissimilarity parameters**			
• → Sub-national drivers	UK, FR	UK, FR, D, BE	UK, D, NL FR, I
• → National drivers	All remaining countries	All remaining countries	Most of remaining countries are not significant

Conclusions

- EMNEs seek technological competences (i.e. patent intensity) only when they invest in higher value added functions;

- However, 'soft' regional innovation conditions (i.e. the Social Filter) are never significant attraction factors for EMNEs;

- The large innovation and technological gap still prevents EMNEs from fully taking advantage of an innovation-prone regional context;

- Functional agglomeration is a significant location attractor for EMNEs because it represents a clear and simply detectable indication of the availability of specialized pools of strategic assets, which are strongly pursued by emerging multinationals investing in Europe .

Policy implications

- Policy makers can play multiple and diversified roles:
  →Leverage <u>strategic asset seeking</u> motives by:

    a) reinforcing national and regional technological capabilities;

    b) supporting the development of 'institutional bridges' able to facilitate EMNEs in their understanding of 'soft' innovation drivers;

  →Leverage <u>functional and sectorial agglomerations by:</u>

    - Careful diagnosis of the national and regional economies.

Emerging versus advanced country MNEs investing in Europe: A typology of subsidiary global–local connections

Elisa Giuliani [a,1], Sara Gorgoni [b,2], Christina Günther [c,e,3], Roberta Rabellotti [d,*]

[a] *Department of Economics & Management, University of Pisa, Via Ridolfi 10, 56124 Pisa, Italy*
[b] *Department of International Business and Economics, University of Greenwich Business School, Old Royal Naval College, Park Row, London SE10 9LS, UK*
[c] *Max Planck Institute of Economics, Evolutionary Economics Group, Kahlaische Straße 10, 07745 Jena, Germany*
[d] *Department of Political and Social Sciences, University of Pavia, Corso Strada Nuova 65, 27100 Pavia, Italy*
[e] *WHU – Otto Beisheim School of Management, Burgplatz 2, 56179 Vallendar, Germany*

ARTICLE INFO

ABSTRACT

This paper empirically investigates how subsidiaries of multinationals from both emerging (EMNEs) and advanced (AMNEs) economies investing in Europe learn from the local context and contribute to it as much as they benefit from it. To explore this we classify the behavior of MNE subsidiaries into different typologies on the basis of how knowledge is transferred within the multinational and on the nature of the local innovative connections. The empirical analysis relies on an entirely new, subsidiary-level dataset in the industrial machinery sector in Italy and Germany. Results show that EMNEs and AMNEs undertake different strategies for tapping into local knowledge and for transferring it within the company. We identify a new typology of EMNE subsidiary that contributes through its significant local innovative efforts to development processes in the host country. This result suggests possible win-win situations from which novel policy implications may be drawn.

Research Questions

1. Do EMNE subsidiaries contribute to the local context as much as they benefit from it?

2. How does their behaviour differ from that of AMNEs?

Research Design

CONTEXT
- The industrial machinery sector
- Italy & Germany

DATA COLLECTION:
- Structured questionnaire
- In-depth interviews

OBSERVATIONS:
- 24 subsidiaries from emerging countries (40-50% response rate)
- 23 subsidiaries from advanced countries (control group)

A typology of subsidiaries
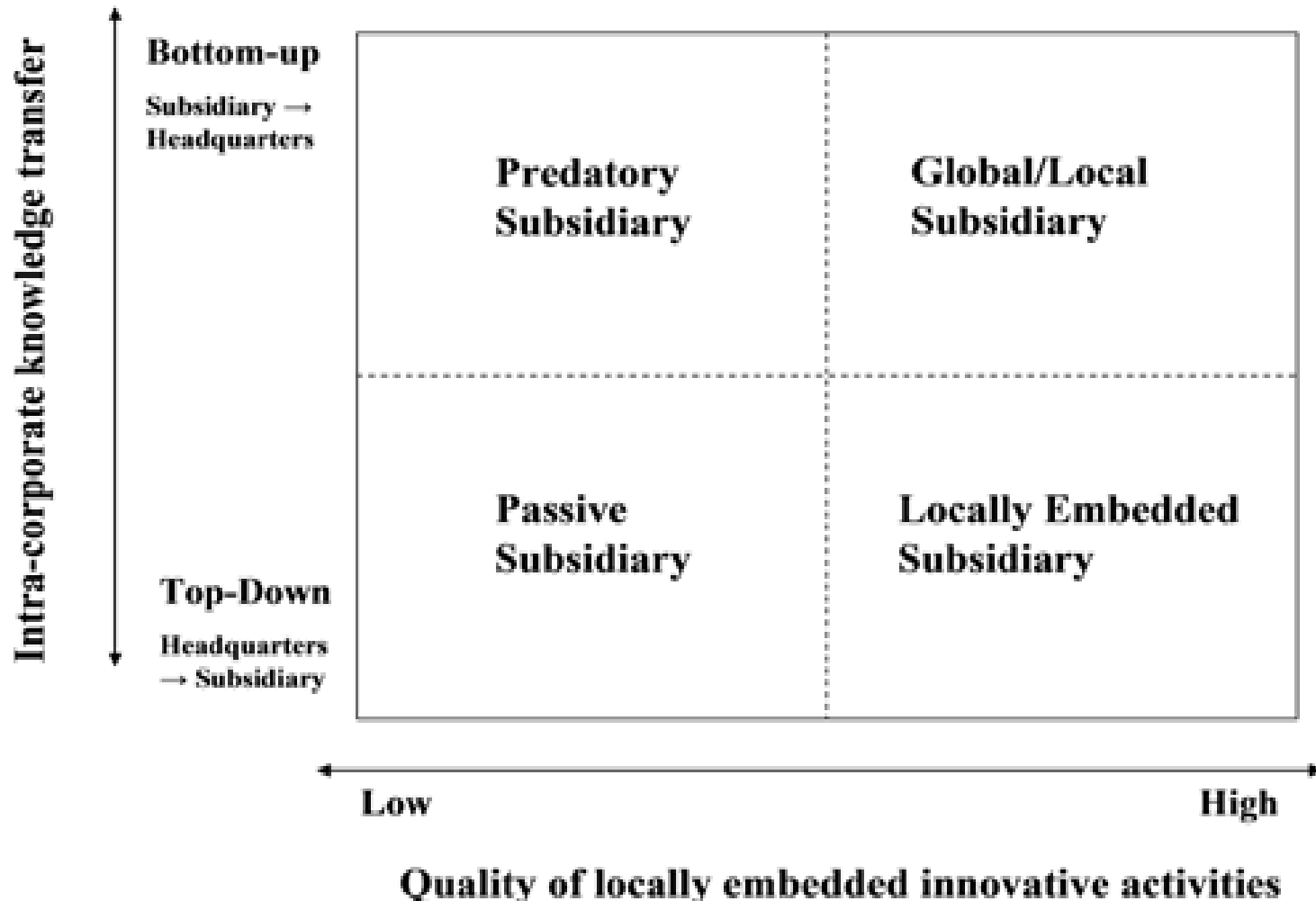
Intra-corporate knowledge transfer

- A measure of the degree to which subsidiaries transfer and/or receive knowledge to/from the headquarters and/or to/from other subsidiaries.
- The questionnaire asked about the extent to which the subsidiary transfers and/or receives knowledge to/from the headquarters and/or to/from other subsidiaries, in eight areas: R&D, product design, production, raw materials procurement, logistics, marketing, management systems and practices, and customer services.

Intra-corporate Knowledge Transfer
$SUMKT_{(i)} - SUMKR_{(i)}$

- Respondents were asked to score responses on a Likert scale ranging from 1 (Not at all) to 4 (Very much).
- For each subsidiary, we summed the values reported for the questions on knowledge transfer (SUMKT) and knowledge reception (SUMKR).

  - Intra-corporate Knowledge Transfer <0: the subsidiary receives more knowledge from the headquarters and/or other subsidiaries than it transfers to them.

  - Intra-corporate Knowledge Transfer >0: the subsidiary transfers more knowledge to the headquarters and/or other subsidiaries than it receives from them

  - Intra-corporate Knowledge Transfer =0: the subsidiary, the headquarters and the other subsidiaries engage in mutual and reciprocal knowledge transfer.

- EMNE subsidiaries reported an average of 3.0 versus -1.9 for AMNE subsidiaries, with differences being statistically significant at 5%.

- EMNEs tend to transfer more knowledge than they receive from their headquarters or from other subsidiaries, while the reverse is true for AMNE subsidiaries

The quality of locally embedded innovative activities
*N. of innov ties $_{(i)}$ * Subs innovation $_{(i)}$*

- Information on local innovation ties was collected through a free recall method by asking our respondents to identify all formal and informal ties formed by the subsidiary with different local actors (e.g. domestic firms, universities);
- The quality of local ties depends on the intensity of the subsidiary's innovative activity, since subsidiaries that invest more in innovation are more likely to transfer valuable knowledge through innovation ties;
- To measure the intensity of the subsidiary's innovative activity we have used the number of innovations (process, product, etc.) developed internally and independently by the headquarters and by the subsidiary;
- EMNE subsidiaries form comparatively more local ties (3.6) than AMNE subsidiaries (0.9). When weighted by their innovative efforts, EMNE subsidiaries report slightly higher average values (7.50) than AMNE subsidiaries (6.01).

Our findings

Bottom-up

Subsidiary →
Headquarters

Predatory Subsidiary	**Global/Local Subsidiary**
15 = 9 EMNEs (2 CHINESE) & 6 AMNEs	**17 = 12 EMNEs (5 CHINESE) & 5 AMNEs**
Passive Subsidiary	**Locally Embedded Subsidiary**
8 = 1 EMNEs & 7 AMNEs	**4 = 2 EMNEs & 2 AMNEs**

Top-Down

Headquarters
→ Subsidiary

Low   High

Quality of locally embedded innovative activities
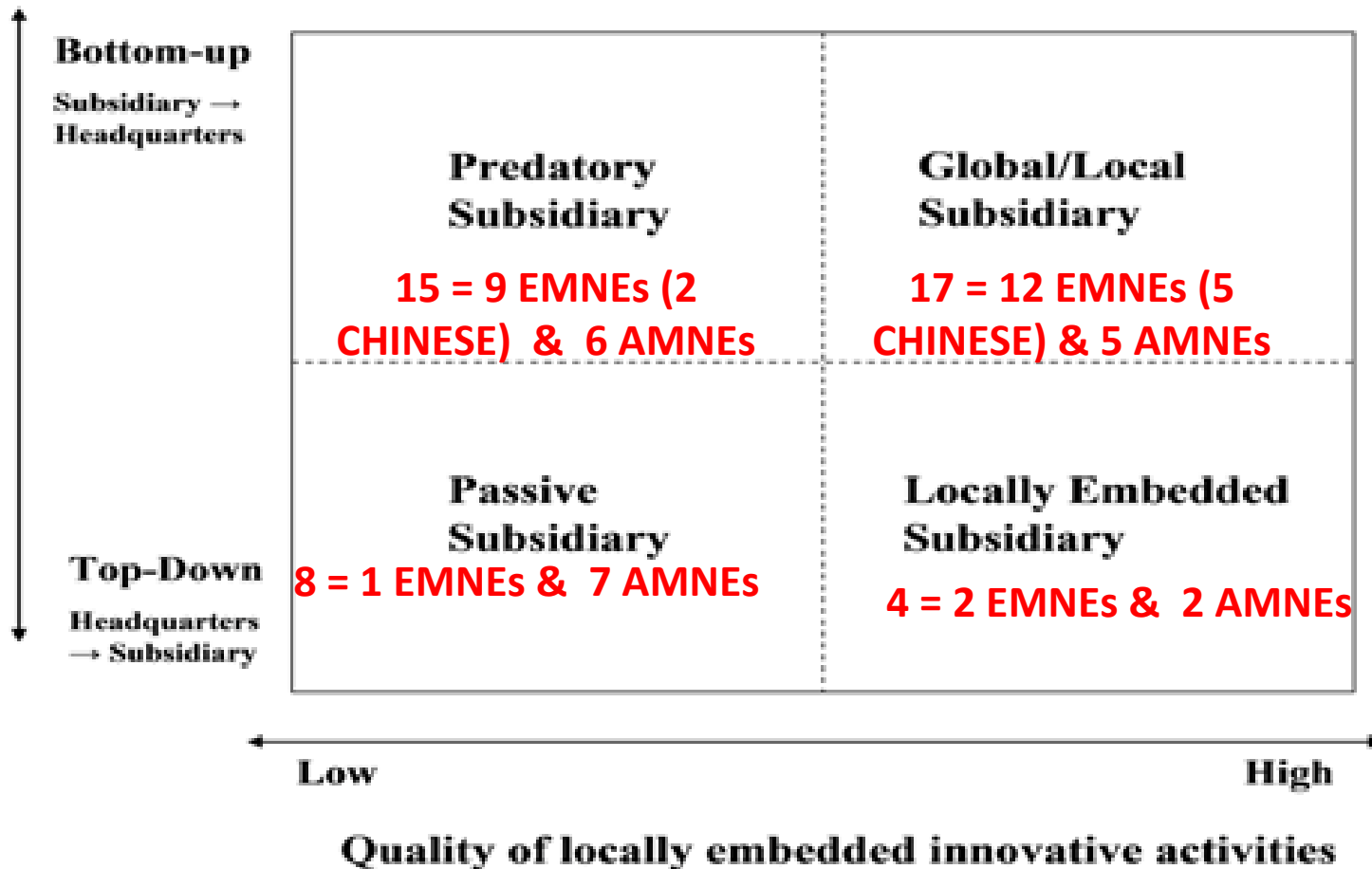
Conclusions

- **EMNE Predatory subsidiaries** are a significant phenomenon:

"*The knowledge transfer is strictly one-way. Without the local knowledge acquired through the subsidiary, the headquarters would not be able to achieve the product quality standards it currently does*" (EMNE CEO in Germany);

- BUT, there are also **EMNE Global/Local subsidiaries**, contributing to local innovation networks (12 out of 17 subsidiaries have applied for patents, including 6 applications to both the EPO and USPO):

"*The foreign owner is especially interested in improving the quality of existing products, taking advantage of the highly qualified labour force as well as all the knowledge deriving from the subsidiaries' longstanding relationships with clients and from the collaborations with other domestic firms and universities are key motivations for investing*" (EMNE CEO in Germany);

- Is a win-win situation possible?

"*Both of us have increased our market potential: the headquarters is now able to serve customers in a higher quality market segment thanks to the knowledge and experience transferred by the subsidiary and for the German subsidiary there is an opportunity to indirectly enter in a new large and expanding segment of market in which we were not present before the acquisition.*" (EMNE CEO in Germany).

Is Co-Invention Expediting Technological Catch Up? A Study of Collaboration between Emerging Country Firms and EU inventors

Elisa Giuliani (giulel@ec.unipi.it)
Dept. Economics& Management, University of Pisa

Arianna Martinelli (a.martinelli@sssup.it)
LEM – Scuola Superiore Sant'Anna

Roberta Rabellotti (roberta.rabellotti@unipv.it)
Department of Political and Social Sciences, Università di Pavia

Forthcoming in World Development

Aim of the paper

- To examine the extent of the <u>technological collaboration in patents between Brazilian, Indian and Chinese (BIC) firms and EU</u>;

- To compare the outcome of such cross-border collaborations to domestic inventions;
  - Patent value and characteristics

- To assess whether there are some differences across firms' type
  - EMNEs vs. domestic firms

Dataset

- Patent data from PATSTAT 2012 (April 2011 version)

- EPO patent applications assigned to BIC entities:
  - 113 EU-BIC co-invented EPO applications ("cross border inventions") with at least one EU inventor;
  - 5102 only BIC EPO applications ("domestic inventions").

- PATSTAT provides all the relevant information about the patent (e.g. year, technological classes, citations, NPL, etc.)

	Brazil	China	India	Total	
Domestic Invention	322	3,474	1,306	5,102	98%
Cross-Border Inventions	30	42	41	113	2%
Total	352	3,516	1,347	5,215	
	7%	67%	26%		

Table 5 Fractional count of the patents per inventor by country

Brazil		China		India	
FRANCE	8.077	GERMANY	13.410	FRANCE	14.379
GERMANY	5.283	NETHERLANDS	7.583	UNITED KINGDOM	11.317
NETHERLANDS	3.017	SWEDEN	4.450	CZECH REPUBLIC	5.871
ITALY	2.500	UNITED KINGDOM	3.883	GERMANY	3.200
UNITED KINGDOM	1.976	ITALY	2.950	AUSTRIA	2.125
OTHER	2.167	OTHER	2.167	OTHER	2.600
BRAZIL	47.020				
CHINA			63.293		
INDIA					100.367

Note: Fractional counting means that if a patent has three inventors from three different countries, each country will account only for 0.33 of that patent. Then in order to have a patent count at country level, the fraction of each patent is summed by country. Other refers to non-BIC and non-EU countries.

Source: Authors' calculations on PATSTAT

Table 7 Patent ownership by types of assignee

	BIC Domestic		Cross-Border		Total	
	Freq	%	Freq	%	Freq	%
MNCs	4,138	81%	72	64%	4,210	81%
DFs	964	19%	41	36%	1,005	19%
Total	5,102		113		5,215	

Source: Authors' calculations based on PATSTAT

Based on ORBIS-Bureau van Dijk information, each applicant is classified on the basis of the following two assignees:

1. BIC MNCs: headquarter or subsidiary of a BIC MNC;

2. BIC DF: BIC firms with no direct investments in a foreign country.

Table 8 Top patentees characteristics by patent type

	Country	# BIC Domestic patents	%	Type of assignee	Industry
HUAWEI TECHNOLOGY	CN	1794	34%	MNC	Manufacture of electronic components
ZTE	CN	525	10%	MNC	Manufacture of communications equipment
DR REDDY'S LABORATORY	IN	237	4%	MNC	Manufacture of pharmaceutical products
SINOPEC	CN	222	4%	MNC	Support activities for petroleum and natural gas extraction
BYD	CN	150	3%	MNC	Machinery, equipment, furniture, recycling

	Country	# cross-border inventions	%	Type of assignee	Industry
HUAWEI TECHNOLOGY	CN	13	12%	MNC	Manufacture of electronic components
PETROLEO BRASILERO	BR	10	9%	MNC	Extraction of crude petroleum
LARSEN TOUBRO	IN	6	5%	MNC	Manufacture of other special-purpose machinery
NATURA COSMETICOS	BR	6	5%	MNC	Wholesale perfume and cosmetics
POSITEC POWER TOOLS SUZHOU	CN	5	4%	DF	Wholesale electronics and telecommunications equipment and parts
DISHMAN PHARMACEUTICALS AND CHEMICAL	IN	5	4%	MNC	Manufacture of pharmaceutical preparations
SUN PHARMA	IN	5	4%	MNC	Manufacture of pharmaceutical preparations

Source: PATSTAT

Regression analysis: Dependent variables

- **Patent value**:
  - Forward citations: a measure of the technological importance of the patent;
  - Number of legislations in which the patent is granted;
- **Characteristic of the invention**:
  - <u>Originality</u>: how technologically broad is the domain from which a patent emerges on the basis of backward citations (i.e. if a patent cites other patents that refer mostly to a limited set of technologies, the originality index is low);
  - <u>Generality</u>: how technologically broad is the future impact of a patent on the basis of forward citations

Regression analysis: Regressors

- CROSS-BORDER dummy takes the value 1 if the patent is a cross-border invention with at least one EU inventor, and 0 if the patent is a domestic BIC invention (i.e. involving only inventors based in Brazil, India, or China);

- Controls at patent level:
  - Team size;
  - Ln Backward citations;
  - Ln Number of claims;
  - Ln Number of Non-Patent Literature (NPL);

- Controls at assignee and inventors level:
  - Ln Assignee Experience
  - Ln Inventors Experience

Estimation methods

1. Poisson Quasi Maximum Likelihood for the count dependent variables (*# of citations* and *# of legislations)*;

2. Quasi-Maximum Likelihood Fractional Logit for variables between 0 and 1 (*Originality and Generality)*;

3. Reverse Causality: since teams involved in international collaborations may be assigned to the most promising and valuable projects;

    – Two instruments:

    1. the propensity to collaborate internationally in the focal patent's technological class in the year before its filing (INSTR1: share of the EPO collaborative patents filed in the same technological class in the previous year);

    2. the assignee's propensity to collaborate internationally in the year before the focal patent filing year (INSTR2: share of the EPO collaborative patents filed by the assignees in the previous year).

Main findings

- Cross-border inventions are more rewarding than those involving only BIC inventors since they produce both higher value (i.e. higher number of forward citations) and more general patents;

- BIC MNEs are more involved in international co-inventions than BIC DFs, possibly because the former can draw on their international networks to generate new and stronger R&D collaborations with foreign entities.

Concluding remarks

- Cross-border inventions provide an opportunity for emerging country firms to tap into international knowledge pools and produce high value patents;

- However, we do not know whether these international collaborations result in relevant technological externalities in the home country beyond the invention, nor whether BIC firms are able to exploit these inventions to develop future innovations.

Emerging Market Multinationals investing in Europe:
Do acquisitions boost patents?
(work in progress)

Amendolagine V., Giuliani E.,

Martinelli A. & Rabellotti R.

Research questions

- Do <u>EMNE acquisitions</u> in Europe impact on the acquirers' innovation capabilities (i.e. <u>patent quantity</u> and <u>quality</u>)?

- What can shape the impact?
  - ➤ Knowledge base of the target company;
  - ➤ Local innovation conditions of the region in which the acquired company is located;
  - ➤ Previous experience of acquirers in patenting.

Data

- All completed majority stake cross-border acquisitions in **medium and high-tech industries** by BRICS firms in the EU27
  - ➤ Time span: 2004-2012
- 326 deals

Accepted Manuscript

The impact of outward FDI on the performance of Chinese Firms

C. Cozza, R. Rabellotti, M. Sanfilippo

Aim of the paper

- Investigating the home effect of FDIs from EMNEs:

  - on their production efficiency (LAB PROD; TFP));
  - on their scale and assets (EMPL, SALES) (including intangibles INT/TOTAL ASS);
  - on their financial performance (PROF, ROA).

- Differences based of the mode of entry: M&A vs. greenfield;

- Focus on investments in the EU, as they are more likely to be targeted by asset-seeking FDIs.

Methodology

The objective is to measure the changes in performance that can be <u>attributed</u> to the decision of investing in the EU:

- <u>Self-selection problem</u> because larger and more productive firms are more likely to undertake FDIs;

- We built a counterfactual by selecting a <u>group of non-investors whose characteristics closely match those of the Chinese investing companies</u> (propensity score matching);

- Thus the <u>control group includes Chinese companies with no foreign affiliates, but with the same ex-ante probability to undertake a FDI</u>;

- With DiD estimators we compare the change in the average outcomes for the two groups of firms during a time period that includes one year before the first investment (t= -1) and a time period (t=n) after it.

Main findings

- Chinese investors register an increase in productivity, but the effect materializes only some years after the investments;

- Greenfield investments result in early and higher productivity gains compared to M&As;

- Especially in more distant contexts such as the EU27, M&As are more complex to manage than greenfield investments and this can result in underperforming deals;

- Some evidence that M&As are leading to the transfer of more valuable resources, in the form of intangible assets, to the parent companies.

Other related papers
(available at robertarabellotti.it)

- Amighini A., Cozza C., Giuliani E., Rabellotti R., Scalera V., 2015, "Multinational enterprises from emerging economies: What theories suggest, what evidence shows. A Literature Survey", forthcoming in *Economia e Politica Industriale*.

- Amendolagine A., Cozza C., Rabellotti, R., 2014, Chinese and Indian Multinationals: A Firm-Level Analysis of Their Investments in Europe, 27, CIRCLE – Lund University (forthcoming in *Global Economic Review*).

- Amighini, A. Cozza, C., Rabellotti, R., Sanfilippo, M., 2014, "Chinese Outward FDI: What Can Be Done with Firm-level Data?", *China and the World Economy*, 22(6), 44-63.

- Crescenzi, R.,Pietrobelli, C., Rabellotti R., 2014, Innovation Drivers, Value Chains and the Geography of Multinational Corporations in Europe, *Journal of Economic Geography*, 14, 1053-1086.

- Piscitello L., Rabelllotti R., Scalera V., 2014 Chinese and Indian M&As in Europe: The relationship between motive and ownership choice, CIRCLE WP, 3, Lund: University of Lund (forthcoming in Risberg, A., King, D. and Meglio, O. (Eds), The Routledge Companion to Merger and Acquisition).

- Amighini, A., Rabellotti R. & Sanfilippo, M., 2013, "Do Chinese State-Owned and private Enterprises Differ in their Internationalization Strategies?", China Economic Review, vol. 27, 312-325

- Amighini, A., Rabellotti R & Sanfilippo, M. , 2013, "China's outward FDI: An industry-level analysis of host-country determinants", *Frontiers of Economics in China*, 8 (3), 903-936.

- Pietrobelli C., Rabellotti R., Sanfilippo M., 2011, "The "Marco Polo" effect: Chinese FDI in Italy", *International Journal of Technology and Globalization, 4(4), 277-291.*

Thank you

roberta.rabellotti@unipv.it

roberta.rabellotti.it