



# Global innovation networks and regional dynamics

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# The questions

- Why should you care about globalization of innovation? i.e. is Globalization of innovation old wine in new bottles or something really new?
- What are the advantages of going global for innovation?
- What does it take to globalize innovation activities?
- What about the foreign technology driven investments in our region? Will the impact be negative?





# Outline

## 1. Presentation

### Part I

## 2. Background

## 3. Overview of changes

## 4. Impact of outward global innovation networks

## 5. Drivers of outward global innovation networks

### Part II

## 6. Overview of inward global innovation networks

## 7. Impact of inward global innovation networks

## 8. Conclusions





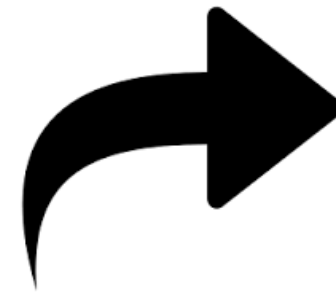
# 1. Presentation

- Prof. in Innovation studies at Circle (Lund University) until august 2016
  - Head of the research platform on globalization of innovation
- Currently
  - Prof. in Innovation studies at Economic history, LUSEM, Lund University
  - Research group on Globalization, Innovation and Sustainability
- Main research topic
  - Globalization of innovation
  - Innovation in emerging economies and developing countries
  - Innovation policy





# **PART I GENERAL OVERVIEW OF CHANGES AND OUTWARD INNOVATION NETWORKS**





# The question

Why should you care about globalization of innovation? i.e. Is Globalization of innovation old wine in new bottles or something really new?





## 2. Background

- Innovation networks have become truly global (UNCTAD, 2005)
  - Increased globalization in parallel with a growing role of certain regions around the world
  - Global innovation networks pinned down to certain regions around the globe
- Suggests that regional dynamics affect and are affected by global innovation networks
  - How??





## 2. Background

### Globalization of innovation as a research field

#### Extremely fragmented literature

- Economic Geography
  - Concept: Globally distributed knowledge bases;
- International business
  - C: Internationalization of R&D, offshoring of R&D
- Innovation studies
  - C: Techno-globalism; Global innovation networks
- Development studies
  - C: Global value chains







## 2. Background

- What we know about internationalization/globalization of innovation...
  - Innovation has long been an international phenomenon but hardly a global one

# SO, WHAT HAS CHANGED?

- Internationalization of **innovation** towards South is more related to adaptation to markets (D) than to development of new products or services (R)
- Internationalization of innovation – hollow out





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## 3. Overview of changes

What has changed is (at least):

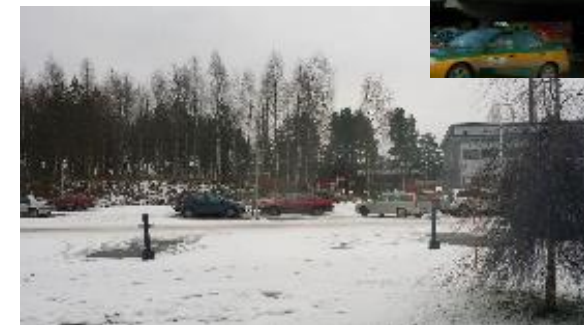
1. The **geography** of the flows: from innovation within the Triad (Japan, US, Europe) to global innovation (China, India)
2. The **nature** of innovative activities, particularly in some emerging economies: from D to R
3. The **actors**, from large multinational companies, to SMEs and standalone





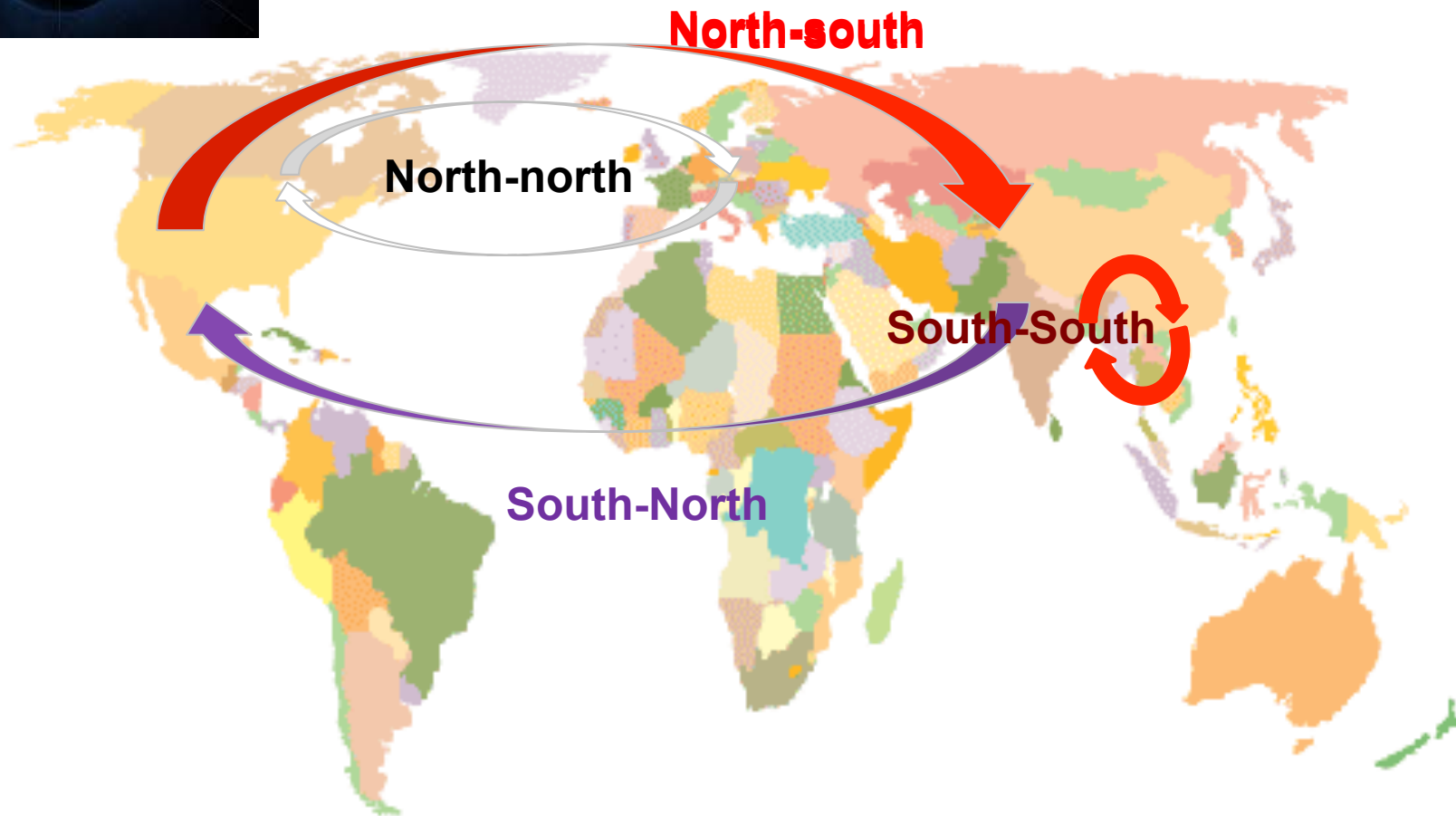
# 3. Overview of changes

- Analysis presented today is based on
  - **Survey:** INGINEUS database (survey in 9 countries in Europe & BICS)
  - **Secondary data:** fDi markets data – Financial Times, All greenfield investments, mergers and acquisitions and minority investments from MNEs from emerging countries (EMNEs)
  - **Interviews:** Firm-based interviews in China, India and Europe
- 2 mechanisms
  - Cross border **R&D investments** – greenfield FDI
  - **Global research collaboration**





### 3. Overview of changes Changing geography



Based on UNCTAD (2005) FDI report





### 3. Overview of changes

## Changing geography

## Offshoring of R&D, by destination

**Cross-border investment projects in R&D-related and manufacturing activities, by country of destination (January 2003 - August 2012)**

Design, development and Testing			R&D			Manufacturing		
Rank	Country	% share	Rank	Country	% share	Rank	Country	% share
1	India	20.3%	1	China	16.9%	1	China	16.3%
2	China	12.8%	2	India	14.7%	2	US	9.1%
3	US	7.9%	3	US	7.9%	3	India	6.1%
4	UK	6.6%	4	UK	5.9%	4	Russia	4.3%
5	Germany	3.5%	5	Singapore	4.8%	5	Brazil	3.5%
...	...	...	...	...	...	...	...	...
22	Sweden	1.0%	27	Sweden	0.7%	43	Sweden	0.4%
Total		100%	Total		100%	Total		100%
		(3980)			(3162)			(30554)
Top 5		51.2%	Top 5		50.2%	Top 5		39.3%
Top 20		78.7%	Top 20		83.4%	Top 20		73.5%

Source: Castelli and Castellani (2013)



# 3. Overview of changes

## Changing geography

### Offshoring of R&D, by origin

**Cross-border investment projects in R&D-related and manufacturing activities, by country of origin (January 2003- August 2012)**

Design Development & Testing			R&D			Manufacturing		
Rank	Country	% share	Rank	Country	% share	Rank	Country	% share
1	US	45.3%	1	US	42.7%	1	US	17.6%
2	Germany	9.7%	2	Germany	9.1%	2	Japan	14.2%
3	UK	7.0%	3	Japan	8.0%	3	Germany	12.1%
4	Japan	6.9%	4	France	5.2%	4	France	5.5%
5	France	5.5%	5	UK	5.1%	5	UK	4.7%
6	India	3.3%	6	Switzerland	3.8%	6	Italy	3.5%
7	Switzerland	2.9%	7	China	3.1%	7	Switzerland	3.4%
8	Netherlands	2.1%	8	South Korea	2.5%	8	South Korea	3.1%
9	Canada	1.9%	9	Netherlands	2.4%	9	Netherlands	2.6%
10	Sweden	1.3%	10	Canada	2.2%	10	Taiwan	2.3%
11	China	1.3%	11	India	2.1%	11	Canada	2.3%
12	Spain	1.2%	12	Sweden	1.8%	12	Spain	2.3%
13	Finland	1.2%	13	Finland	1.3%	13	China	2.1%
14	South Korea	1.1%	14	Italy	1.2%	14	Sweden	2.1%
15	Denmark	0.9%	15	Denmark	1.2%	15	India	2.0%
	Other countries	8.50%		Other countries	8.40%		Other countries	2.0%
	<b>Total</b>	<b>100%</b>		<b>Total</b>	<b>100%</b>		<b>Total</b>	<b>100%</b>
		(3980)			(3162)			(30,554)



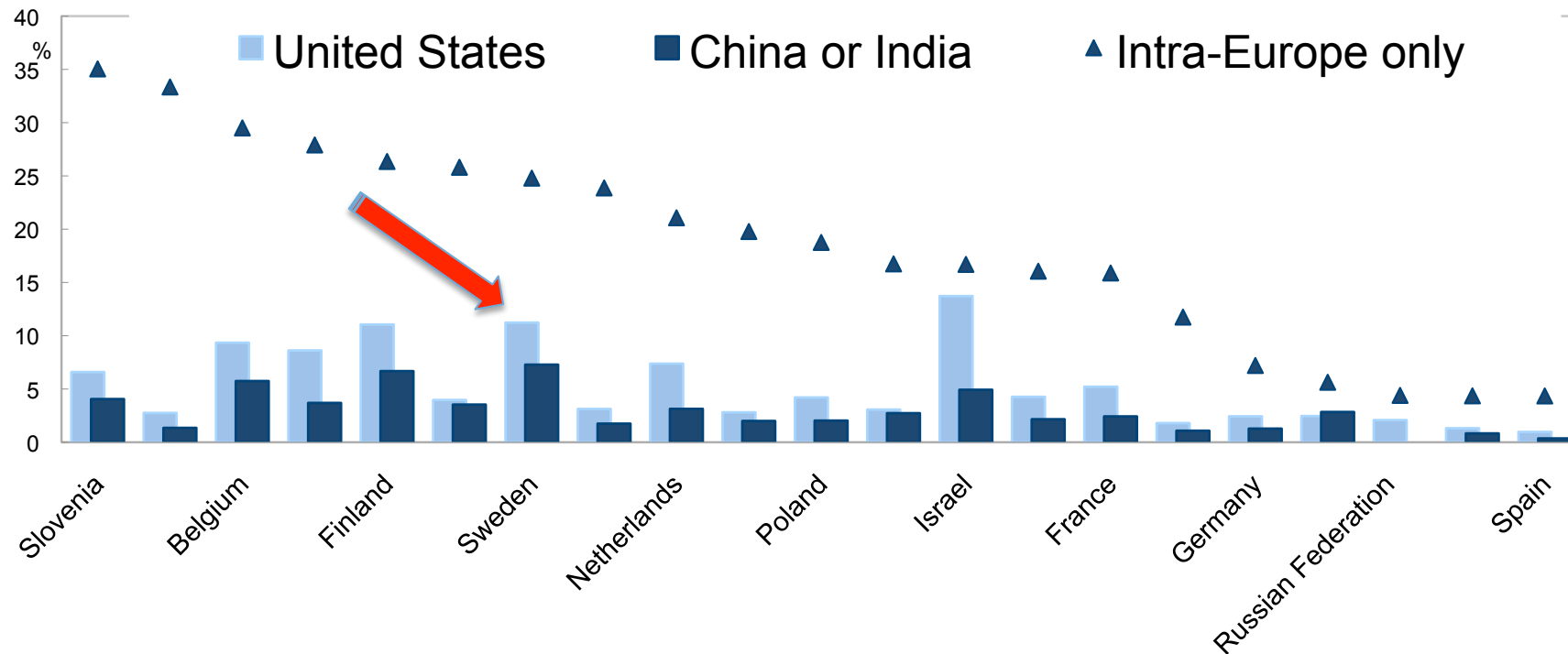


### 3. Overview of changes

## Changing geography

## Research collaboration

- OECD firms engaged in international research collaboration by partner country (OECD, Science and Technology indicators, 2012)







### 3. Overview of changes

## Changing actors

- And this is not only a "large firm" phenomenon...  
In Sweden 19% of the innovative firms with less than 50 employees that collaborate for innovation, do so with Chinese and Indian partners

	Total	Sweden	Other Europe	USA	China and India	Other
10-49 employees	30	95	54	24	19	14
50-249 employees	36	99	72	28	21	19
More than 250 employees	62	98	83	50	40	36

16% in  
2010-2012

Source: Swedish innovation survey (2012-2014)  
<http://www.statistikdatabasen.scb.se>





### 3. Overview of changes

## Changing actors

- Developing countries are playing a much more important role in these global innovation networks (Barnard and Chaminade, 2012)
  - Based on firm-based survey in European and middle-income countries (9 European and BRICS)
  - Firms involved in research collaboration networks that are highly global, networked and innovative
    - **Mainly standalone firms (!)**
    - **Mainly SMEs (between 50-250 employees)**
    - **Mostly located in middle-income countries**





### 3. Overview of changes

## Changing nature

Cross-border R&D investments by country of destination and type of investment (2003-2011). Selection of industries

	Design, Development and Testing		R&D		Total DDT (number)	Total R&D (number)
	China (%)	India (%)	China (%)	India (%)		
ICT & Electronics	12.57	26.475	17.60	20.03	1949	1148
Life sciences	11.94	12.313	8.60	10.62	268	744
Transport Equipment	14.66	12.931	21.56	13.13	464	320
Physical Sciences	22.61	18.261	33.57	10.00	115	140
Creative Industries	6.99	11.397	20.83	16.67	272	72
Environmental Technology	8.60	6.452	13.86	6.93	93	101

Source: Chaminade et al (2013)





### 3. Overview of changes

- What we know about internationalization/globalization of innovation...
  - Innovation has long been an international phenomenon but **not a global one**
    - The majority of R&D is conducted close to headquarters
    - When internationalized is usually in neighbor countries (within EU, for example)
  - Globalization of innovation is associated almost exclusively to **large multinationals**
  - Internationalization of **innovation** towards South is more related to **accession to markets (D)** than to development of new products or services (R)





### 3. Overview of changes

- Is Globalization of innovation something really new?

**Yes!**





# IMPACT OF OUTWARD GLOBAL INNOVATION NETWORKS

- What are the advantages of going global for innovation?





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## 4. Impact of outward global networks - Collaboration

- Research collaboration and offshoring of innovation (FDI) globally is related to **new to the world innovations** (Chaminade and Harirchi, 2014; Plechero and Chaminade, 2016a)
  - And this is valid also for SMEs (Aslensen and Harirchi, 2013)
  - This is particularly the case for market partners, no matter where are they located!







## 4. Impact of outward global networks – R&D offshoring

- In general, R&D offshoring is associated with **higher productivity growth** in EU regions (Pieri and Castellani, 2013)
- Innovation abroad complements innovation at home!
  - Complementary effect and NOT substitution effect as when production is offshored





## 4. Impact of outward global networks – R&D offshoring

- The impact varies significantly depending on country of destination (Pieri and Castellani, 2013)
  - Effect is larger if R&D offshoring to South-East Asia
  - Positive if offshoring to China
  - Significantly lower productivity growth rates in regions offshoring R&D to India





## 4. Impact of outward global networks – R&D offshoring

- Possible explanation: combination of country and sector specificities (Pieri and Castellani, 2013)
  - R&D offshoring to South-East Asia concentrated in *high-tech manufacturing* (43% of all R&D projects)
  - R&D towards India concentrated in knowledge intensive *services*
  - Orchestrating value chain in knowledge-intensive activities (services) more complex than in manufacturing (Mudambi and Venzin, 2010)





## 4. Impact of outward global networks – R&D offshoring A look into Sweden

Cross border R&D investments in Sweden (2003, 2011)

	Design, Development and Testing		R&D	
	EU 27	Sweden	EU 27	Sweden
EU15	21.3%	22.7%	27.4%	25.0%
Developed (US, Canada, Japan)	18.7%	17.0%	19.9%	9.4%
South-East Asia	7.6%	2.3%	9.0%	3.1%
China	11.2%	13.6%	13.5%	28.1%
India	13.7%	15.9%	8.3%	18.8%
TOTAL (number projects)	1560	88	725	32

(Chaminade et al, 2015)





# IMPACT

- What are the advantages of going global for innovation?
  - Breakthrough innovations
  - Higher productivity in the region





# DRIVERS OF OUTWARD GLOBAL INNOVATION NETWORKS

- Ok, so if going global has a positive impact, what does it take?





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## 5. Drivers of outward global innovation networks (GINs)

- GIN dynamics are affected by:
  - Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
  - Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
  - Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
  - Region







## 5. Drivers of outward global innovation networks

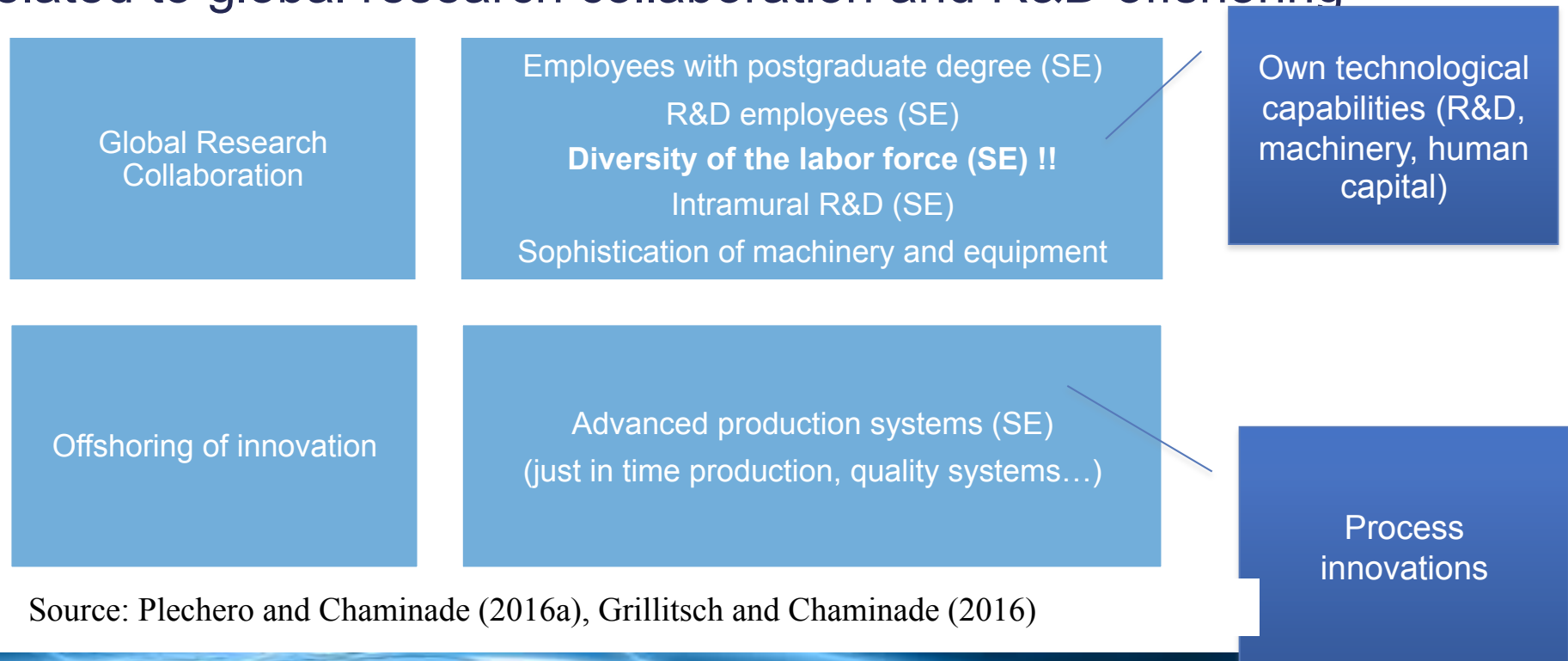
- Network dynamics are affected by:
  - Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
  - Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
  - Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
  - Region





## 5. Drivers of outward global innovation networks

Firms' internal competences are significant and positively related to global research collaboration and R&D offshoring



Source: Plechero and Chaminade (2016a), Grillitsch and Chaminade (2016)





## 5. Drivers of outward global innovation networks

- Network dynamics are affected by:
  - Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
  - Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
  - Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
  - **Region**





## 5. Drivers of outward global innovation networks

- Role of the region in the propensity to engage in global innovation networks
  - Direct effect
    - Organizational thickness
    - Specialization
    - Industrial structure
  - Indirect effect
    - Firm capabilities





## 5. Drivers of outward global innovation networks

### Understanding how regions affect GINs - Direct effect

1. **Organizational thickness** of a region affects engagement in GINs
  - Firms located in regions that are neither organizationally too thick nor too thin are those that engage more in GINs (Tödling et al, 2011; Plechero and Chaminade, 2015) – compensation mechanism
  - Increasingly innovation is occurring outside the urban agglomerations (Rodriguez –Pose and Wilkie, 2015)





## 5. Drivers of outward global innovation networks

Understanding how regions affect GINs -  
Direct effect

### 2. Regional **specialization** affects engagement in GINs

- Higher specialization, more importance of regional linkages (Plechero and Chaminade, 2016b)





## 5. Drivers of outward global innovation networks

### Understanding how regions affect GINs - Direct effect

3. **Industrial structure of the region affects engagement in GINs (Ebersberger et al, 2014; Martin, 2011)**
  - Regions specialized in industries dominated by scientific knowledge-bases engage more in international networks





## 5. Drivers of outward global innovation networks

### Understanding how regions affect GINs - Indirect effect

Regions affect the innovative capabilities of local firms

- Firms' own knowledge reservoir and innovative performance is influenced by regional framework conditions (Srholec, 2008)
- Firms with strong in-house capabilities can use international networks to compensate for a weak RIS (Grillitsch and Nilsson, 2015; Rodriguez-Pose and Fitzar, 2014)







# DRIVERS OF OUTWARD GLOBAL INNOVATION NETWORKS

- Ok, so if going global has a positive impact, what does it take?
  - **Internal competences**
    - Qualified and diverse labor force
  - **Location, location, location**
    - Thick regions – local networks more likely
    - Thin regions – global networks more likely
      - BUT globalization is complex – competences needed





And now...time to  
refuel the brain!

Second part  
coming soon...





## PART II

- INWARD GLOBAL INNOVATION NETWORKS – INWARD FLOWS TO EUROPE





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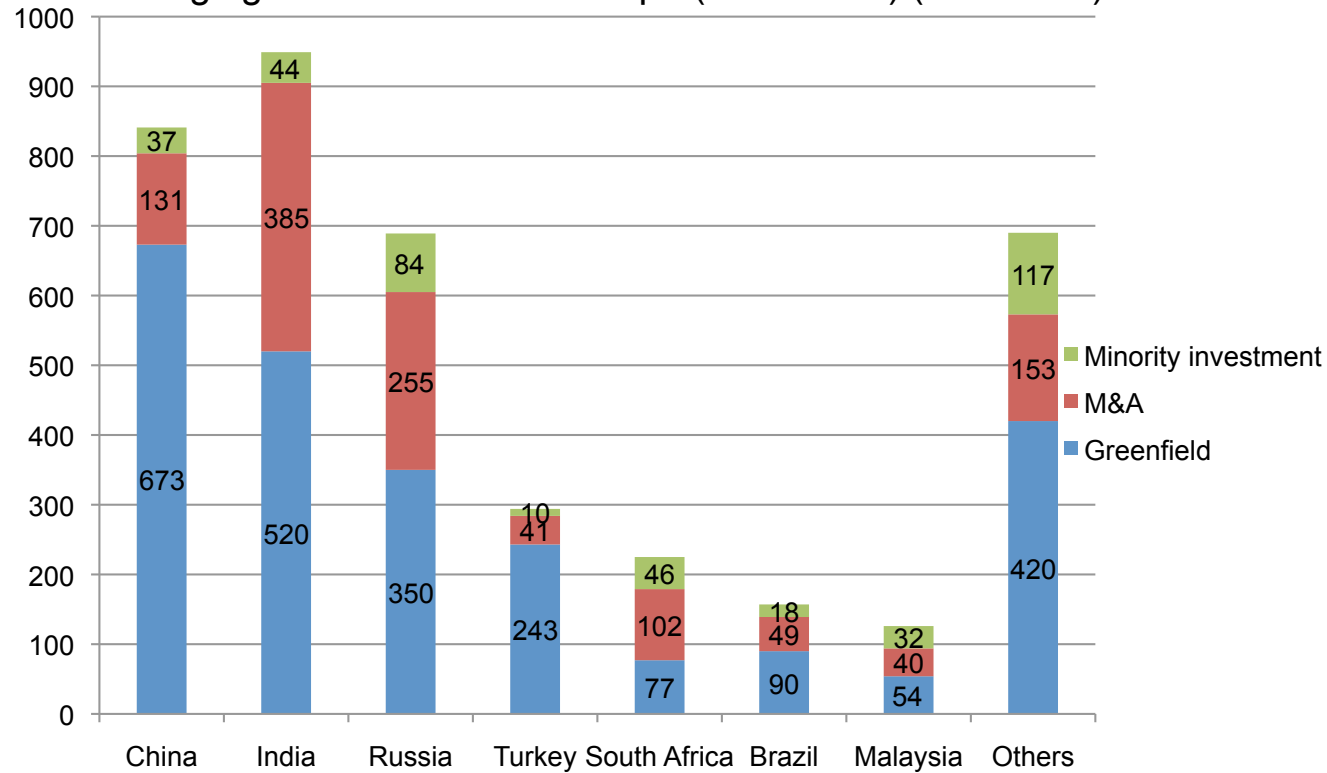






# 6. Overview of inward innovation flows

Emerging countries FDI to Europe (2003-2011) (# of deals)



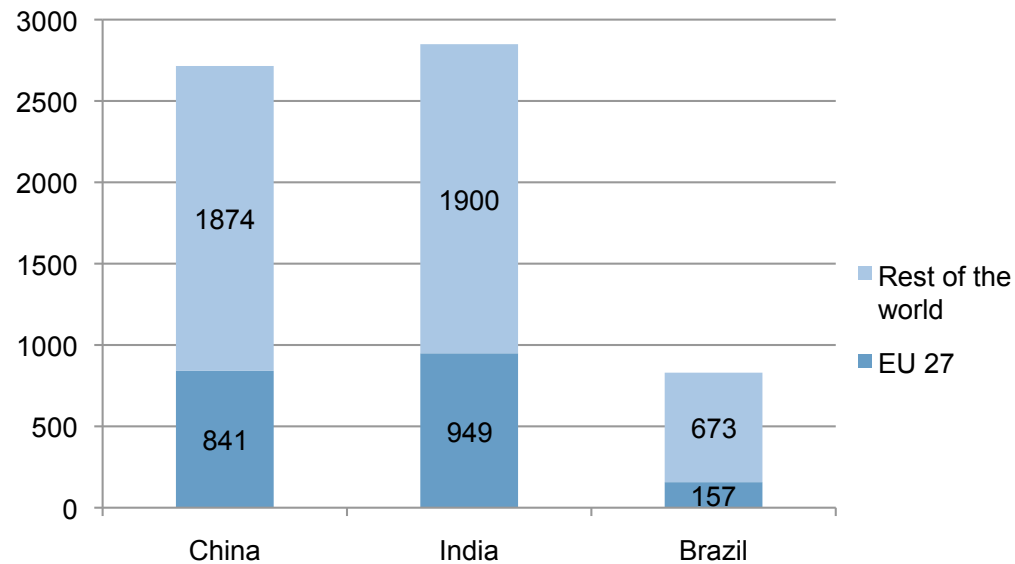
Source: Chaminade et al (2015) based on Fdi Markets





## 6. Overview of inward innovation flows

Emerging countries FDI to Europe & rest of the world (2003-2001) (# of deals)



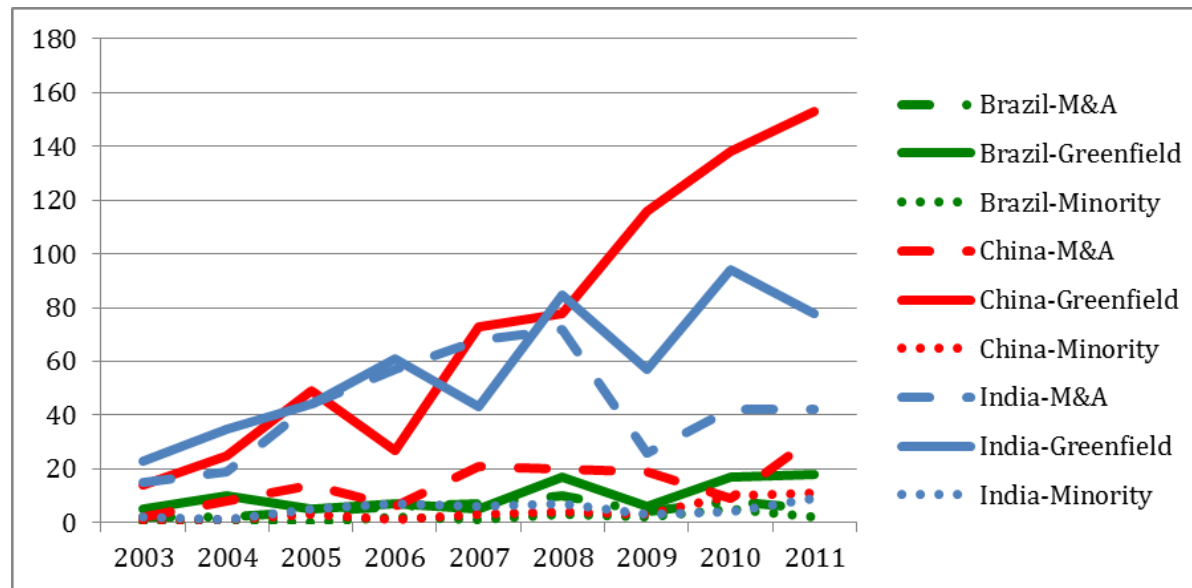
Source: Chaminade et al (2015) based on Fdi Markets





# 6. Overview of inward innovation flows

Chinese, Indian and Brazilian FDI to Europe (2003-2011)



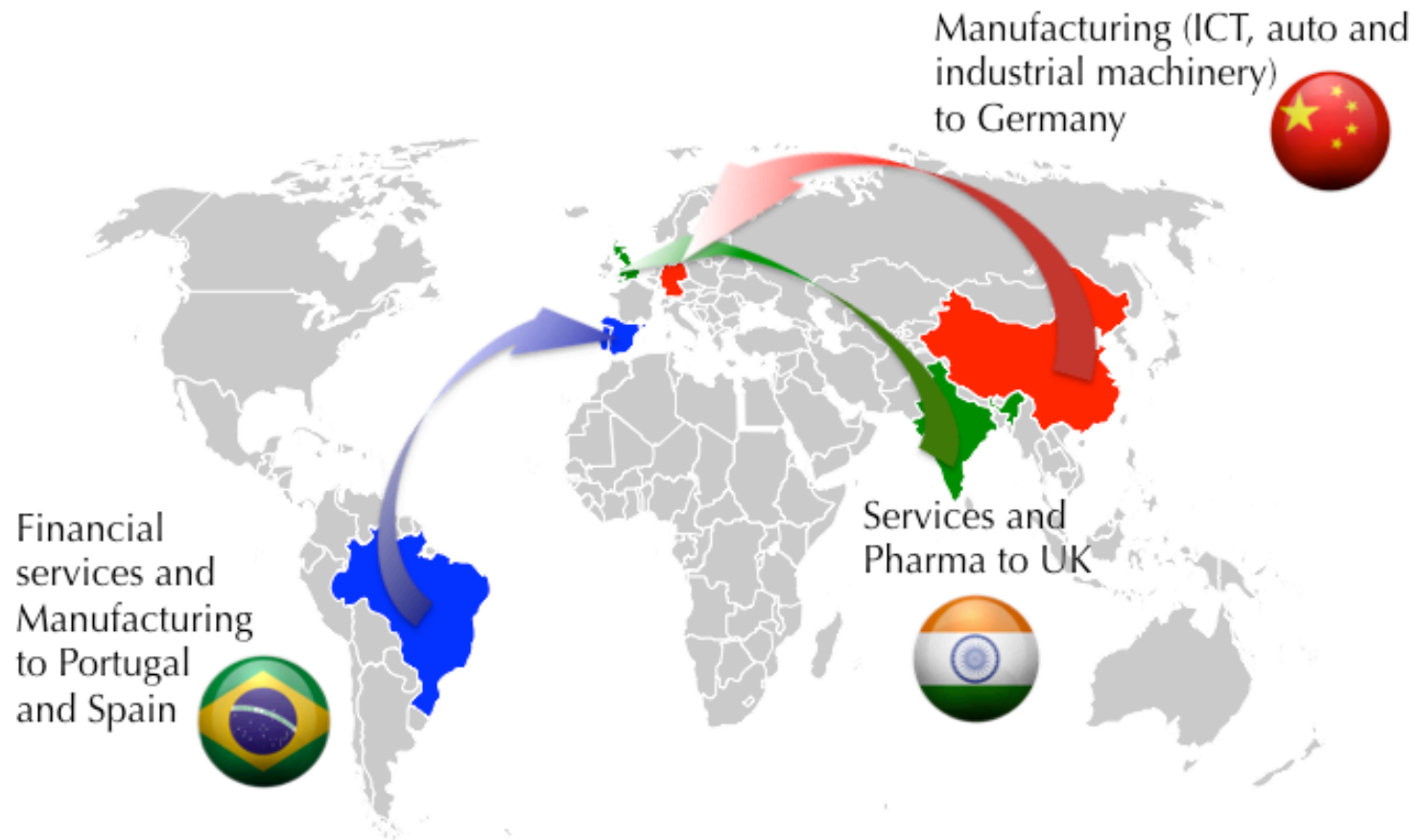
Source: Chaminade et al (2015) based on FDI Markets







## 6. Overview of inward innovation flows





# 6. Overview of inward innovation flows

(Chaminade et al, 2015)

- Why do EMNEs invest in Europe?
  - To access intangible assets (i.e. technology, knowledge, brands, commercial networks)
  - To generate knowledge
  - To exploit economies of scale and scope
  - To gain legitimacy and reputation
- How do EMNEs invest in Europe?
  - Greenfield investments are the preferred mode of entry
  - Acquisitions are preferred when the objective is (rapidly) acquiring technological competences





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# The question

- What about technology driven foreign direct investment in Europe...will they buy our companies, copy the technology and closing them down?

“The asset stripping syndrome”





# 7. Impact of inward innovation flows

(Chaminade et al, forthcoming)

## Method

- Comparative analysis of 6 MNES from China and India
- 8 technology driven investments in Europe
- Selection of cases
  - Purposive sample from EMENDATA
    - At least one greenfield and one acquisition
    - Not largest ones
    - Operating in a similar subsector
- Data collection
  - Semi-structured interviews with CEO in headquarter and subsidiaries





## 7. Impact of inward innovation flows (Chaminade et al, forthcoming)

### Cases

- Auto1: Indian car manufacture. Acquisition TFDI in emission control followed by greenfield
- ICT1: Indian ICT service provider. Multiple TFDI in Europe (acquisitions).
- ICT 2: Indian Telecommunication company. Two TFDIs in Europe (acquisitions)
- ICT3: Indian Telecommunication service provider. Two TFDIs in Europe (acquisitions)
- CLEAN1: Chinese wind turbine. Greenfield TFDI in Europe
- CLEAN2: Indian wind turbine. Greenfield and acquisition TFDI Europe.





## 7. Impact of inward innovation flows

- 4 possible outcomes
  - **Asset stripping:** Purchase of a company because of the IP and then close down
  - **Asset withering:** Purchase of a company and IP and failure to maintain tech capabilities
  - **Asset maintenance:** Purchase of a company and IP and maintenance of level of tech capab.
  - **Asset development:** Purchase of a company or greenfield and development of technological capabilities





## 7. Impact of inward innovation flows

- No generalized predatory behavior! (in line with Giuliani et al, 2016)
  - Asset stripping is the exception, not the rule
  - Complementarities exist (technology, capital, customer base)
- Subsidiary's degree of autonomy matters
  - Technology strategy
  - Clients, procedures, networks
- Time matters
- EMNEs more likely to create win-win situations than MNEs from advanced countries (AMNEs) (Giuliani et al, 2014)







## The question



- What about technology driven foreign direct investment in Europe...will they buy our companies, copy the technology and closing them down?

“The asset stripping syndrome”





# 7. Impact of inward innovation flows

## ...and more findings

(Chaminade et al, 2015)

- Management has a great influence on impact
  - Awareness of cultural differences HQ-S
  - Awareness of gap between technical competences of subsidiary and HQ
    - Autonomy needed
  - Awareness of gap between dedicated customer base of subsidiary and global base of the HQ
  - Awareness of importance of local networks





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## 8. Conclusions & policy implications

### The questions

1. Why should you care about globalization of innovation? i.e. is Globalization of innovation old wine in new bottles or something really new?
2. What are the advantages of going global for innovation?
3. What does it take to globalize innovation activities?
4. What about the foreign investments in our region? Will the impact be negative?





# The questions

1. **Why should you care about globalization of innovation?**
  - The geography and nature of the internationalization of R&D and other innovation activities is changing
  - Internationalization of innovation activities is no longer a phenomenon exclusive of large firms (SMEs still marginal, but growing)
  - Sweden is one of the EU countries with the highest engagement in international and global innovation networks – more likely to be influenced by these global changes





## 8. Conclusions & policy implications

### 2. What are the advantages of going global for innovation?

- Global research collaboration positively associated with new to the world innovations
- Offshoring of R&D is positively associated with home country region productivity growth
  - Complementing rather than hollowing-out
  - Particularly good for R&D offshoring towards East Asia
  - Caution with R&D offshoring towards India (SWEDEN)





## 8. Conclusions & policy implications

### 3. What does it take to globalize innovation activities?

- Access to **competences** is critical, particularly for those firms that need or want to internationalize
  - Technological capabilities (hard)
  - Management techniques for international business and cross-cultural communication (soft)
  - Diversity of the workforce
  - Mobility of highly skilled human resources (smart use)
- The **region** where the firm is located is key!- complex linkages between global network and regional dynamics





## 8. Conclusions & policy implications

### 4. What about the foreign investments in our region? Will the impact be negative?

- No generalized predatory behavior!
- EMNEs more likely to create win-win situations than MNEs from advanced countries (AMNEs)
- Autonomy, knowledge of the business and managerial capabilities are key







**THANKS!!!**  
**TACK SÅ MYCKET!!!**

So, if you have NOT  
been browsing funny cat  
videos during the  
presentation...

**ANY QUESTIONS?**



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# Itchy to know more? Original publication sources

THANK YOU!!!

- Plechero, M.; Chaminade, C. (2016a). Spatial Distribution of Innovation Networks, Technological Competencies and Degree of Novelty in Emerging Economy Firms. European Planning Studies. <http://www.tandfonline.com/doi/full/10.1080/09654313.2016.1151481>
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[www.cristinachaminade.net](http://www.cristinachaminade.net)

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