



# **Greening global value chains: innovation and the international diffusion of technologies and knowledge**

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# Outline

- Innovation and technology transfer to developing countries
  - The example of climate-mitigation technologies (Glachant et al., 2013)
- Evaluation of different policy approaches
  - A focus on intellectual property rights
- Possible issues to be discussed

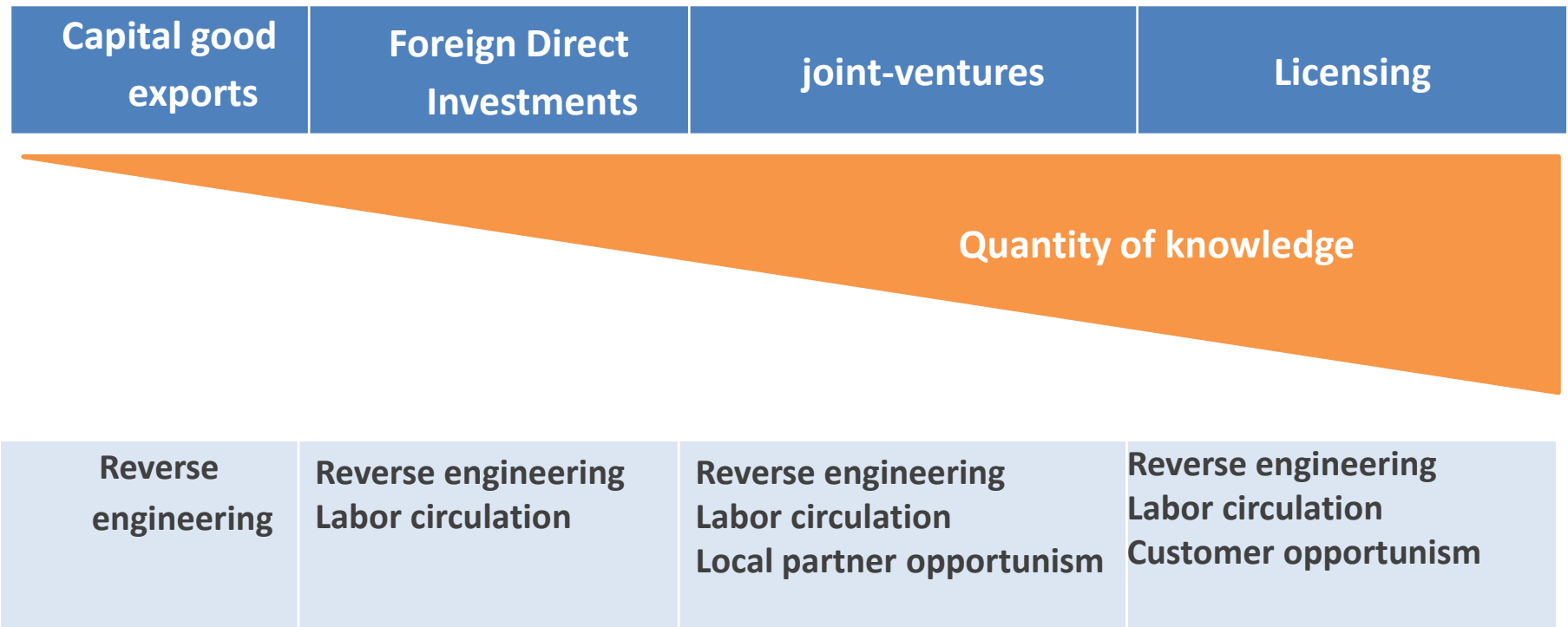
# Innovation (learning by searching)

Climate-friendly patented inventions by developing countries (2007 – 2009)

World rank	Country	Share of world climate patented inventions (2007-2009)*
9	China	1.7%
18	Taiwan	0.9%
21	India	0.7%
22	Russia	0.5%
25	Brazil	0.4%
31	South Africa	0.2%

Message 1: Developing countries (emerging economies + LDCs) hardly innovate through learning by searching

# The channel of technology transfer

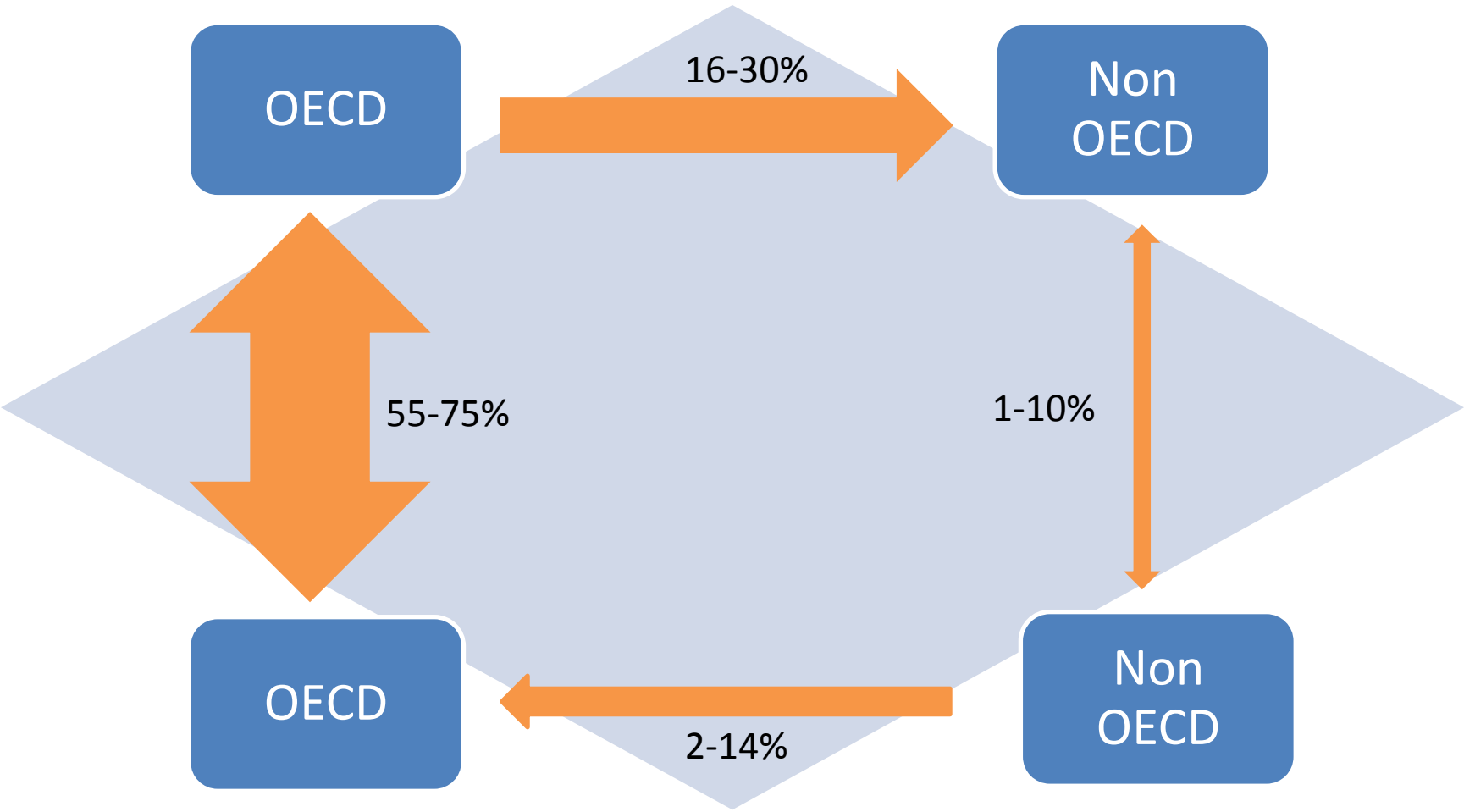


# Three indicators to quantify tech transfer

	Definition
<b>Patent</b>	Volume of patents filed in the recipient country by inventors located in the source country
<b>International trade</b>	Volume of bilateral trade of low-carbon equipment goods
<b>Foreign direct investment + JV</b>	Count of capital links between a source company owning at least one low-carbon patent and a foreign company

Reference: Glachant, Dussaux, Ménière, Dechezleprêtre (2013) “Promoting the International Transfer of Low-Carbon Technologies”, report for the French Centre for Strategic Analysis

# The geography of climate tech diffusion



# Tech transfer towards the major emerging economies

Country	Patents	Equipment goods	FDI links	Economy size (2009 GDP)
China	15.5%	8.3%	7.1%	11.1%
Mexico	2.2%	1.7%	2.5%	2.2%
Russia	1.3%	1.4%	2.2%	3.3%
South Africa	1.2%	0.4%	0.9%	0.7%
India	n.a.	1.5%	1.6%	4.9%
Brazil	0.7%	0.7%	2.5%	2.9%

Imports of low-carbon patent flows, capital goods and direct investments in selected emerging economies as a share of world imports (2007–2009)

**Message 2: Major emerging economies are already connected to international technology flows. But LDCs are not.**

# Policy instruments

- Environmental policies
- Technological capacity building
- Intellectual Property (IPR)
- Barriers to trade and FDI
- The Clean Development Mechanism
- Business-led initiatives
- International agreements

## Question:

- How effective are they in promoting tech transfer?

## Method

- A review of the economic and policy literature



# Key messages

The need to distinguish emerging economies and least-developed countries

## 1. Emerging countries

- Pushing further their integration in the global green economy
- Strengthening intellectual property rights, lowering barriers to trade and FDI, improving technological absorptive capacities
- The next step is creating demand at home with ambitious environmental policies properly enforced

## 2. Least Developed countries

- The lack of technological absorptive capacities is THE PROBLEM
- Strengthening intellectual property rights, lowering barriers to trade and FDI is likely to be ineffective

# Strengthening IP rights to boost tech transfer?

Not possible to conclude with theoretical arguments

- IPR confer legal exclusivity
  - The inventor can use his market power to raise price barriers.
- IPR are property rights
  - facilitate tech diffusion in markets (licensing)
- Patenting requires to publicly disclose information on the technology
  - Contrary to industrial secrecy
- Patents pose problems in certain sectors
  - Information technology

Hence an empirical question...

# Results of empirical studies

- Strict IPR increase tech transfer in countries with technological absorptive capabilities
  - Many emerging economies
- The impact is uncertain in others
  - Developing countries
- Why?
  - Because there exists sufficient competition between green technologies
- May not be true in the future for all technologies and in all sectors
  - Smartgrids ?

# Issues to be discussed?

- The distinction between emerging economies and least-developed countries
- What about technologies and sectors which have received less attention than climate-related and energy technologies?
- Cooperating internationally with which technology-oriented instruments?
- Developing countries need methodologies to identify priority technologies and to adapt policy instruments to local context.
- Technology diffusion within recipient economies, as opposed to international technology transfer.
- Poverty alleviation and green technologies, complements or substitutes?
- Technology and competitiveness of national economies. How to maximize win-win solutions?

# CERNA Technology and Climate Change research programme

Reports and papers available here:

<http://www.cerna.ensmp.fr/index.php/fr/recherche/technology-and-climate-change-research-programme>