THE DEVELOPMENT OF GLOBAL INNOVATION NETWORKS AND THE DIFFUSION OF KNOWLEDGE

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Dirk Pilat, Koen de Backer, Ester Basri and Sarah Box
Contact: dirk.pilat@oecd.org
Outline

- Context

- Evidence and characteristics of the internationalisation of innovation, focusing on 2 key channels of knowledge transfer:
  - Foreign direct investment in R&D and the development of global innovation networks
  - The role of international mobility of the highly skilled

- Implications and policy issues.
Globalisation has new characteristics

1. The development of global value chains:
   - Enabled by the spread of ICT and falling transport costs, production is increasingly fragmented across countries leading to more specialisation and complex production relationships.
   - These global chains increasingly also involve R&D and innovation.

2. The integration of large emerging economies, notably China and India.
Non-OECD countries are of growing importance for global science and innovation

- China is now the third largest investor in R&D globally – with a target to reach an R&D intensity of 2.5% by 2020.
- Some firms have started to undertake R&D for the global market in China.
- Some other non-OECD regions are following.

**Contributions to growth in global R&D, 1996-2001 and 2001-2006**

(in billion constant USD PPP and %)

- **1996-2001**
  - United States: 37%
  - Japan: 23%
  - Other OECD (1): 11%
  - Other non-OECD (2): 7%

- **2001-2006**
  - United States: 16%
  - Japan: 13%
  - Other OECD (1): 13%
  - Other non-OECD (2): 30%

Note: (1) Australia, Canada, Iceland, Korea, Mexico, New Zealand, Norway and Turkey.
(2) Argentina, Brazil, India, Israel, Russian Federation, Singapore, South Africa, Chinese Taipei; latest years for India estimated.
Source: OECD, Main Science and Technology Indicators and national sources.
MNEs still primarily undertake R&D inside the OECD area..

(Current R&D locations, % of responses)

Source: UNCTAD
Which of the following countries would you choose as being the best overall overseas location for R&D (please do not select your own country)?

(9% respondents)

- India
- United States
- China
- Canada
- United Kingdom
- Germany
- Japan
- Ireland
- Finland
- South Korea
- France
- Switzerland
- Other

Source: The Economist Intelligence Unit
.. to gain access to markets and talent
(number of firms citing a factor as critical)

Source: Case studies from OECD (2008), Open Innovation in Global Networks.
Some MNEs have also started to change their approach to innovation ...

**Old model: Closed Innovation**

- **Approach:** “We do it our way” & “not invented here”
- **R&D:**
  - Corporate culture and traditional operations influence targets
  - Performed in-house
  - Internal pool of innovators
- **R&D Outputs:**
  - Advances incorporated internally into firm’s products and services.
  - Product revenues finance next cycles of in-house R&D

**New model: “Open“ Innovation**

- **Approach:** “Access the best” – “proudly found elsewhere”
- **R&D:**
  - Business strategy drives targets (new incentives and funding models)
  - Technology developed cooperatively or acquired
  - Work with many innovators (including private and public sectors, and users)
  - Leverage own IP
- **R&D Outputs:**
  - Internalized or externalized (licensing, spin-offs, venturing)
IN RELYING MORE HEAVILY ON EXTERNAL SOURCES OF INNOVATION

• Major motivations:
  – Increasing the speed of innovation, especially by tapping into knowledge from research institutes, companies and adjacent markets
  – Increasing the number of ideas for new projects
  – Attracting and retaining talent
  – Increasing external funding of ideas and technology development

Source: OECD (2008), Open Innovation in Global Networks.
MNEs also engage in new practices

- Multinational firms are very active in creating ecosystems
  - High tech campuses & networks
  - Partnerships, aimed at spill-overs
  - Not always geographically based, but rather technology-based

- Engagement in partnerships
  - Complementary skills
  - Reputation and trust important

- New IT tools are being used:
  - Innovation portals
  - Technology intermediaries
Intellectual property is important ...

- IPR have become important in almost all industries:
  - Non-disclosure agreements
  - Confidentiality and exclusivity agreements
  - Brands, design, models
  - Patents: though different by sector (pharma versus ICT)

- IPR for defensive reasons:
  - To protect the business
  - To prevent others from taking out a patent that is peripheral for the business

- However, companies also engage in open innovation practices:
  - Licensing activities
  - Strategic alliances
  - Sharing technologies
What do you see as being the most significant risks to developing global innovation networks? (% respondents)

- Theft of intellectual property: 60%
- Loss of control over innovation processes: 45%
- Cultural differences: 38%
- Difficulty managing remote staff: 33%
- Difficulty sharing knowledge: 30%
- Difficulty in ensuring knowledge: 27%
- Concerns over quality control: 25%
- Excessive complexity in supply chain: 23%
- Incentives not sufficiently aligned: 18%
- Possibility of conflict: 15%
- Other: 5%

Source: The Economist Intelligence Unit
Implications: attractiveness to R&D

• Global firms look for attractive locations and partners that have complementary knowledge to offer:
  • Attractiveness of an economy as a location for FDI is important – implying that sound macroeconomic and structural policies matter.
  • Being at the high end of the innovation chain requires strong capabilities: high-performing universities and public research institutions, a well developed research infrastructure and excellent human resources.
  • The quality of the system also depends on how well knowledge flows within the system and between system:
    • E.g. industry-science linkages, clusters.
    • Openness to FDI, trade and highly skilled workers from abroad.

• Protection of IPR matters, but also new practices to leverage IPR.
  • Combining proprietary and open innovation: maintaining incentives for investment in innovation and leveraging IPR to create value.
.. also for developing countries

• Some developing countries may benefit from the internationalisation of R&D, but experiences differ:
  • China attracted R&D FDI based on a large domestic market and strong human resources; Chile has not received significant R&D FDI;
  • Spill-overs from foreign R&D on domestic innovation are often limited.
  • Advanced economies are often more able to “embed” R&D FDI within their national innovation system (Switzerland versus China and Hungary).
  • Cooperation in innovation networks may offer greater opportunities.
• For most developing countries, other channels of knowledge diffusion will be more important for innovation, e.g.:
  • International trade
  • FDI in production
  • Licensing
  • International mobility of highly skilled
International mobility: growing international competition for talent

- **International mobility of researchers helps:**
  - address labour market shortages in receiving countries
  - diffuse tacit knowledge and establish networks
  - give access to new learning opportunities

- **And can have additional benefits for receiving countries:**
  - In enabling increased R&D activity
  - In fostering knowledge flows with sending countries
  - In increasing enrolment in graduate studies
  - In strengthening firm and job creation, etc.
Impacts on sending countries

- Typically focus on remittances and brain drain, with regard to developing countries
  - Remittances can boost income, improve child health/schooling, but could “paper over problems”
  - Some countries experience large absolute brain drain of researchers, others large relative drain. Potential negative impacts on economic activity & institutional development ... but ... what is the counterfactual?
- Additional impacts related to high skilled emigration and knowledge flows:
  - Brain circulation – from return migration to “commuting” mobility - Building of networks, linkages and channels for knowledge.
  - Diaspora - building familiarity with and confidence in the sending country, plus conduits for knowledge and information flows, e.g. India and Chinese Taipei.
  - Potential “beneficial brain drain” – mobility may provide an incentive to improve human capital.
Moving ahead on mobility policies

• Mobility policies in OECD countries are currently mainly aimed at attracting talent and addressing shortages:
  – With growing international demand for talent, developing and strengthening national efforts to foster talent will become more important to address demand.
  – Enabling talent to go abroad may be equally important as attracting talent.
  – Attracting talent requires a broad approach, recognising its many drivers

• Current policies are often not coherent:
  – Policy gaps: little attention for circular mobility, diaspora policies
  – Attracting talent requires a supportive environment for innovation
  – Need to ensure coherence with development/aid policy to foster a more positive-sum outcome: e.g. in using development policies to foster capacity in developing countries
Looking forward

- In May 2007, the OECD Ministerial Council Meeting mandated the OECD to develop an *Innovation Strategy* to provide governments with a stronger basis for strengthening and reforming their policies.

- This will include a strong focus on the global dimensions of innovation, e.g.:
  - How to adapt innovation policies to the effects of globalization
  - Examining regional, national, local strategies for participation in global markets
  - Examining the roles of innovation, globalization, and government strategies in addressing critical global challenges in health, climate change, etc, including through international cooperation and technology transfer.
  - Measurement: enhancing our understanding of globalisation and measuring its impacts.
References to some recent OECD work

- OECD (2007), Staying Competitive in the Global Economy: Moving up the Value Chain
- OECD (2007), Trade and Innovation
- OECD (2008), The Internationalisation of Business R&D: Evidence, Impacts and Policy Implications
- OECD (2008), Open Innovation in Global Networks
- OECD (2008), The Global Competition for Talent: International Mobility of the Highly Skilled
- OECD (2008), OECD Reviews of Innovation Policy: China