



Globalisation of R&D: Beyond the OECD borders

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R&D : tendances récentes

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Motivating factors/Driving forces

- Changing models of business innovation
 - Shift to “open innovation “ model
 - Greater reliance on external sources of knowledge
 - Capability to manage distributed innovation networks
- Increased internationalisation of R&D
 - Within and among OECD countries
 - Access to knowledge and to markets
- Increasing capabilities of non-OECD member countries
 - Stable, market-oriented economies
 - Growing science and technological capability
 - Workforce (skills + wages)

Changing business R&D strategies

Old model: closed innovation

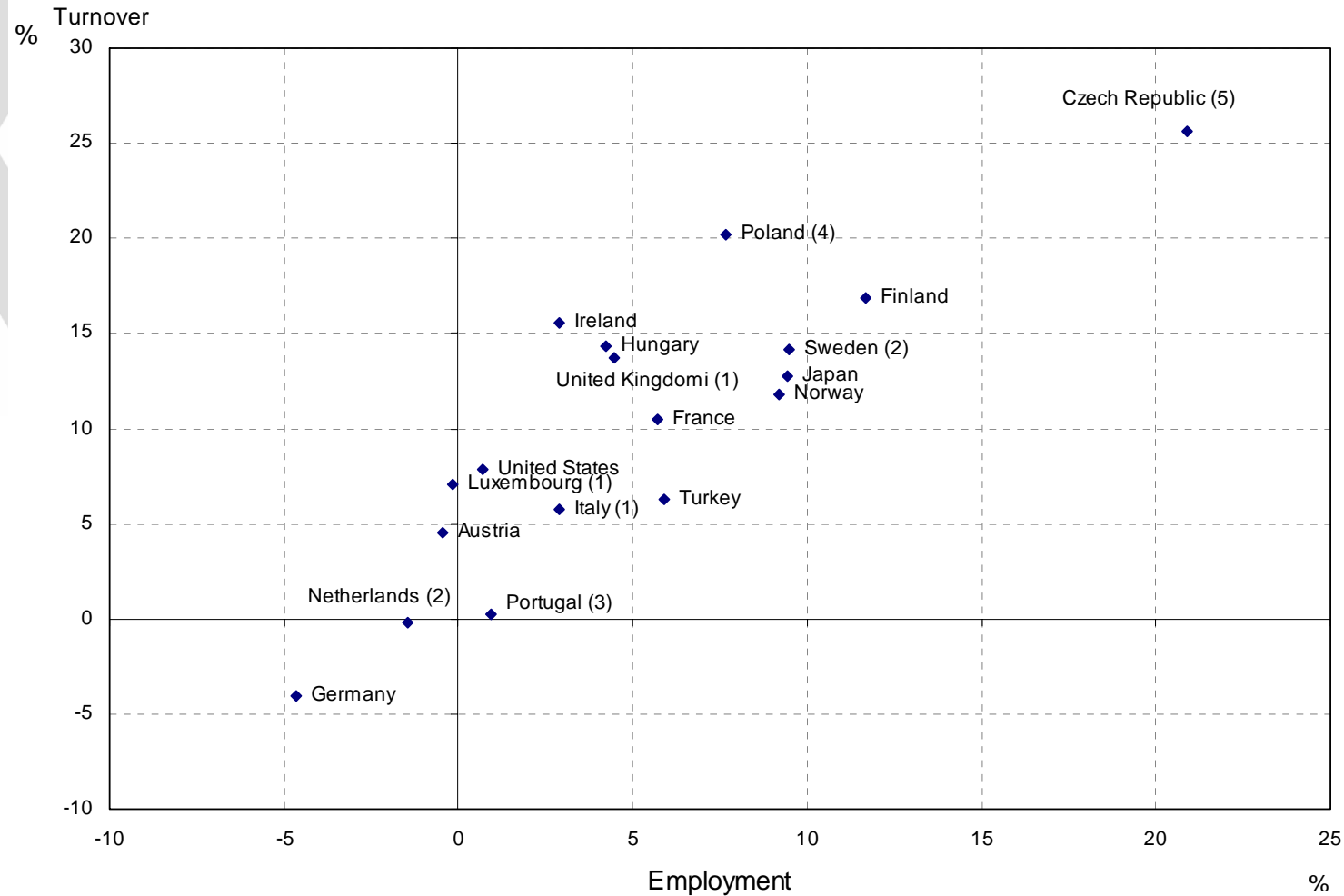
- Virtuous circle
- Firms identify needed technological advances
- Firms conduct R&D internally
- Firms incorporate advances into new products & services
- Product revenues finance additional R&D

New model: open innovation

- R&D linked to business strategy (new funding models, incentives for workers)
- Acquisition of external technology (licensing, corporate VC, M&A, collaborative research)
- Externalisation of R&D results (licensing, spin-offs)
- Globalisation to tap into world-wide talent pools

Globalization: Foreign affiliates play larger role

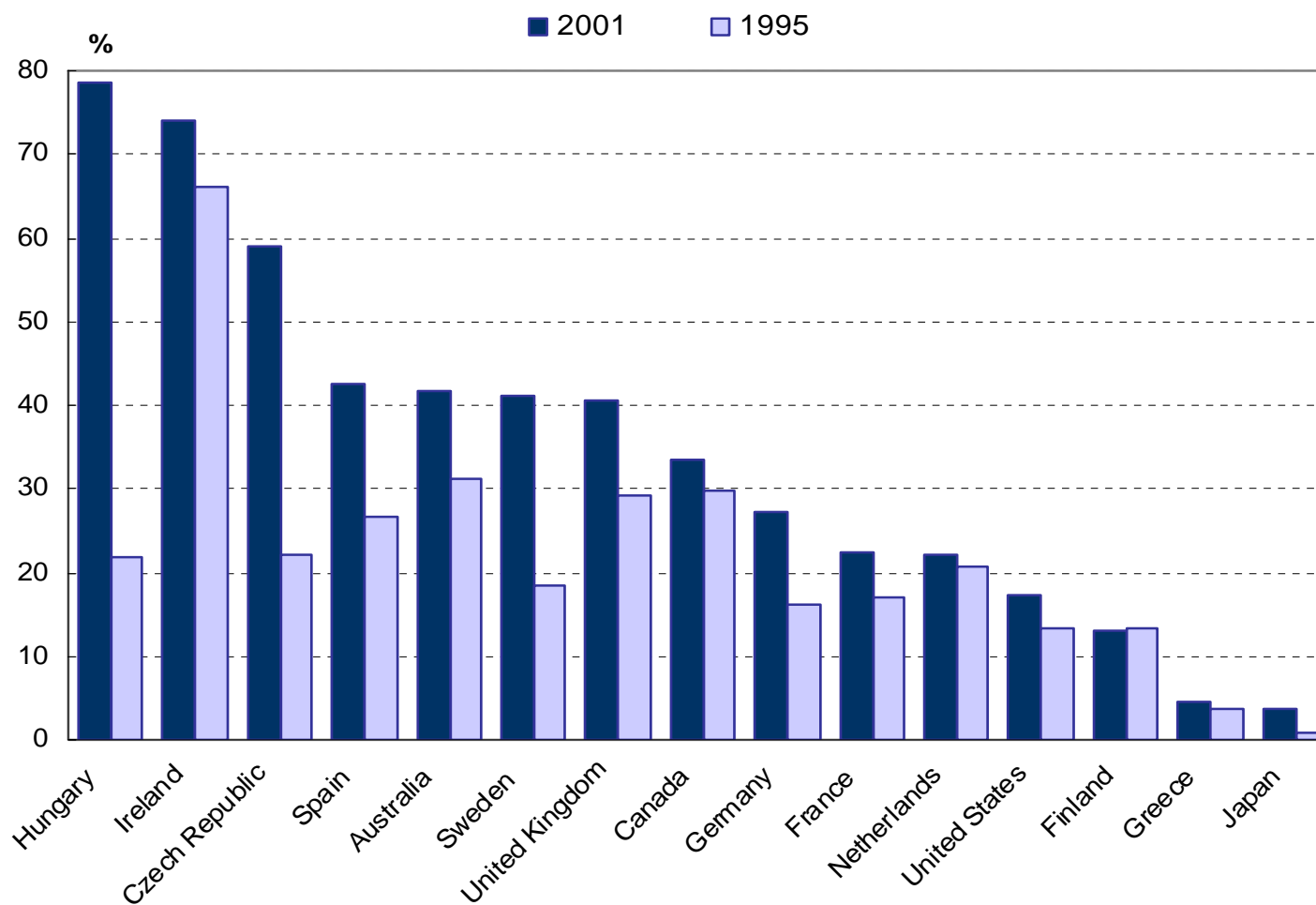
Growth in output and employment in foreign affiliates (manufacturing), 1995-2001



Source: OECD Science, Technology and Industry Outlook 2004

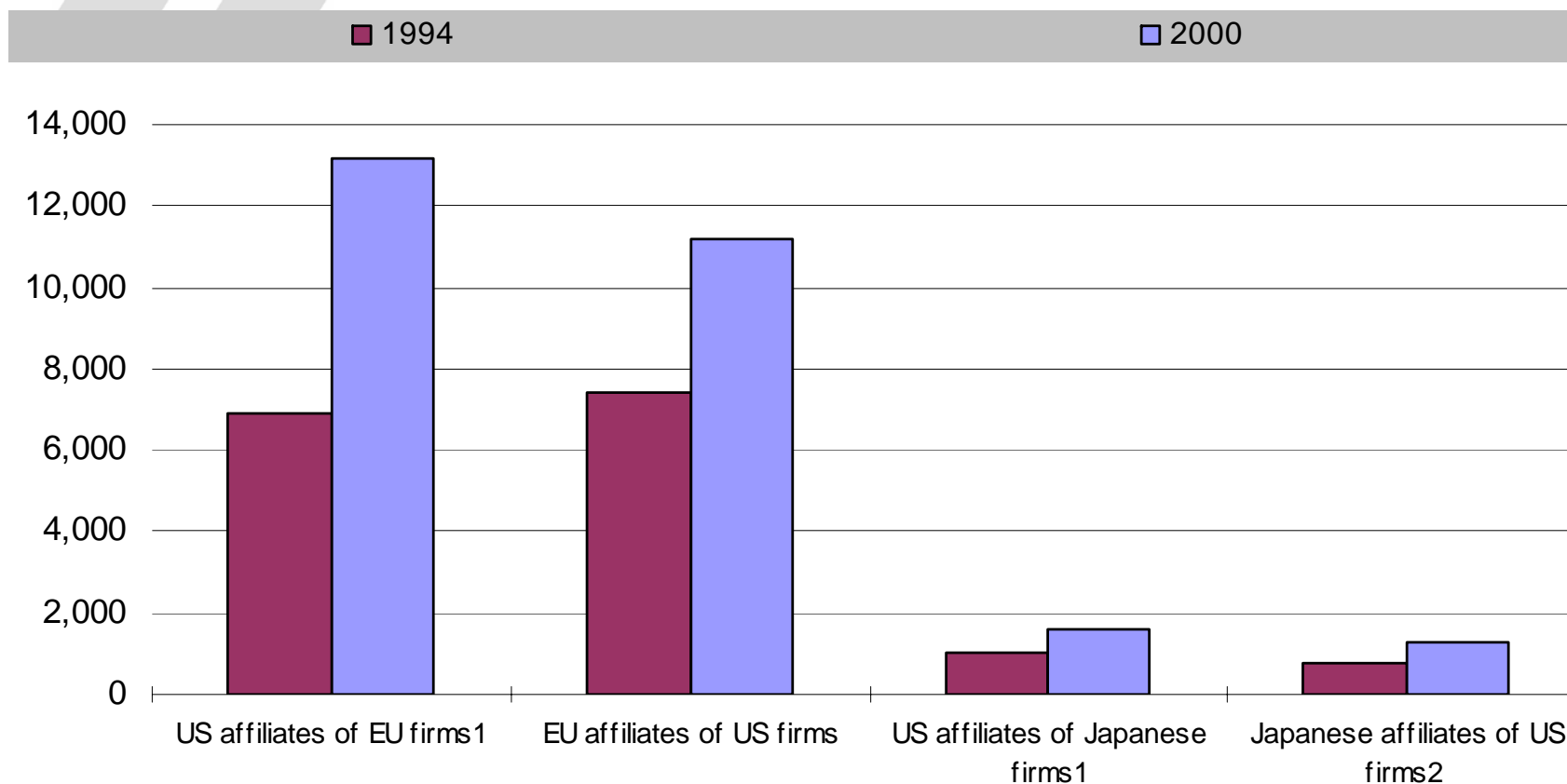
Growing share of R&D in foreign affiliates

Share of business R&D controlled by foreign affiliates



Intra-OECD flows of R&D investment changing

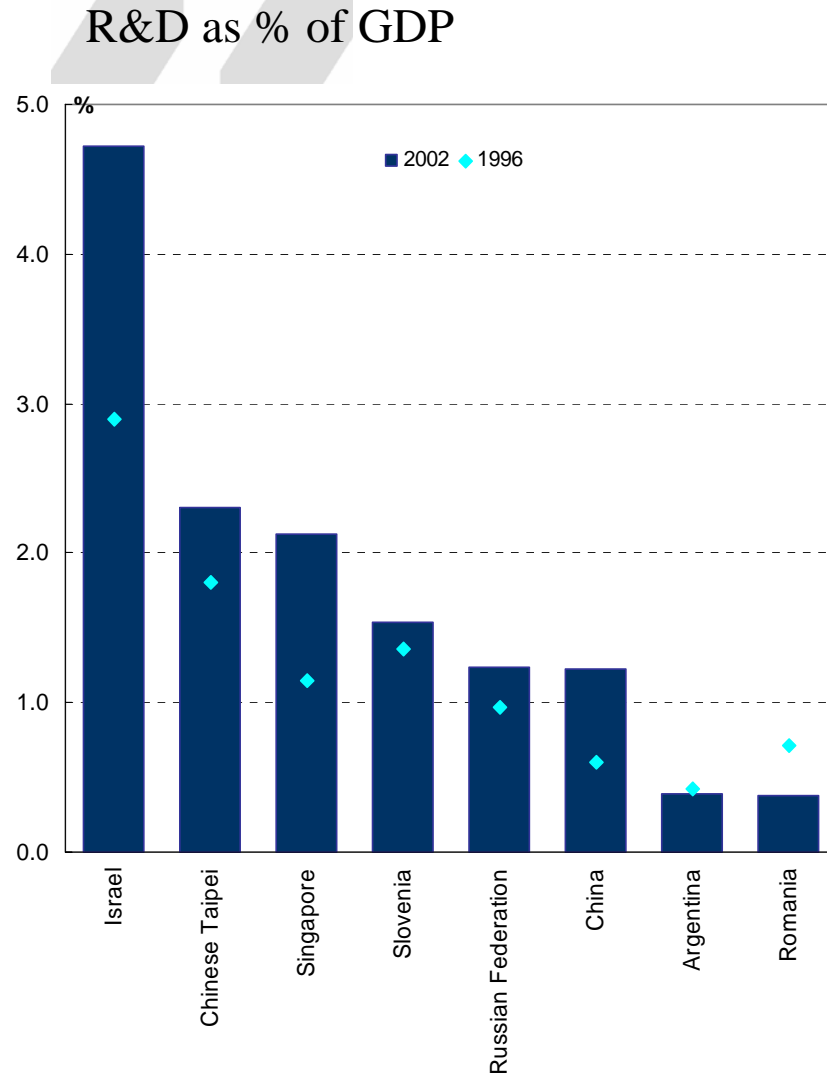
R&D in manufacturing industries, millions of current US\$



Chemicals (incl. pharmaceuticals), communications equipment and motor vehicles account for 2/3 of US inward investment

Source: OECD STI Outlook 2004

Non-OECD members are more capable

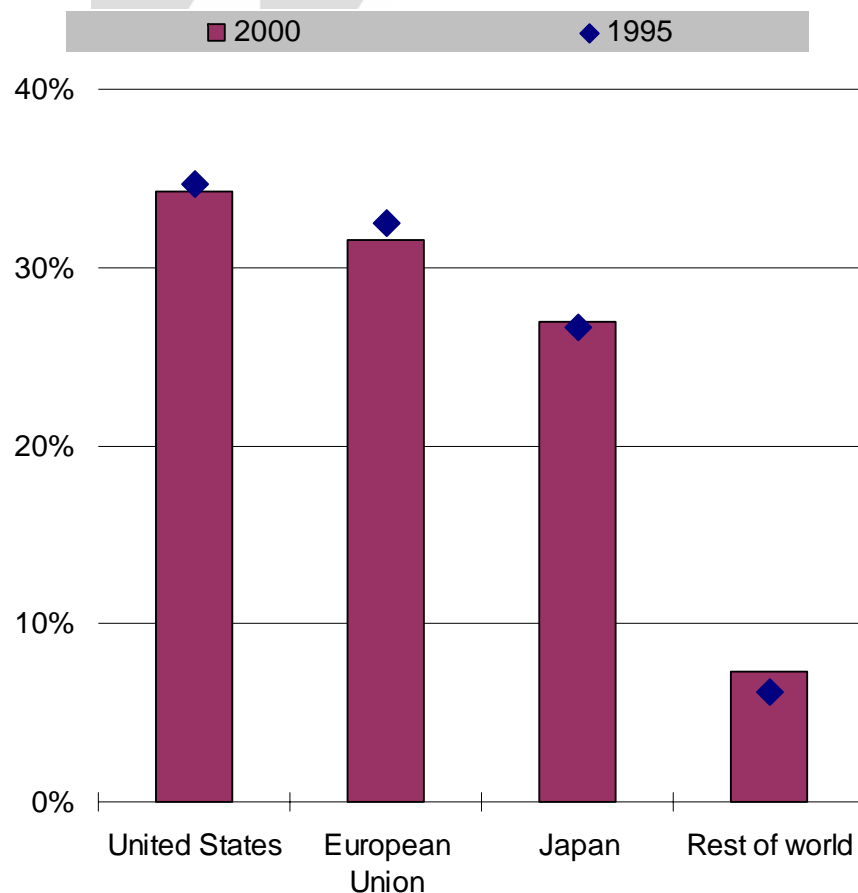


Source: OECD Science, Technology and Industry Outlook 2004.

- Combined R&D of China, Israel and Russia equalled 14.7% of OECD's in 2001, versus 6.4% in 1995.
- Patenting by non-Members has increased, but EU, Japan and US accounted for 92.7% of global patent families in 2000, down from 94.4% in 1991.
- Most rapid growth in US outward R&D investments is outside EU, Japan and Canada

Slower growth in patent families

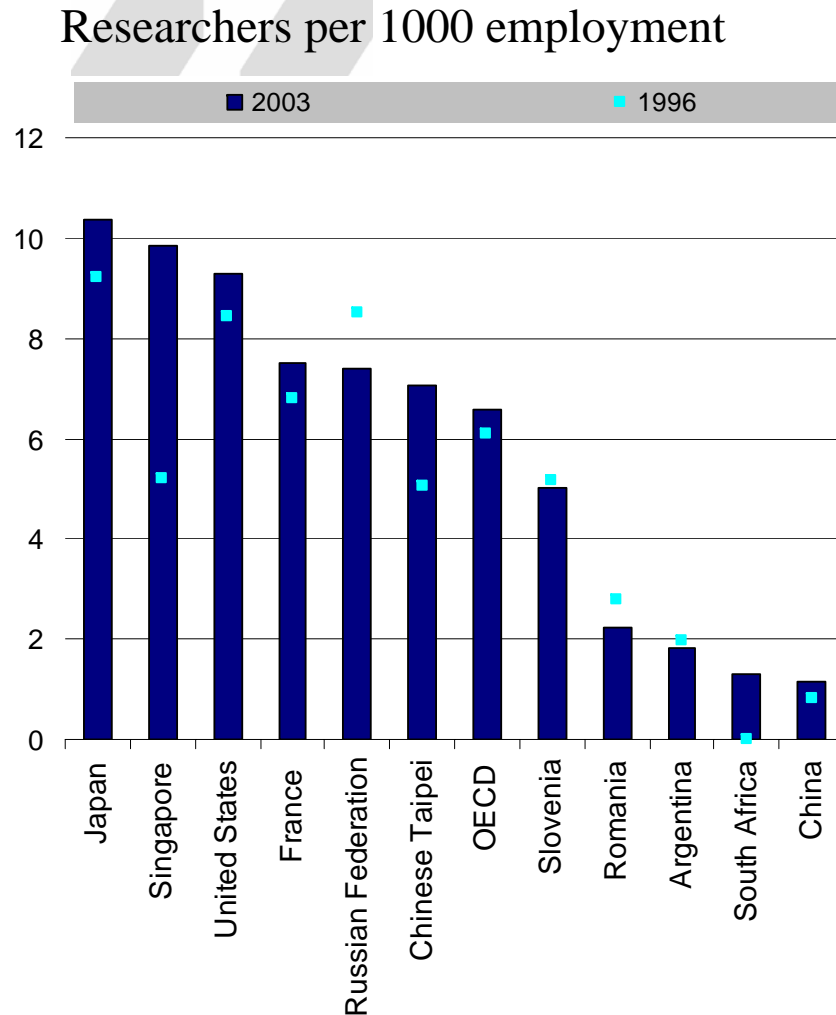
Share of world patent families



- Patenting has increased in OECD and non-Member countries
- Share of non-Members in patent families increased slightly from 1995-2000.
- Low share of patent families reflects low generation of inventions and limited application in global markets.
- Many patents in non-Members are owned by foreign affiliates

Source: OECD MSTI Database, January 2004

Human resources: how many researchers?

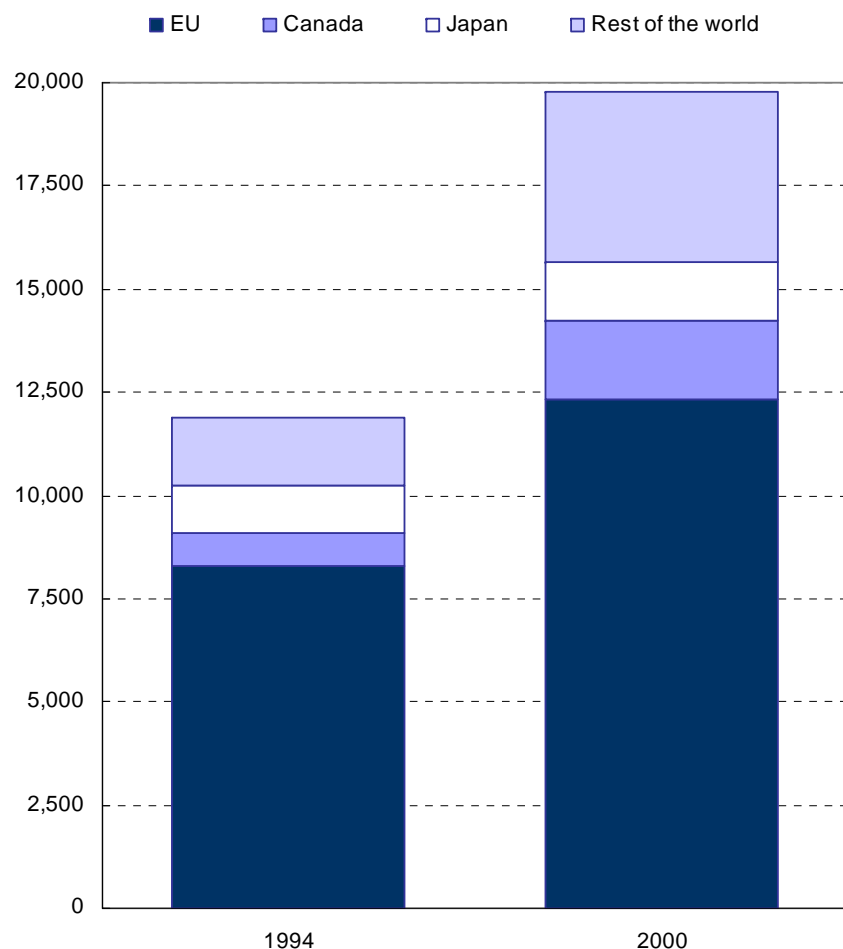


- Total number of researchers in China = 862,000 in 2003, up from 548,000 in 1996.
- Most recent figures for US, EU and Japan and Korea in 2001/2 were: 1.3 million; 1.2 million, and 647 thousand, respectively
- Researchers per thousand have increased in most OECD countries, but patterns differ in non-Members.

Source: OECD Main Science & Technology Indicators, June 2005

Changes in outward R&D investment

US outward R&D investments, US\$ millions



Source: OECD Science, Technology and Industry Outlook 2004.

- Outward investments growing in all major regions (in nominal terms)
- Growth fastest in “rest of world” (5X)
 - China US\$ 506M in 2000 compared to 5M in 1994
 - Singapore US\$ 548M in 2000, compared to <50M in 1994
- Motor vehicles, Radio/TV/Comms, Computing equipment and non-pharmaceutical chemicals are largest components
- As a share of industry financed R&D, expenditures actually declined, from 12% in 1994; 10.8% in 2000).

Factors influencing the location of R&D

- *Market* -- Proximity to large, relatively homogeneous market with lead customers.
- *Scientific and technological expertise* — Proximity to major universities and research labs. Tap into locally generated ideas, suppliers and people.
- *Innovative environment* — ease of commercialising inventions.
- *Quality of life* — makes foreign assignment more attractive to expatriated workers.
- *Labour market* —wages can be important, but so are issues of skills and regulation.

Captures the benefits of R&D-related FDI

	Inward	Outward
+	<ul style="list-style-type: none">• Augmentation of local technical capability• Knowledge & economic spill-overs• Job creation• Better tailored products	<ul style="list-style-type: none">• Tap into other sources of expertise• Enhance access to foreign markets• Results may be exploited at home, producing economic benefits
-	<ul style="list-style-type: none">• Foreign control over domestic R&D resources• Results may be exploited elsewhere; loss of economic benefit	<ul style="list-style-type: none">• Loss of jobs• Loss of technical capability• Hollowing out of industry; will manufacturing follow?• Loss of economic benefits if results exploited locally

Benefiting from globalisation

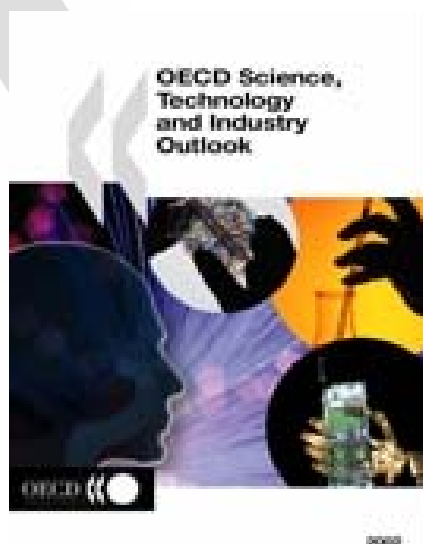
- MNEs contribute disproportionately to productivity growth in *home and host* countries
 - More of growth in labour productivity in Belgium, UK and US was result of MNEs than uninational or unaffiliated firms
 - Nearly all of pickup in US non-financial corporate labour productivity in late 1990s resulted from MNEs
 - In Belgium, MNEs had a higher rate of employment increase at home than non-MNEs
 - Estimated 14% of US productivity growth 1986-97 resulted from technological spillovers from foreign affiliates in the US
- Issue is ensuring benefits
 - Improving attractiveness of domestic economy
 - Facilitating spillovers, such as through linkages to local suppliers.
- For OECD countries
 - Increasing incentives exist for firms from OECD countries to invest abroad to tap into emerging markets and centers of excellence
 - Foreign firms will have growing incentives to invest in regions other than OECD countries.
 - Issue is to remains attractive to foreign investment and to enhance benefits of global linkages.

OECD work on globalisation

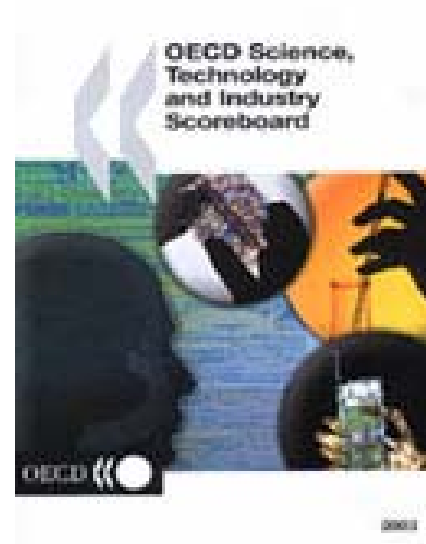
- Forthcoming publication on “Indicators of Economic Globalisation”
- Ongoing project on globalisation and S&T policy
 - Trends in internationalisation of R&D
 - Examination of factors contributing to business R&D location decisions
 - Review of policy responses in Member countries
- Engagement of non-Members
 - China is now an “Observer” to the OECD Committee for Scientific and Technological Policy, as are Russia, Israel, South Africa.
 - Ongoing review of national innovation system of China
 - Recent review of role of public/private partnerships for innovation in Russia
 - Planned review of national innovation system of Chile (2006)
 - Collection of statistics on select non-Members

For more information. . .

STI Outlook 2004



STI Scoreboard 2005



www.oecd.org/sti/innovation