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Internationalisation of R&D: Size, main Trends, and new Lines of Research

Bernhard Dachs and Georg Zahradnik
Austrian Institute of Technology (AIT)

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Internationalisation of R&D:

Size, main Trends, and new Lines of Research

Bernhard Dachs, Georg Zahradnik, AIT

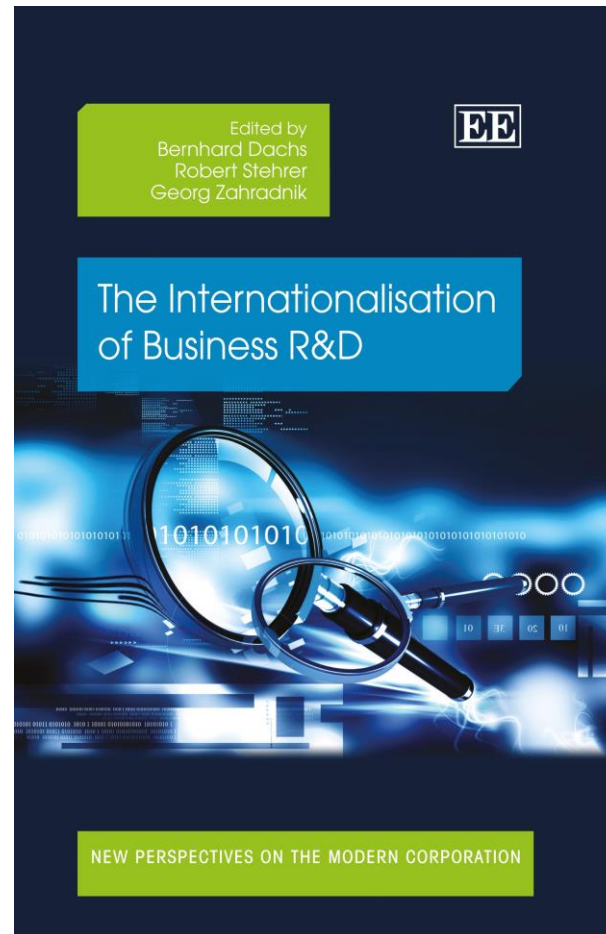
Topic of the talk

- Internationalisation of business R&D: research and development activities (R&D) of firms performed **outside their home countries**

- In the last 30 years it has emerged from a very minor issue to a driving force of change in national innovation systems
 - Patel/Pavitt, JIBS 1991: “Research and development – despite globalisation of production and sales - remains far from being globalized”
 - Strong linkages between firms and the home country universities and other actors in the home innovation system

- Part of a larger internationalisation trend in **science** (OECD 2014)
 - Mobility of students and research personnel, cross-border publications, internationalisation of universities

Joint research between wiiw and AIT



GVCs and R&D internationalisation

- There are important linkages between the two trends
- Internationalisation in production and R&D follow similar rationales
 - Exploitation of superior assets, self-selection argument
 - Support of foreign production with R&D and innovation units
 - Existence of location-specific advantages, such as localized knowledge
- However, there are also important differences
 - Much smaller role of emerging economies as host and source countries
 - Dominance of manufacturing sectors in R&D internationalisation
 - No financial services in R&D internationalisation
 - Stronger complementarities between R&D abroad and domestic R&D

Questions and measures

- Has R&D internationalisation advanced in recent years?
- What trends can we see at country level?
- Is Europe still attractive for R&D by non-European firms?
- What are new developments in R&D internationalisation?

- We use data on R&D expenditures of foreign-owned firms collected from EUROSTAT and national statistical offices
 - **Inward BERD** = **B**usiness **R&D** expenditure of foreign-owned firms
 - **No measure of flows** between countries
 - R&D expenditure of domestic firms abroad (outward BERD) is only available for few countries

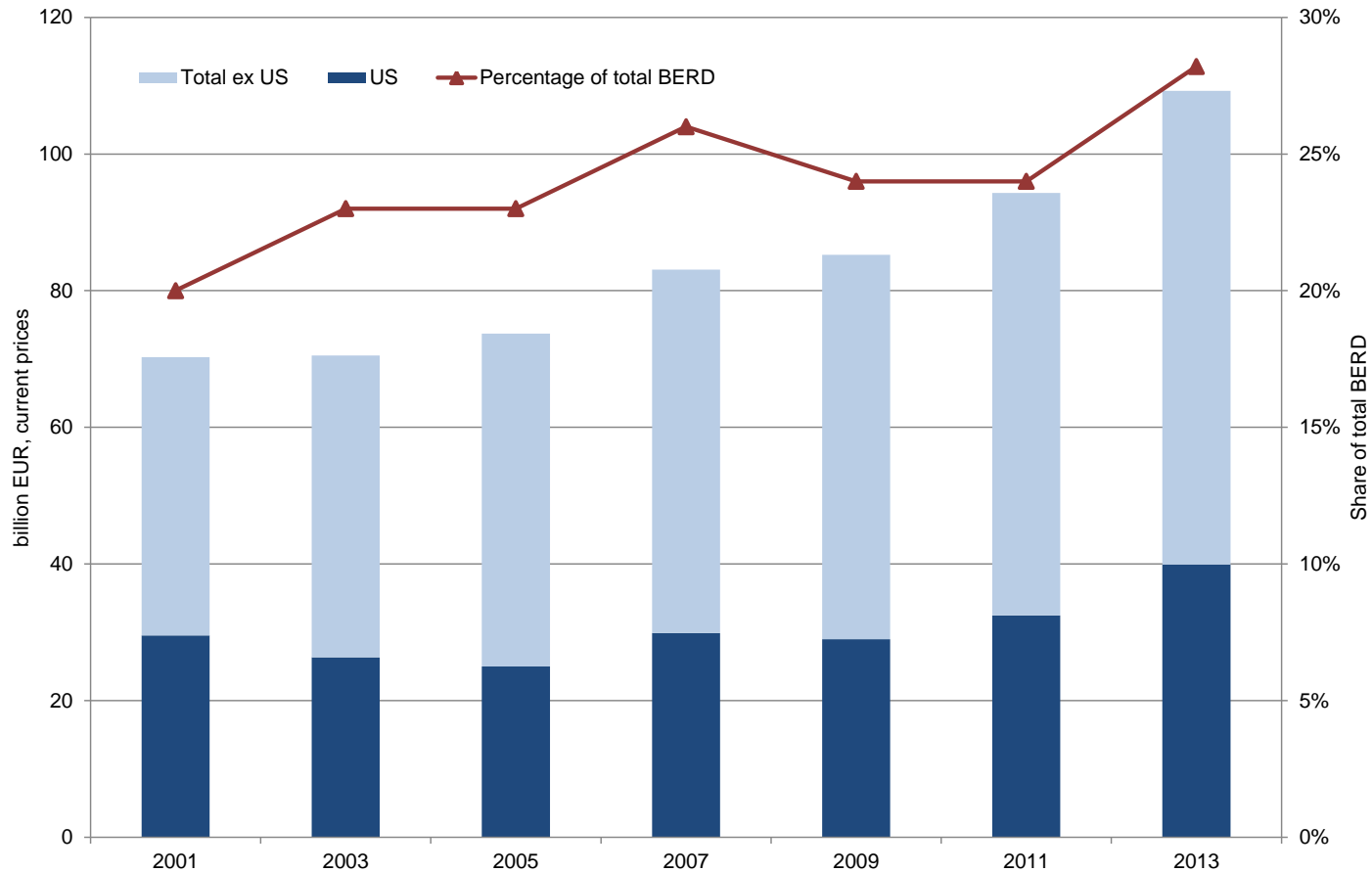
Drivers of the process

- Wish to exploit superior assets at foreign markets (Dunning, OLI model); this needs adaptation of products to these markets
- Emergence of global value chains
- Limitations of the home country innovation system to provide all necessary knowledge
- Localized and sticky character of some knowledge promotes knowledge-seeking outside the home countries

Trends in R&D internationalisation

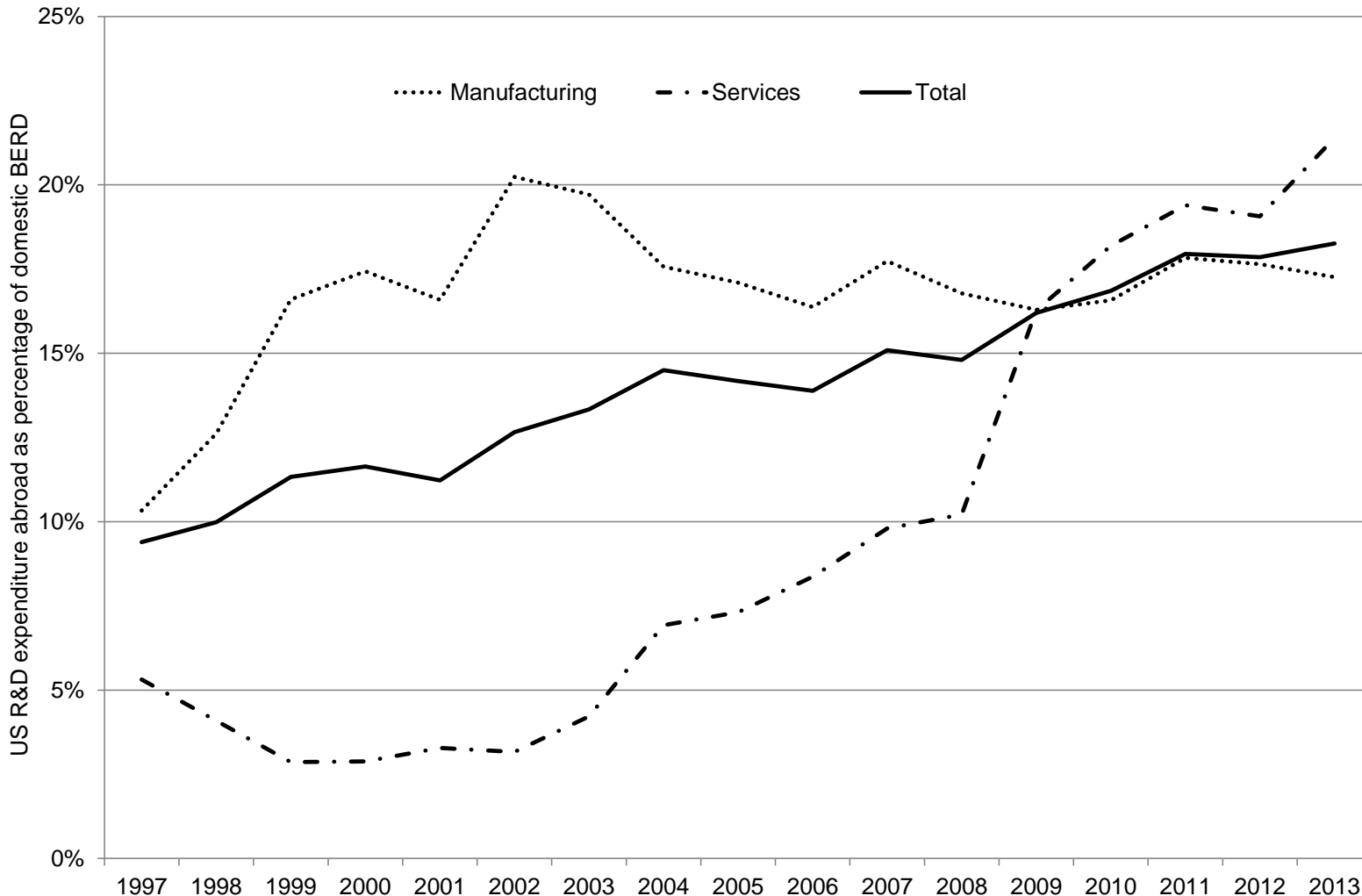
R&D by foreign-owned firms is increasing

Inward BERD in bn EUR and share of total BERD, 2001-2013



R&D of domestic firms abroad is increasing as well

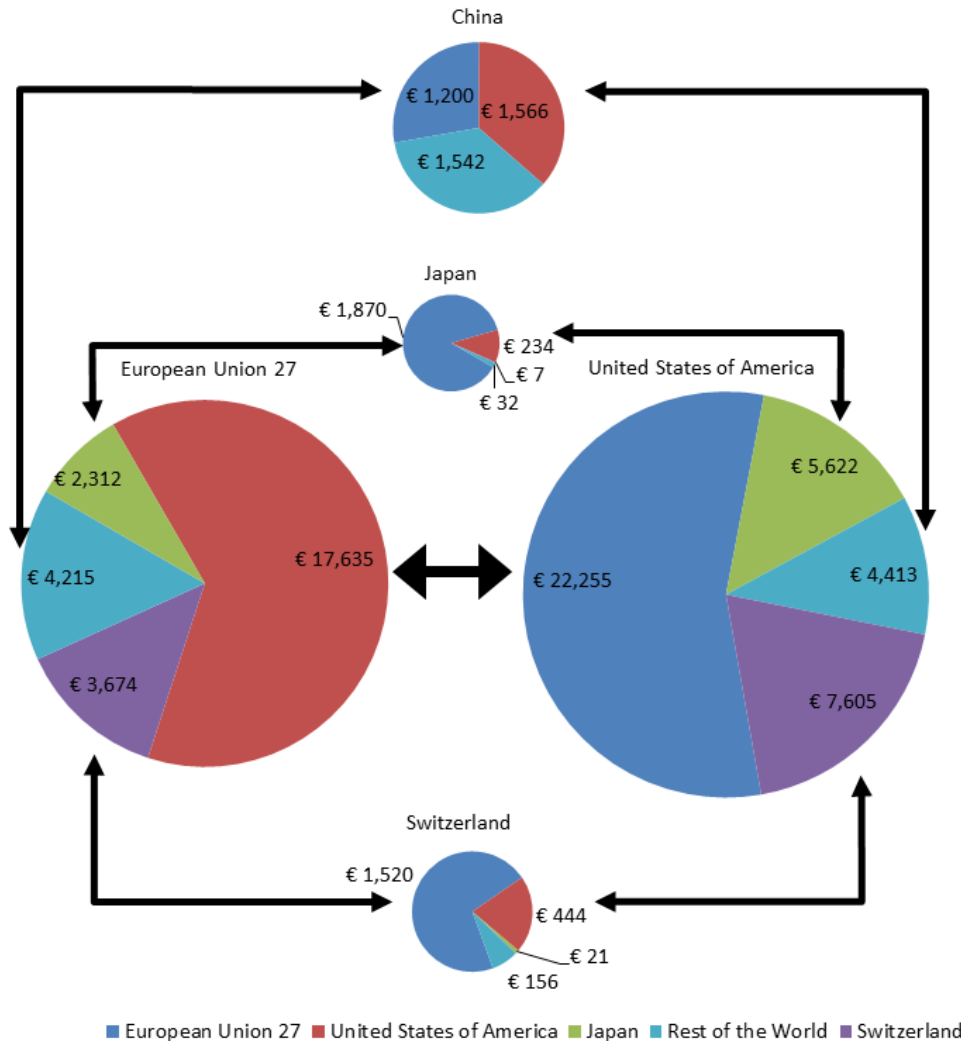
Ratio of outward BERD and domestic BERD, United States, 1997 - 2013



Source: OECD, Eurostat, national statistical offices, own calculations

Internationalisation of R&D does not mean globalisation

Global inward BERD relations, 2013

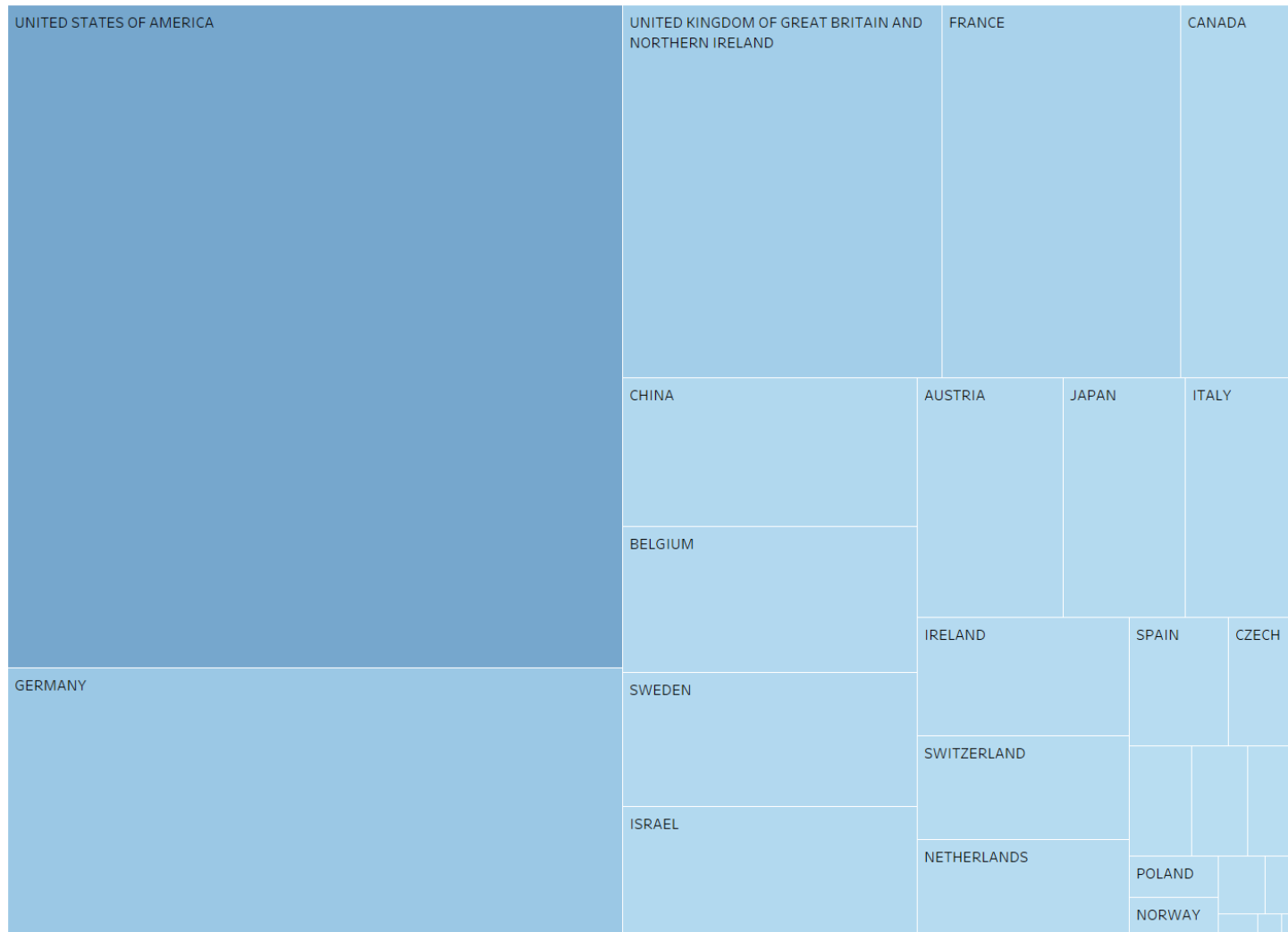


Notes: No inward data available for China for 2013, amounts estimated based on US outward data and total inward BERD in China in 2007. Data for Switzerland as of 2012 and home country breakdown as of 2008 (not available for 2012), country breakdown for Japan as of 2007 (not available for recent years).

Source: OECD, Eurostat, national statistical offices, own calculations

Size relationships in absolute terms

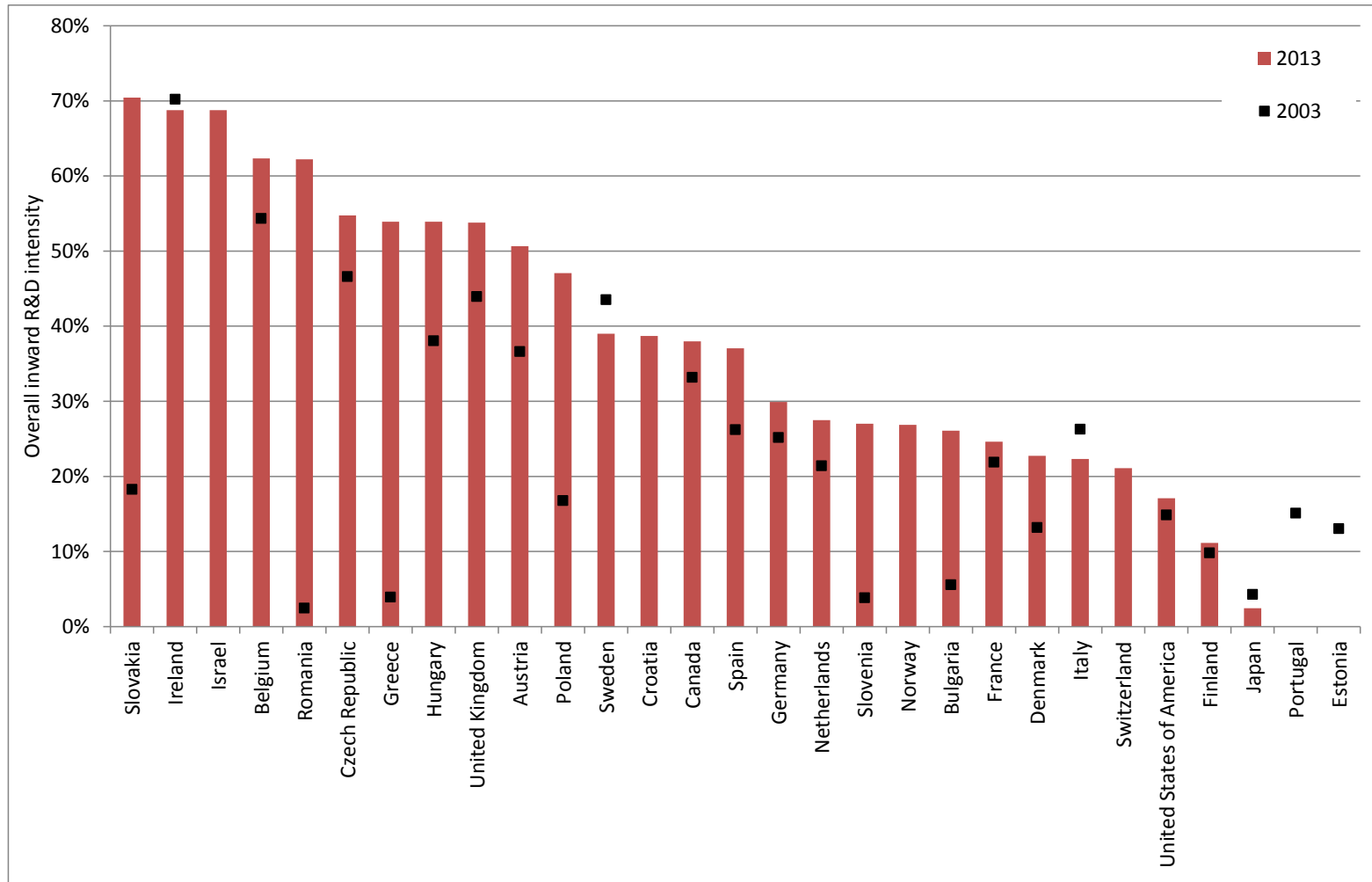
Total inward BERD, 2013



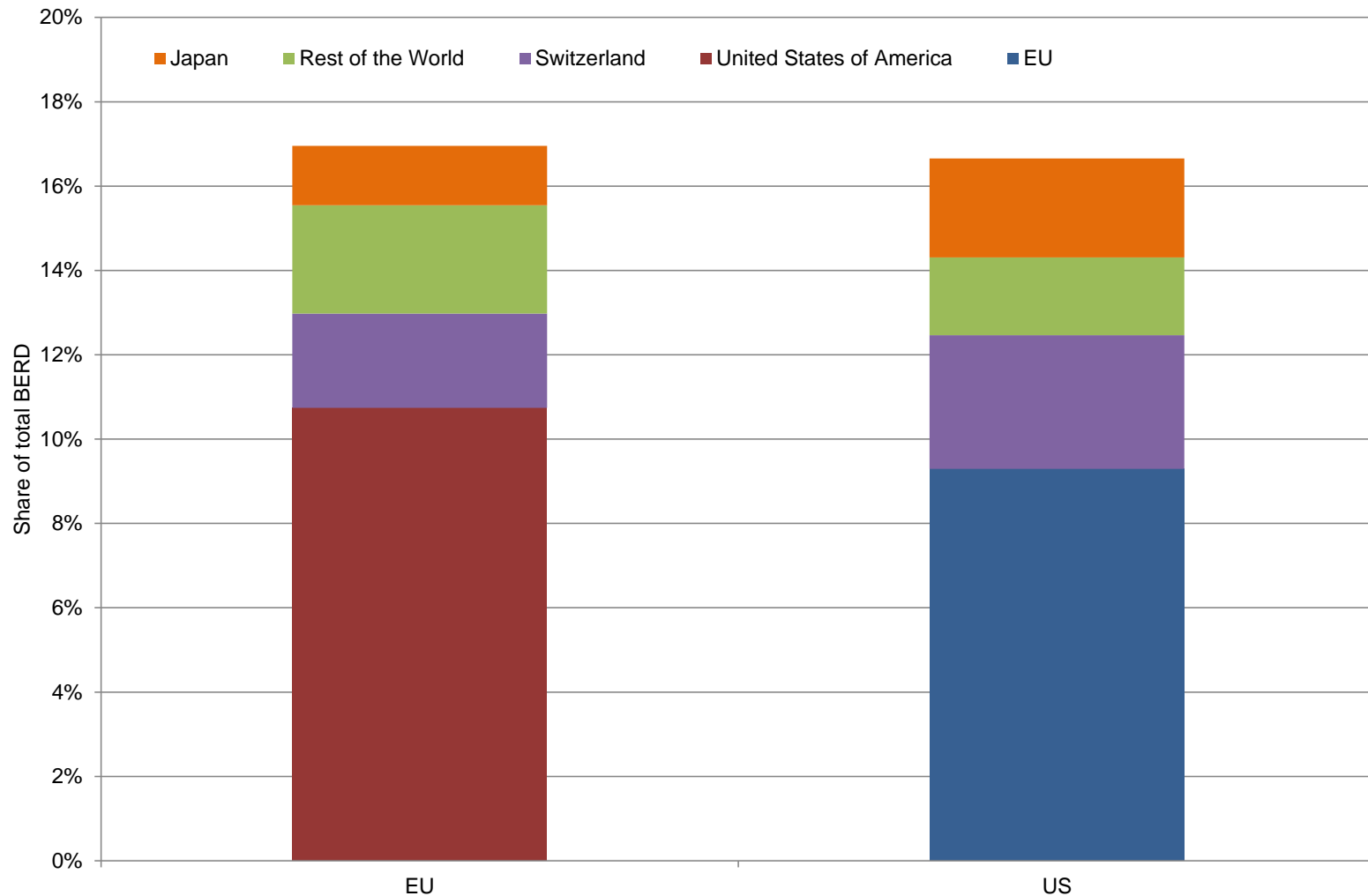
Source: OECD, Eurostat, national statistical offices, own calculations

Small and medium countries are highly internationalised

Share of foreign-owned firms on total BERD, 2013



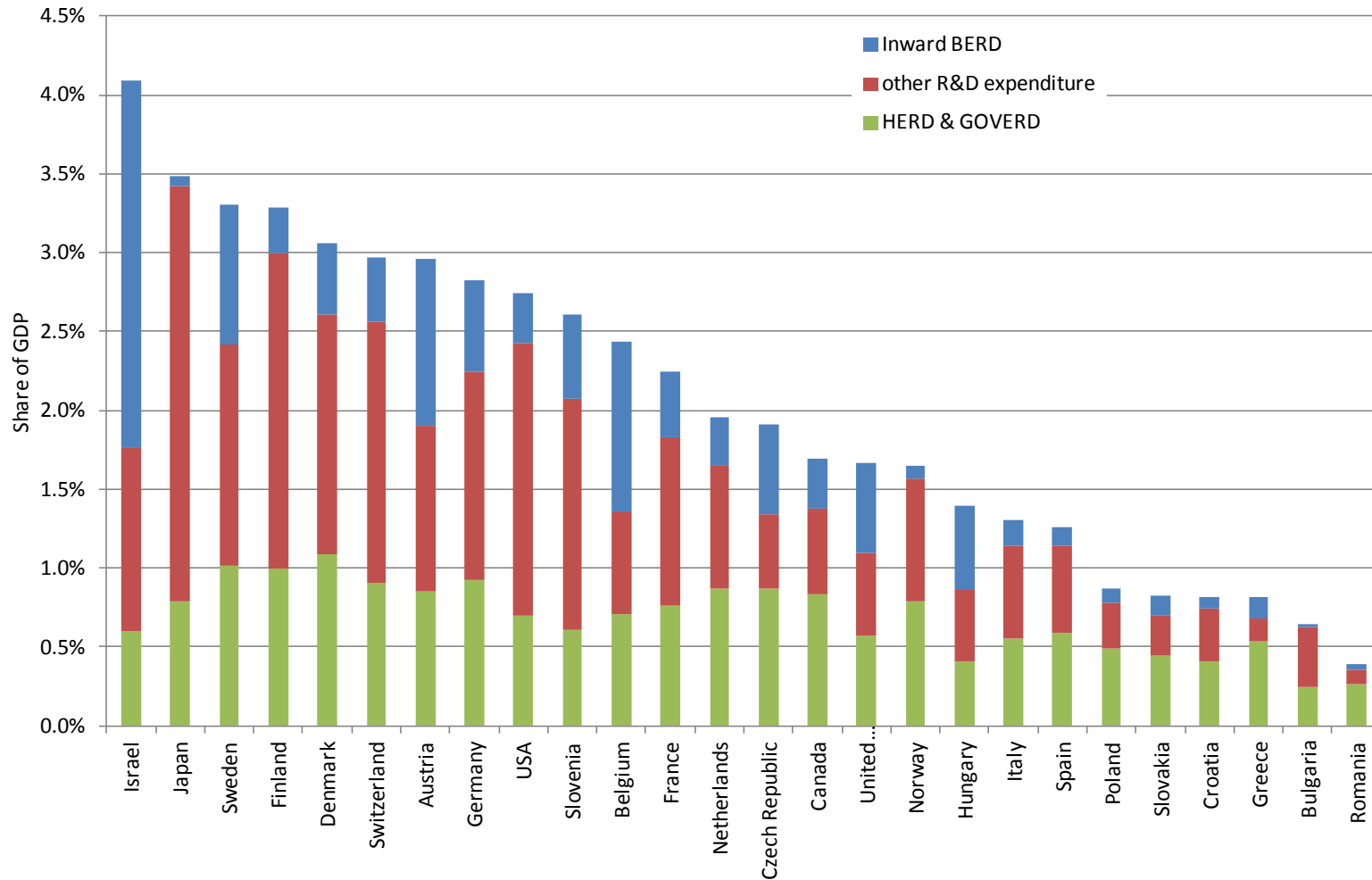
Inward BERD: European Union and the United States, 2013



Source: US Bureau of Economic Analysis; estimate of the EU based on Eurostat, national statistical offices

Foreign firms have become relevant actors in R&D

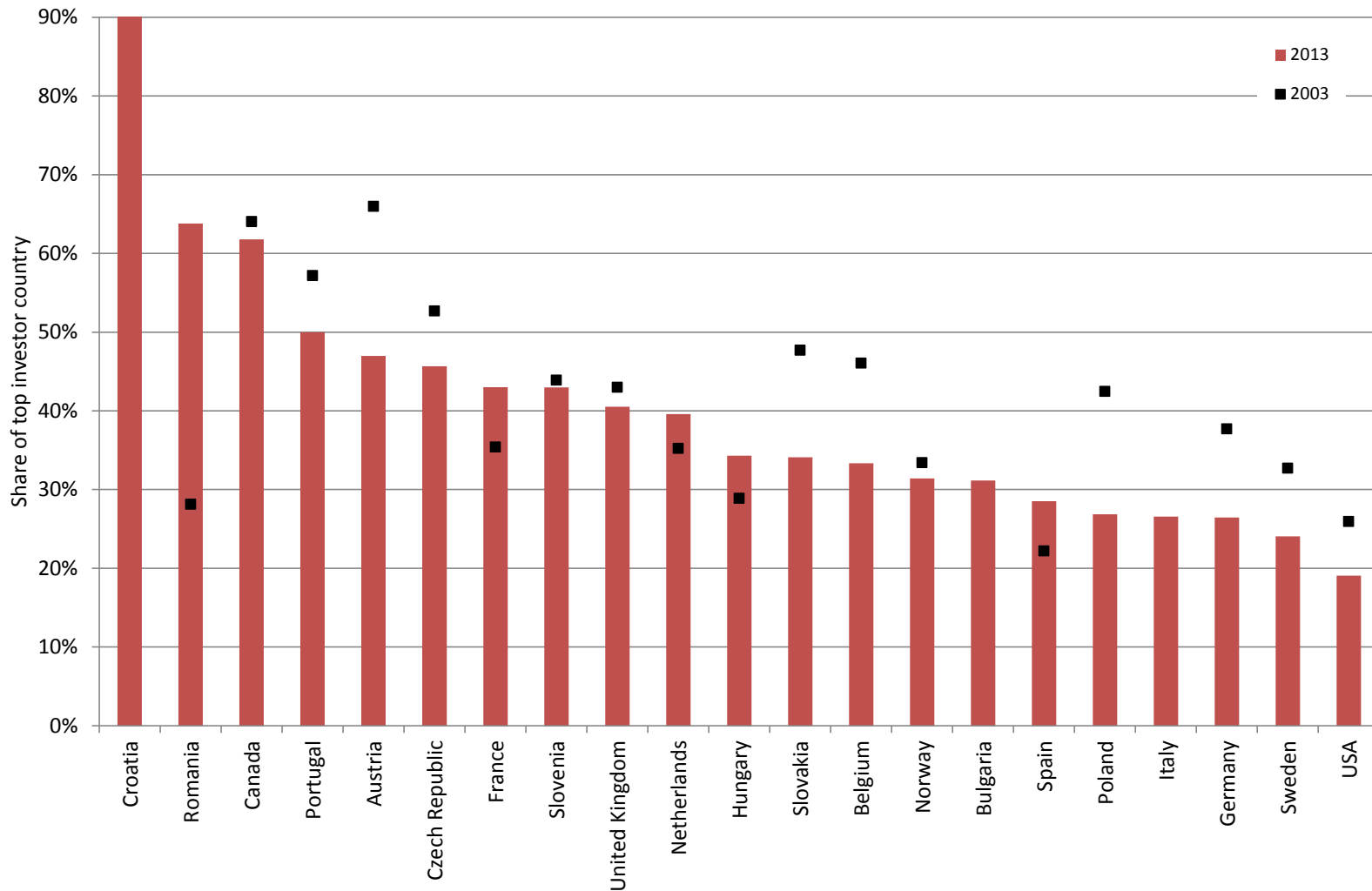
Inward BERD, HERD and GOVERD, other R&D as % of GDP, 2013)



Source: OECD, Eurostat, national statistical offices, own calculations

R&D internationalisation becomes more diverse

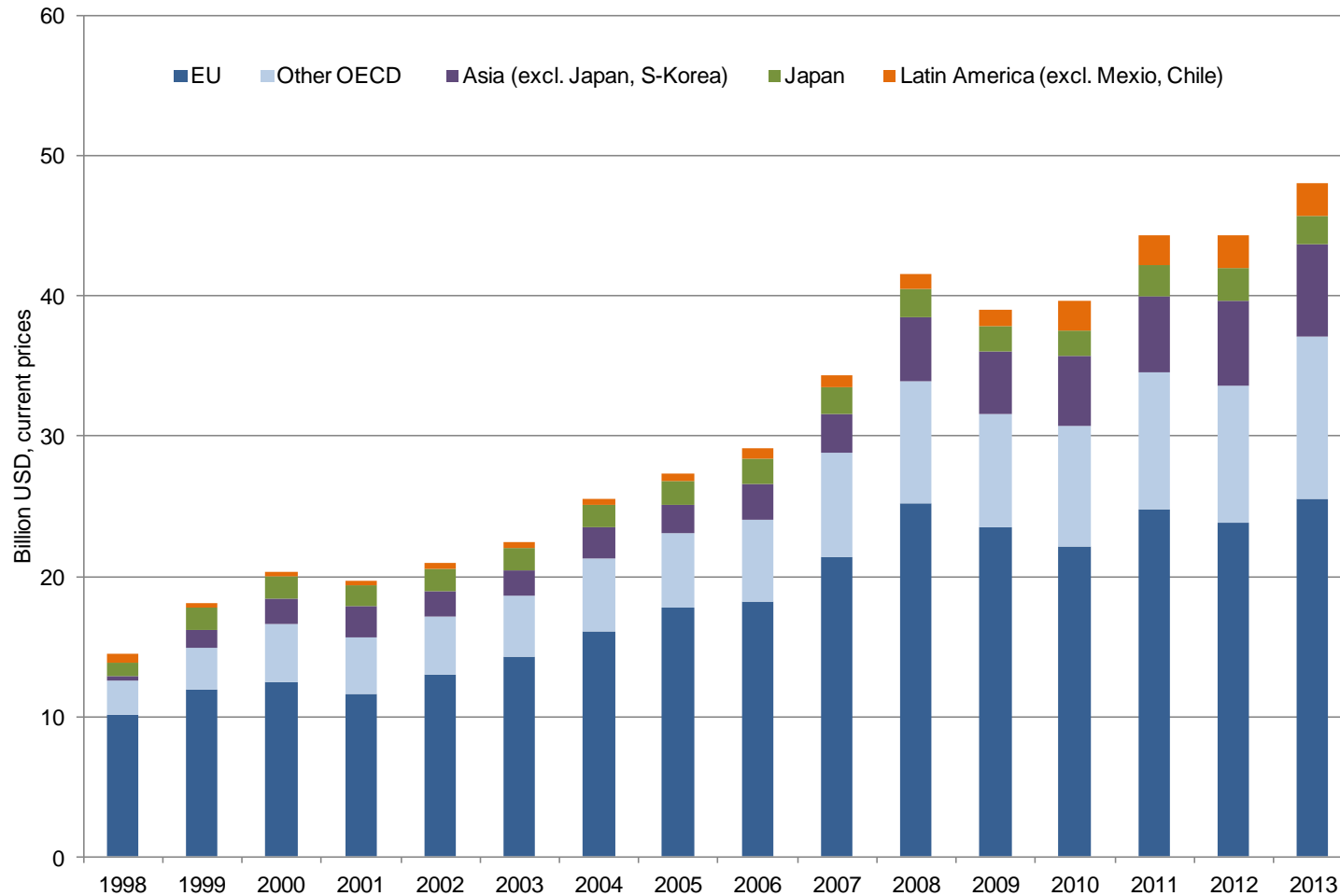
Share of the top investor country on total inward BERD, 2003 and 2013



Source: OECD, Eurostat, national statistical offices, own calculations

Is the EU still attractive for US firms? – yes, in absolute t.

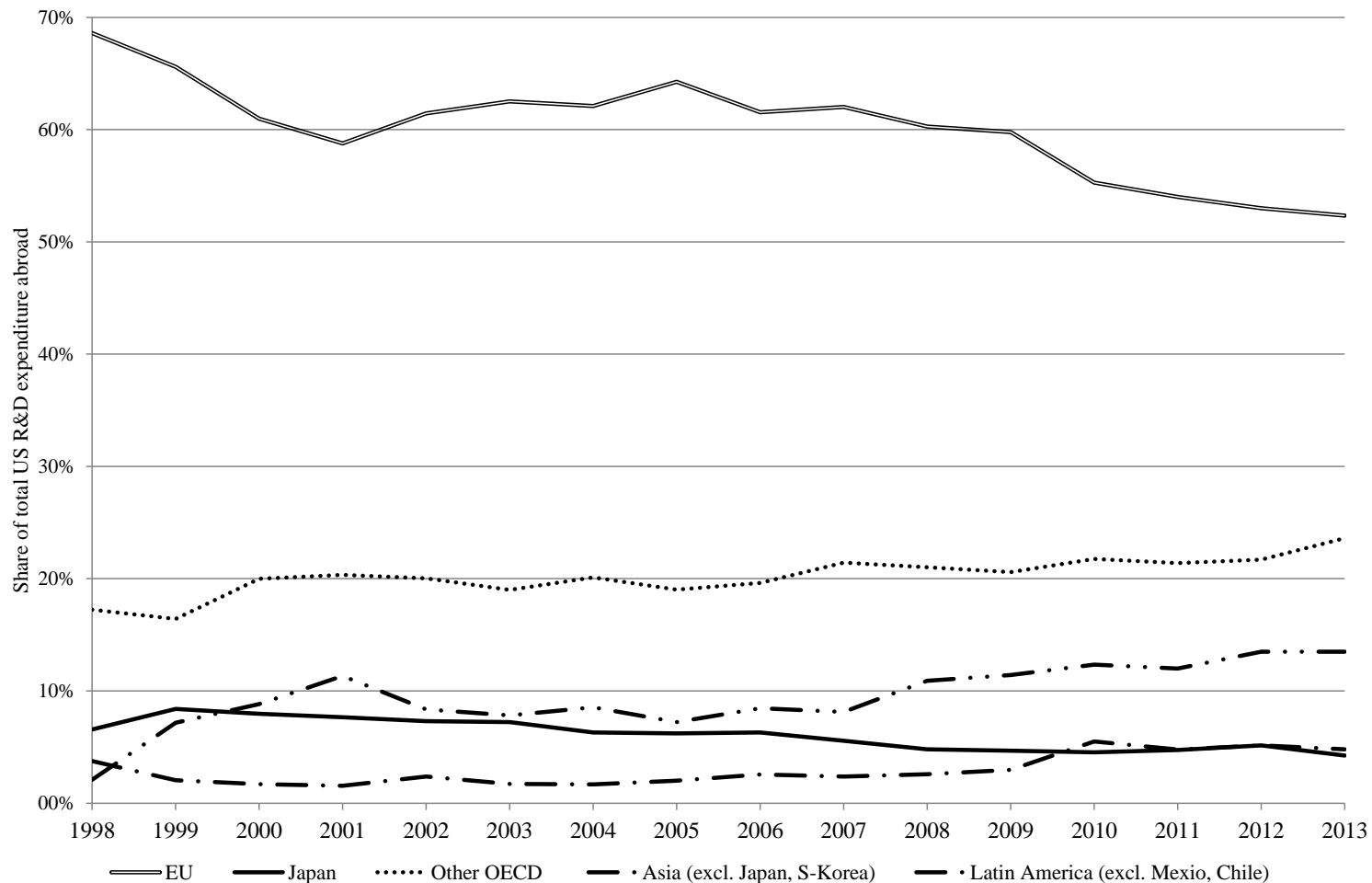
R&D expenditures of US firms abroad, 1998-2013



Source: US Bureau for Economic Analysis

Europe's share on global US R&D activities is decreasing

R&D expenditures of US firms abroad, 1998-2013, shares



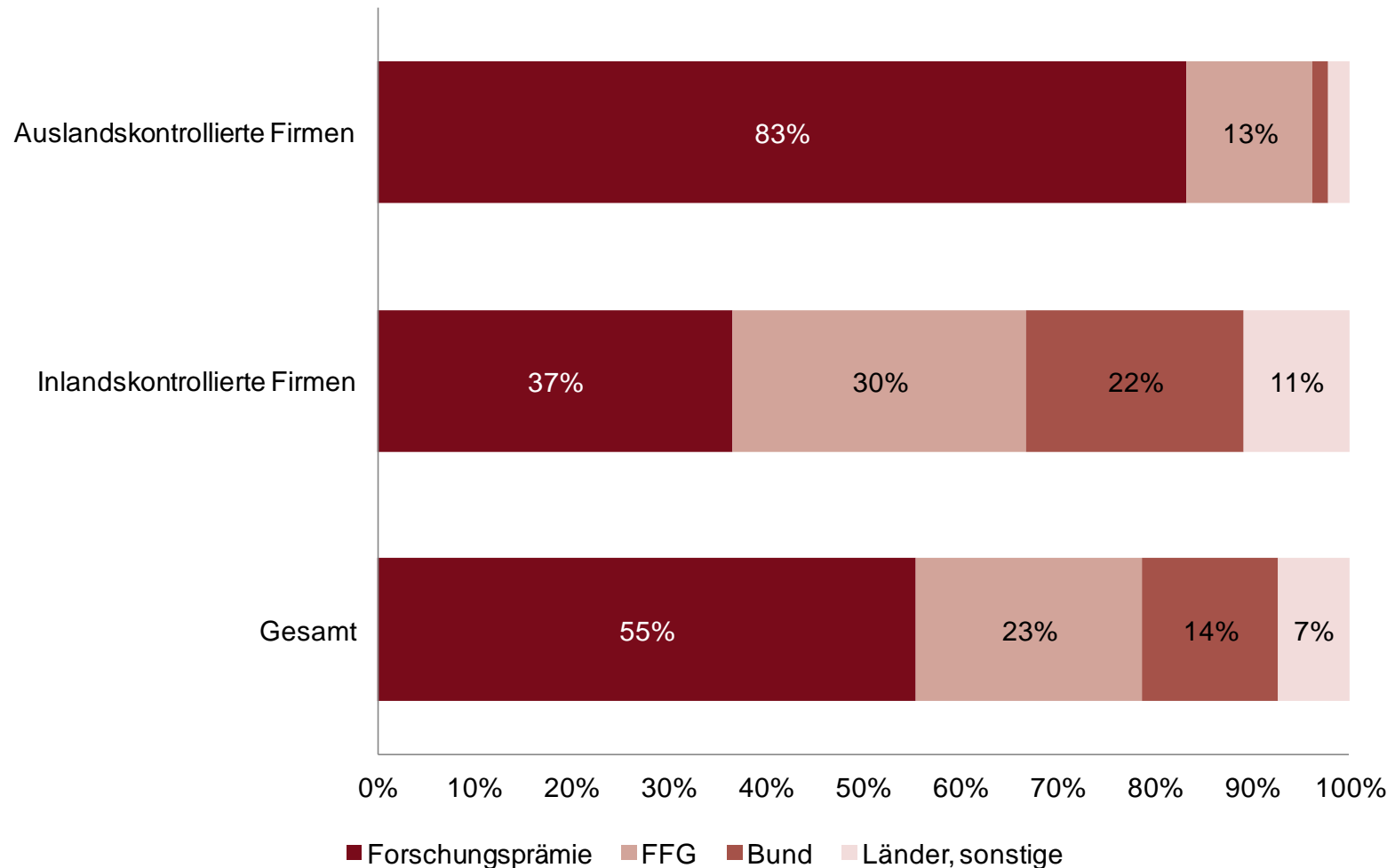
New lines of research

R&D tax incentives and internationalisation

- Tax incentives are offered by 28 of the 34 OECD countries and a number of non-OECD countries (Appelt et al. 2016).
- It seems that tax credits for R&D are very appealing for MNEs:
 - MNEs more often perform R&D and operate in R&D intensive sectors
 - Tax credits for R&D favour large R&D spenders (no upper ceiling in many countries, costs of applying for and administering R&D funding are considerably lower, opportunities to shift R&D costs between countries)
 - Income-based tax incentives for R&D (tax breaks for income from trademarks, patents etc) in the form of patent boxes may be particularly appealing for MNEs with multiple R&D locations
- The new all-purpose investment incentive to attract and retain FDI? - Bellak and Leibrecht (2016)

The preference for R&D tax incentives

R&D funding in foreign-owned and domestic firms by instrument, Austria, 2013



Note: Total funding as percentage of R&D expenditures: Foreign-owned firms 10%, domestic firms 15%

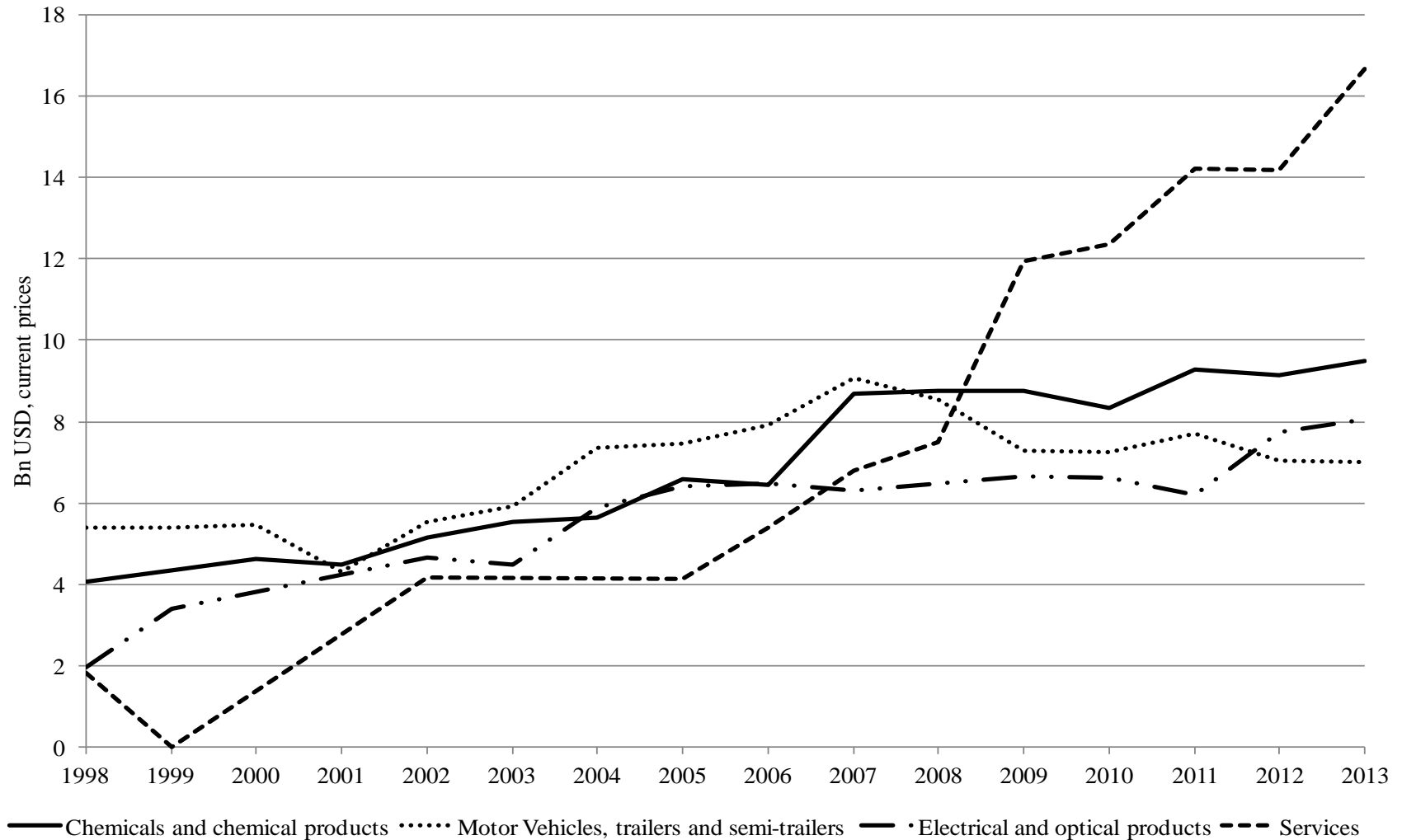
Source: AIT-Darstellung nach Statistik Austria, F&E-Erhebung

The role of services in R&D internationalisation

- Services are the ‚dark matter‘ of R&D internationalisation
 - We assume that R&D internationalisation in services has grown a lot.
 - However, data for service sectors are missing in most countries
 - In countries where data is available, services account for a third of inward BERD

Service R&D expenditure abroad is growing faster

R&D expenditures of US firms abroad, 1998-2013, sector split



Drivers of the trend towards services

- Tradeability revolution in services (Grossman, Rossi-Hansberg 2008, Baldwin 2006)
- Fragmentation of value chains (for example testing, drugs development by specialized biotech companies in pharmaceuticals)
- Higher R&D intensity of services because of new technologies (ICT, software services)

We know too little about India and China

- India and China have considerably increased their R&D expenditures in recent years
- We know only little about the role of foreign-owned firms in this expansion
 - We know total inward BERD for China (~4 bn EUR) but not the European share
 - No data for India, total inward BERD may also be the size of China
- We know a bit about Indian and Chinese firms in Europe
 - There are a few R&D active firms from India and China in Europe
 - Due to data constraints (confidentiality) the big picture is lacking

The role of emerging economies in R&D internationalisation

- The rise of EMNEs creates new questions for research on the internationalisation of R&D.
 - It challenges old views on the global diffusion of knowledge from the most to least developed countries
 - raises new questions on the nature of superior assets of EMNEs, given that these firms evolve in more restrained environments than firms in advanced economies (Narula 2012).

- Moreover, it brings back family and state ownership, two governance models which have become quite unfamiliar in the US and the EU.
 - Family- and state-owned firms may have different cultures of decision-making, and follow different rationales in R&D internationalisation.
 - For example, the rise of EMNEs has created fears of 'predatory behaviour' - that state-owned EMNEs will acquire domestic companies, exploit their knowledge and leave.

Thank you for your attention!

Bernhard Dachs, Georg Zahradnik
AIT Austrian Institute of Technology
Center for Innovation Systems & Policy