THE INTERNATIONALIZATION OF CORPORATE R&D AND THE DEVELOPMENT OF AUTOMOTIVE R&D IN EAST-CENTRAL EUROPE

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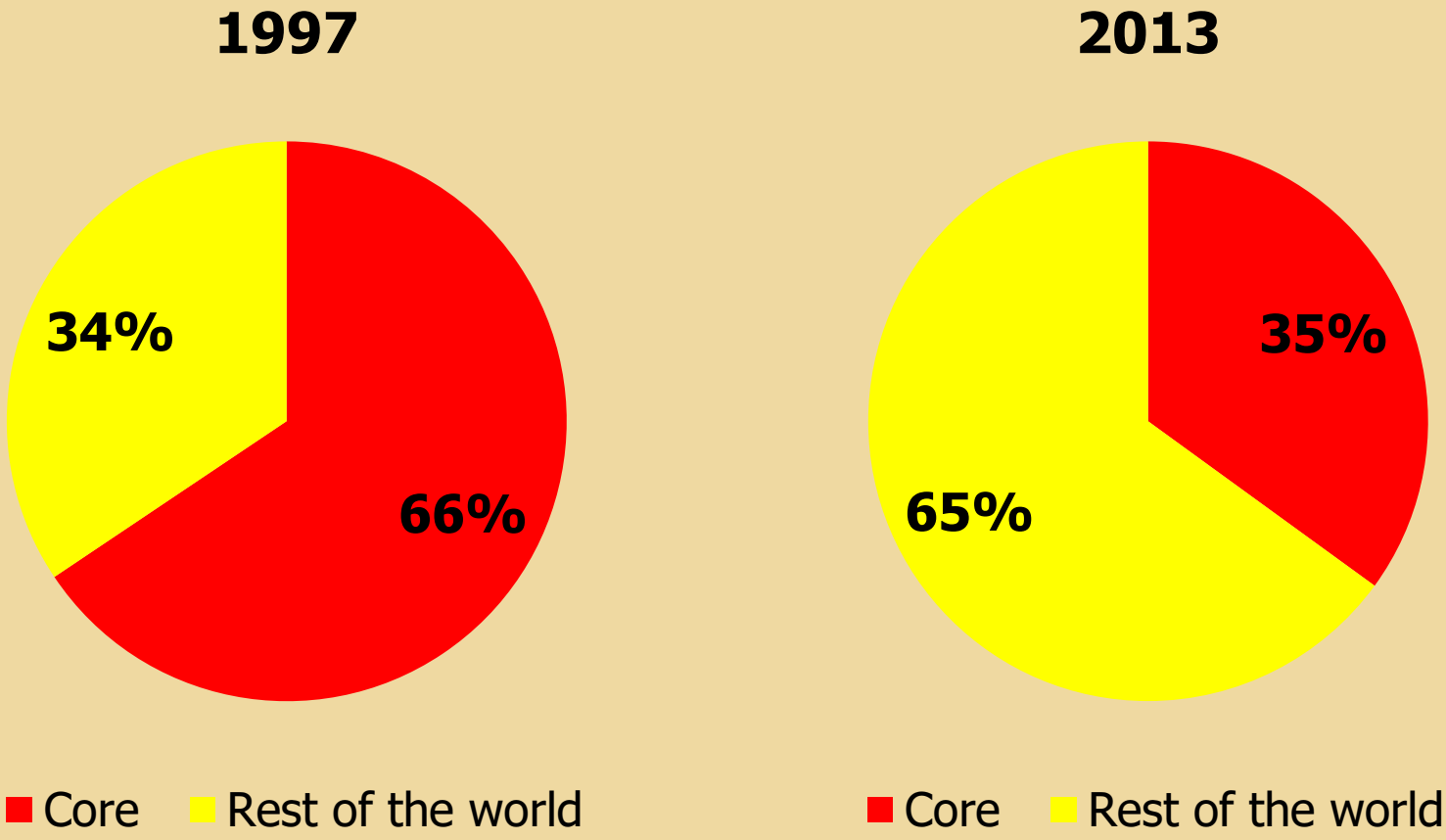
CHANGING GEOGRAPHY OF THE GLOBAL AUTOMOTIVE INDUSTRY IN THE 1990s and 2000s

- Rapid increase in the vehicle assembly in less developed countries
  - Populous countries with potentially large markets
  - Peripheral areas surrounding the traditional core regions of the automotive production

GEOGRAPHIC SHIFT IN THE GLOBAL AUTOMOTIVE INDUSTRY

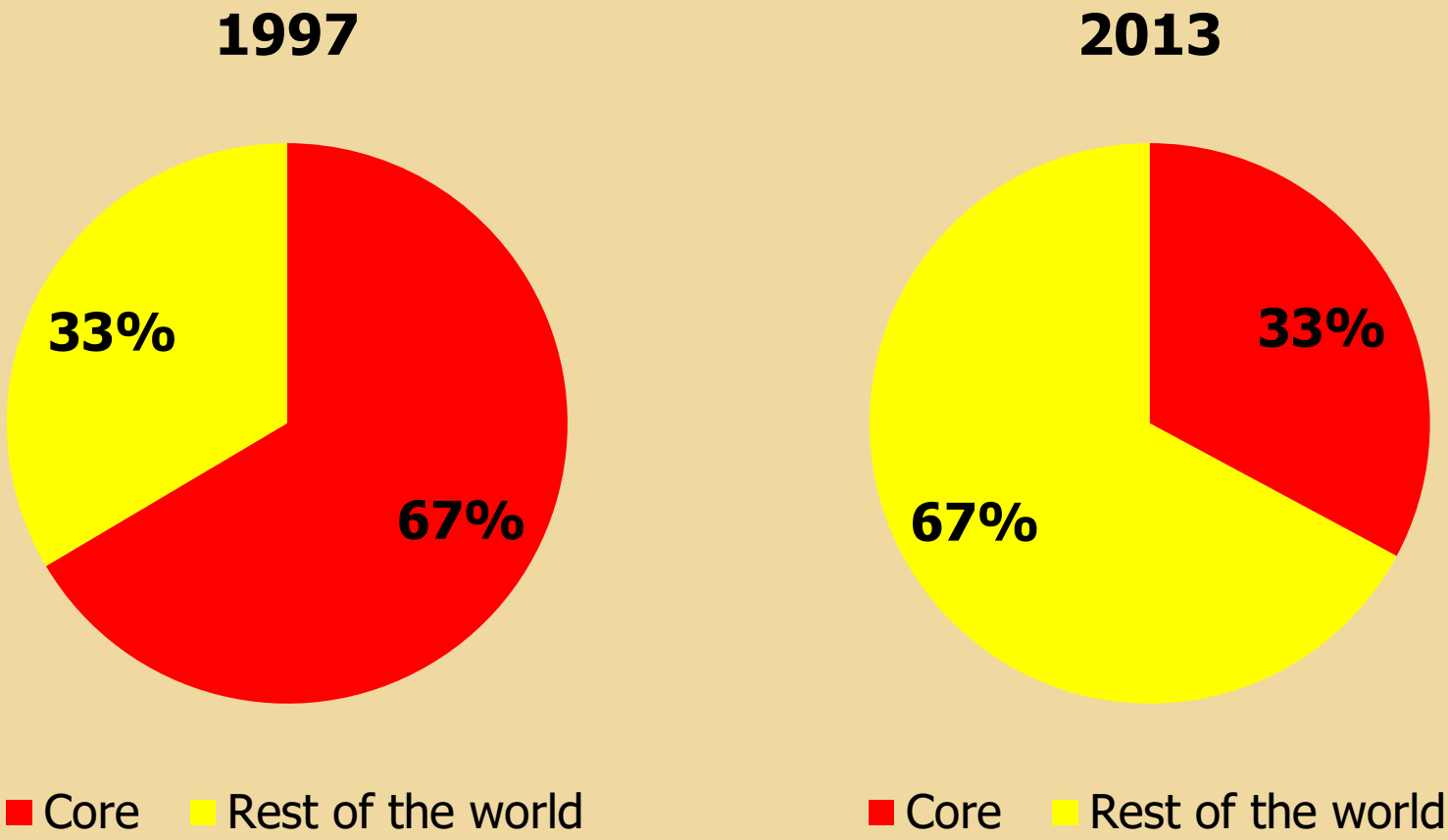
The share of the automotive industry core and the rest of the world of the total vehicle production, 1997 and 2013



Core: France, Germany, Italy, Japan, Sweden, the United Kingdom and the United States

GEOGRAPHIC SHIFT IN THE GLOBAL AUTOMOTIVE INDUSTRY

The share of the automotive industry core and the rest of the world of the passenger car production, 1997 and 2013



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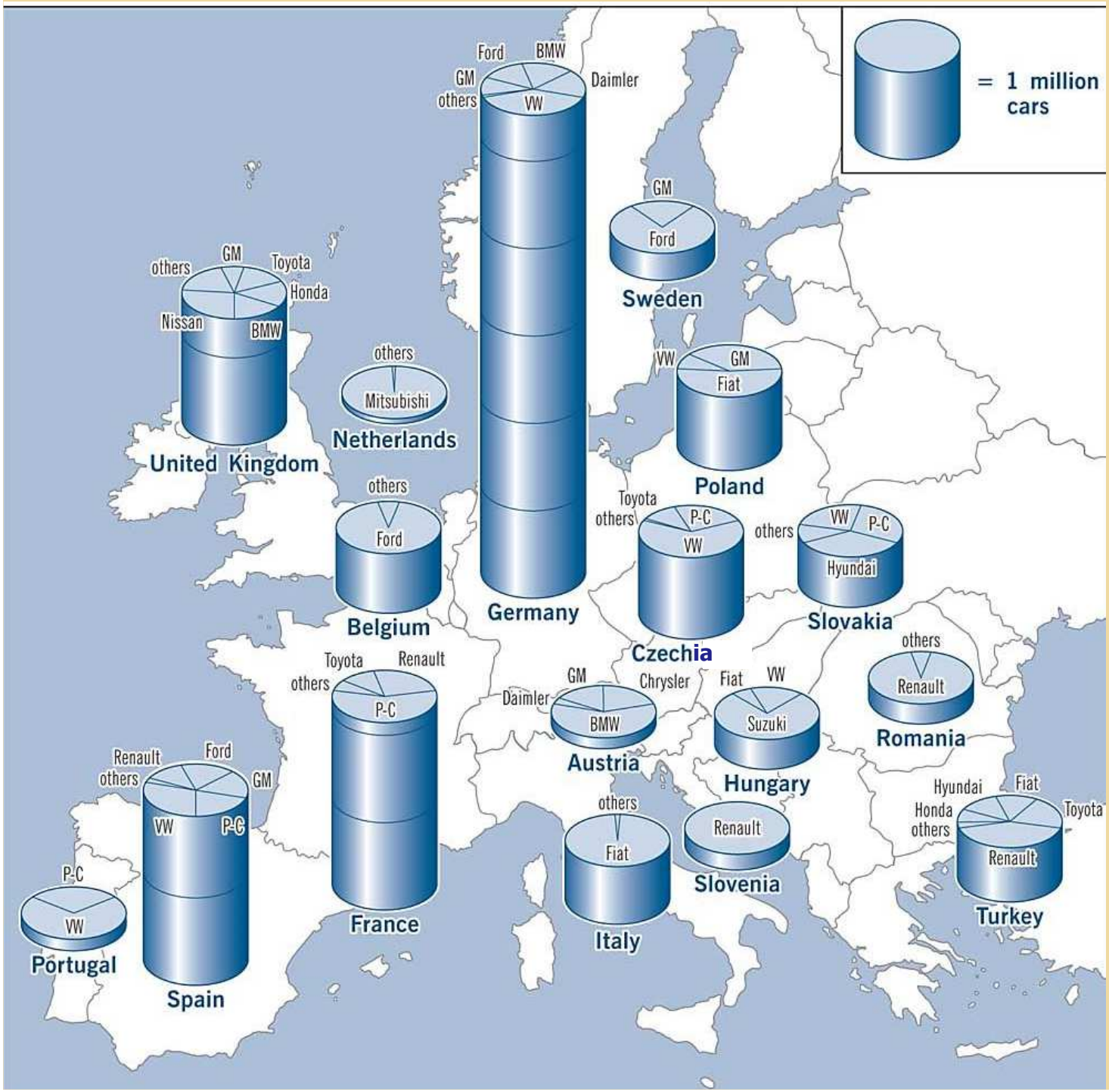


AUTOMOBILE PRODUCTION IN EUROPE IN 2009

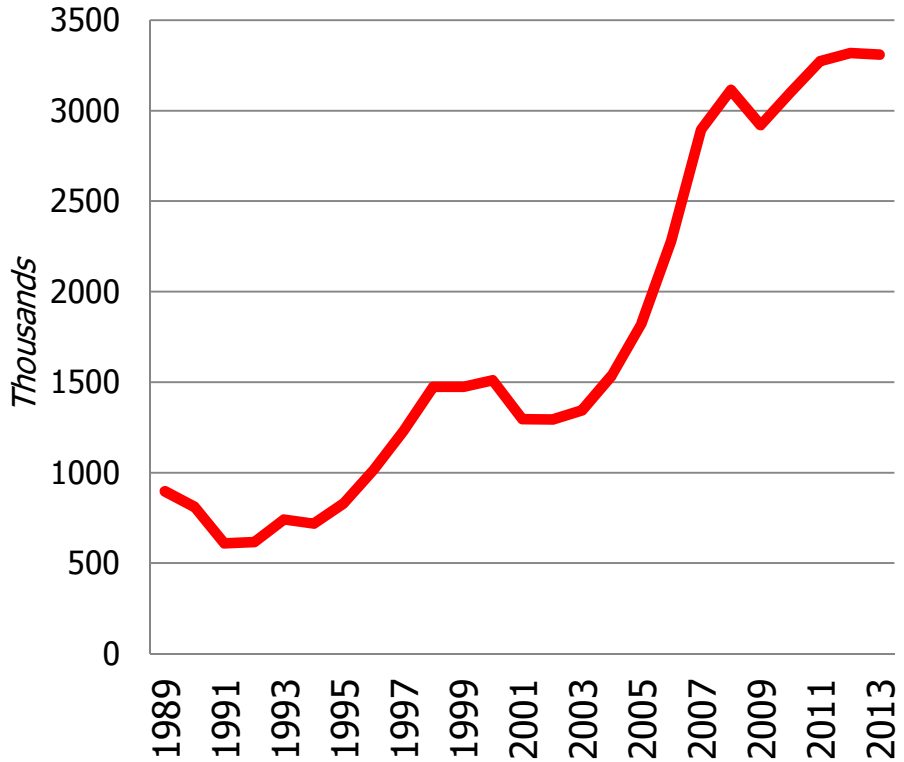
Passenger car production shares in 2013:

Western Europe: 69.6% (89% in 1990)

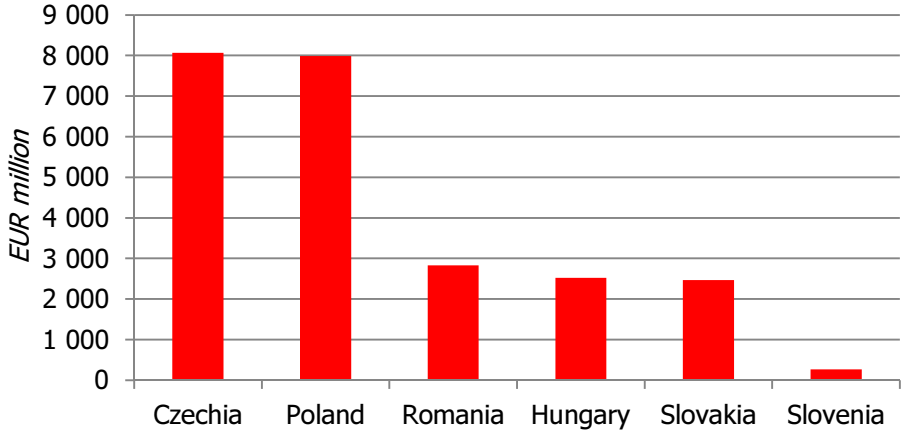
Eastern Europe: 30.4% (11% in 1990)

FDI-DEPENDENT DEVELOPMENT OF THE AUTOMOTIVE INDUSTRY AFTER 1990

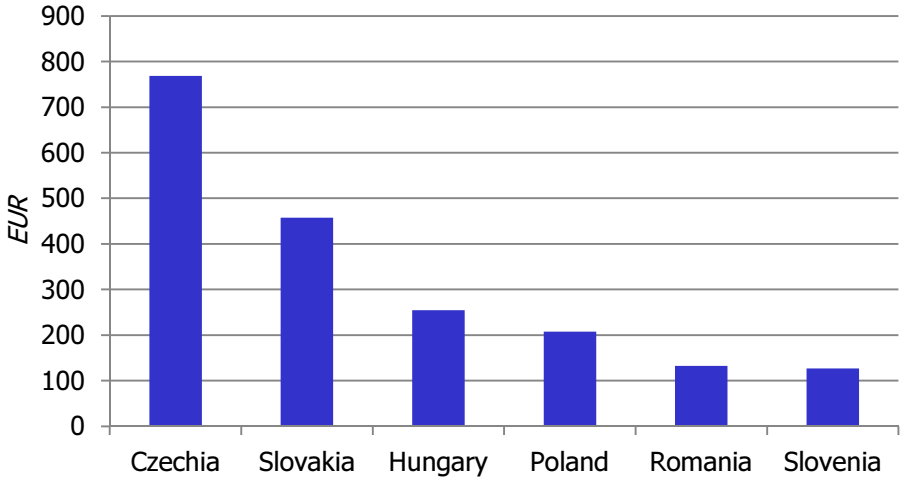
ECE passenger car production



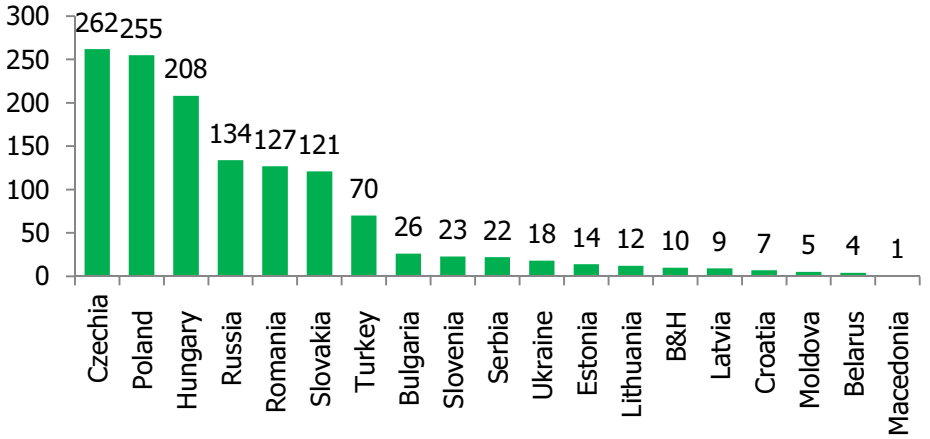
FDI stock automotive industry (NACE 29), 2012



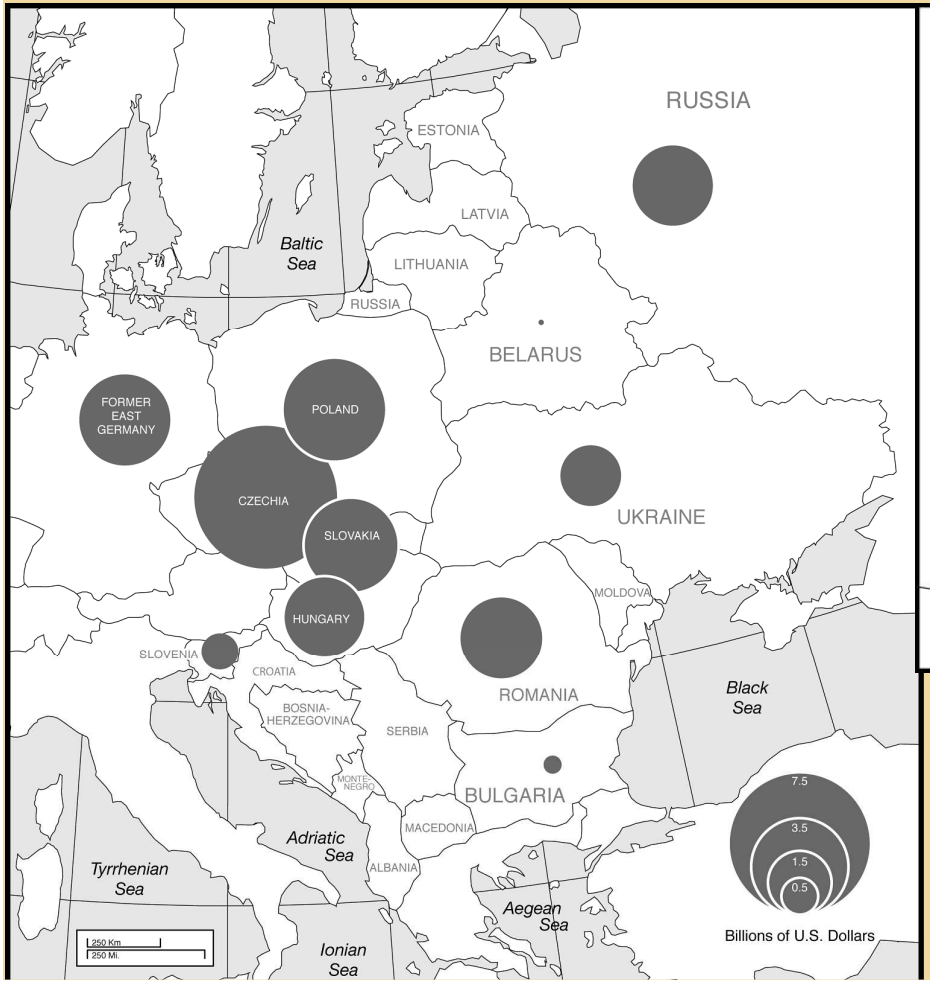
FDI stock per capita (NACE 29), 2012



Number of FDI investments in new automotive supplier plants, 1997-2009



FDI into passenger car assembly in Central and Eastern Europe (2007)



Passenger car assembly plants in Central Europe

RESEARCH QUESTION

- To what extent the increase in the automotive production outside traditional core areas has also led to the development of R&D competencies in peripheral regions of the global automotive industry?
  - Case study of ECE

INTERNATIONALIZATION OF CORPORATE R&D THROUGH FDI

- R&D: one of the least internationalized activities of TNCs
- (Uneven) increase since the late 1970s
  - The need to support the rapidly expanding overseas sales, distribution and manufacturing by TNCs with development and design capabilities
  - Driven by high-tech TNCs from small, highly-developed countries with small domestic markets and limited domestic R&D talent
  - Slower pace of R&D internationalization by TNCs from USA, larger West European countries and Japan
    - Larger domestic markets and the larger pools of a scientific labor force

INTERPRETATIONS

- R&D “globalization”
- R&D “triadization”
- R&D “non-globalization”

CORPORATE R&D HIERARCHY

- Basic research, applied research and development
  - Patterns of R&D concentration and decentralization and related geographic patterns of concentration and dispersion
- Decentralization of corporate R&D in the 1980, recentralization in the 1990s

Forces promoting geographic concentration of R&D	***Forces promoting geographic dispersion of R&D***
Scale and scope economies in R&D	Customizing and tailoring parent company products and processes to foreign markets
Synergy effects	Providing technical support for host market factories
Better control over research results	International mergers and acquisitions
The need for personal interactions for certain types of R&D information (tacitness)	Tapping into scientific and technical talent and technological strengths of particular countries
Advantages of technical, social, cultural and organizational proximity for R&D communication and coordination	Monitoring new technological developments in foreign countries
The accumulated R&D experience in the home country (cumulativeness and path dependency)	Internal and external organizational decomposition of innovation activities
Difficulties of R&D internationalization, such as political risks in foreign countries, dangers of parallel development, high coordination and information costs, immobility of the best R&D personnel, high R&D wage costs in the core countries	Economic policies of host governments, such as local content requirements, investment incentives, protectionist barriers, and political pressures to establish or maintain local R&D units
	Advances in information and communication technologies

INTERNATIONALIZATION OF CORPORATE R&D IN THE AUTOMOTIVE INDUSTRY

- Low
  - Only R&D in the aerospace industry less internationalized
  - Predominantly demand-driven R&D internationalization strategies focusing on development
    - Automobiles require regional and national product adaptation

SPATIAL IMPLICATIONS OF THE COMMON PLATFORM STRATEGY FOR AUTOMOTIVE R&D

- R&D concerning platforms and modules spatially concentrated near the home base
- Regional R&D centers specializing in the upper-bodies modifications established in the most important regional markets
- Increased role of leading suppliers (Tier 0.5) in R&D – co-design and co-location with lead firms
  - About 60% of automotive R&D
  - *Increased* spatial concentration of R&D

FDI EFFECTS ON R&D IN HOST ECONOMIES

- Truncation or R&D development due to R&D "globalization"?
- "Truncation" in peripheral regions of developed economies in the 1970s and 1980s (Britton, Hayter and others)
- Under what conditions can FDI support R&D development in foreign locations?
  - Strategic coupling

TWO THEORETICAL QUESTIONS

- Did truncating effects of FDI on domestic R&D also developed in ECE in the 1990s and 2000s or did "globalization" of R&D lead to a significant increase in automotive R&D functions and competencies in ECE?
- Under what conditions can FDI lead to a successful automotive R&D development in host economies?
  - Can we identify examples of the successful strategic coupling between TNCs and regional R&D assets in the ECE automotive industry?

EUROPEAN AUTOMOTIVE R&D, 2007

	R&D expenditures		R&D personnel	
	mil EUR	%		%
France	3,490	13.3	30,912	19.8
Germany	17,587	67.1	83,155	53.3
Italy	1,000	3.8	8,833	5.7
Spain	254	1.0	3,664	2.3
Sweden	1,537	5.9	9,567	6.1
UK	1,364	5.2	9,454	6.1
Czechia	290	1.1	3,252	2.1
Hungary	50	0.2	876	0.6
Poland	27	0.1	1,118	0.7
Romania	35	0.1	1,070	0.7
Slovakia	3	0.0	72	0.0
Slovenia	7	0.0	133	0.1
Total EU	*26,205*	*100.0*	*156,082*	*100.0*
Germany & France	*21,077*	*80.4*	*114,067*	*73.1*
Total CE	*377*	*1.4*	*5,451*	*3.5*
Total ECE	*412*	*1.6*	*6,521*	*4.2*

Source: Eurostat

PER CAPITA AUTOMOTIVE DATA OF ECE COUNTRIES EXPRESSED AS A PERCENTAGE OF GERMAN PER CAPITA LEVELS IN 2007

	R&D expenditures	R&D personnel	Vehicle assembly	Automotive employment
Germany	**100.0**	**100.0**	**100.0**	**100.0**
Czechia	13.1	31.0	123.5	113.9
Hungary	2.3	8.5	39.2	53.4
Poland	0.3	2.9	28.2	34.1
Romania	0.8	4.9	15.2	28.3
Slovakia	0.3	1.3	143.4	60.8
Slovenia	1.6	6.5	134.5	48.4
CE total	*2.7*	*8.1*	*57.5*	*52.2*
ECE total	*2.2*	*7.3*	*47.0*	*46.3*

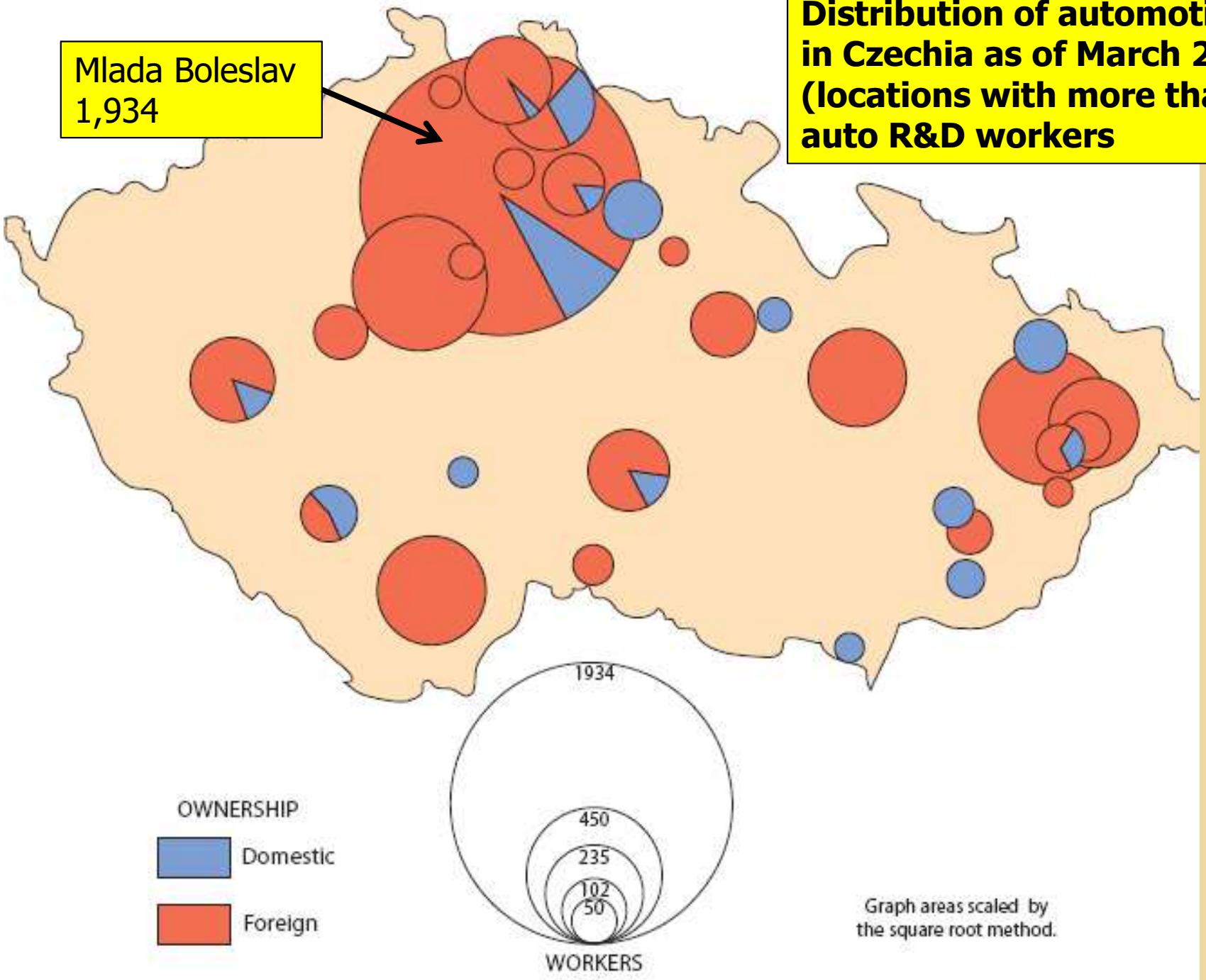
THE PERCENTAGE SHARE OF INDIVIDUAL COUNTRIES OF THE TOTAL ECE AUTOMOTIVE R&D, PRODUCTION AND EMPLOYMENT IN 2007

	R&D expenditures	R&D personnel	Vehicle assembly	Automotive employment
Czechia	70.4	49.9	30.9	29.0
Hungary	12.1	13.4	9.6	13.3
Poland	6.5	17.1	26.1	32.1
Romania	8.5	16.4	8.0	15.1
Slovakia	0.7	1.1	18.8	8.1
Slovenia	1.7	2.0	6.5	2.4
ECE total	100.0	100.0	100.0	100.0

WHY IS CZECH AUTOMOTIVE R&D RELATIVELY STRONG WITHIN ECE?

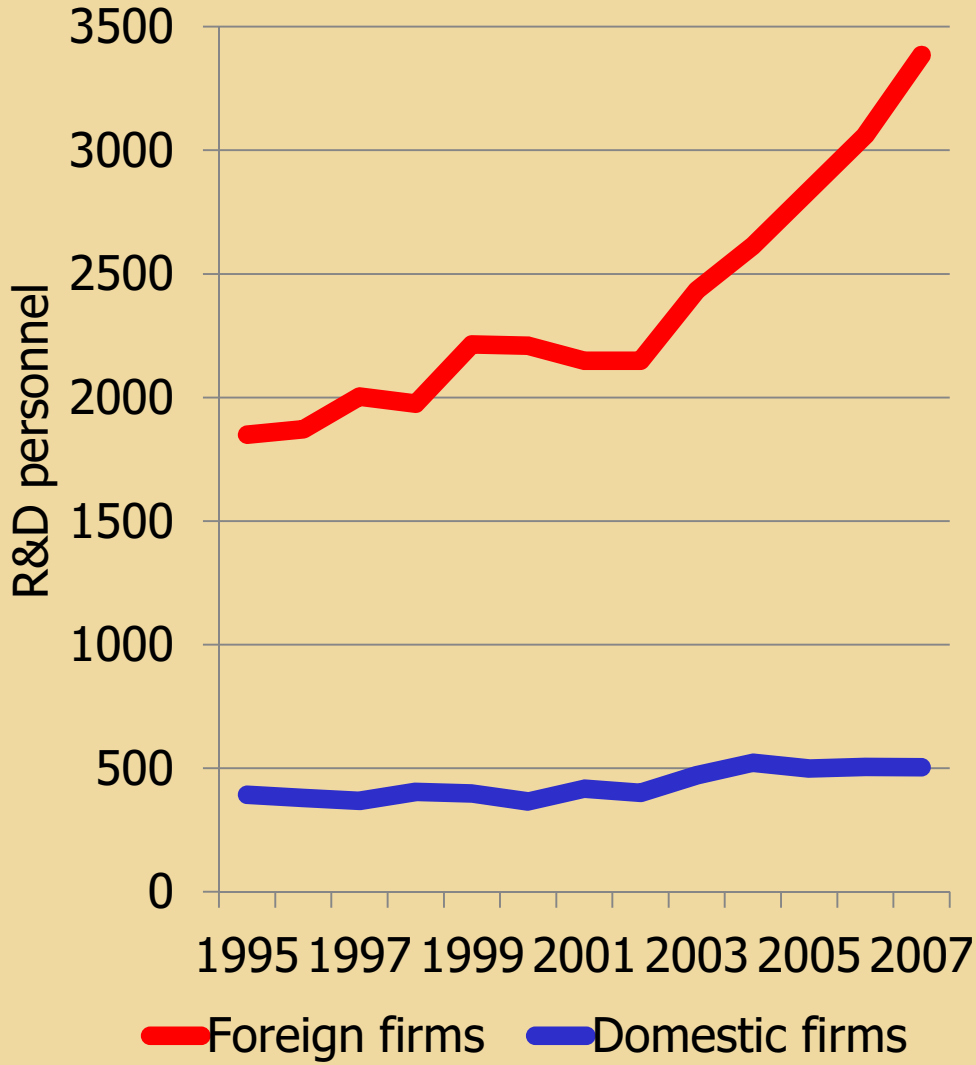
- The importance of Škoda Auto
  - 75% of total R&D expenditures in the Czech automotive industry
  - A tier-two lead firm
  - A typical regional automotive R&D center
    - 584 R&D workers in 1991, 1,766 in 2012
    - Reasons: 1 basic model in 1991, 7 in 2013
  - Location of engineering firms close to Škoda
    - Co-location precondition for co-design
  - Strategic coupling

Distribution of automotive R&D in Czechia as of March 2011 (locations with more than 20 auto R&D workers

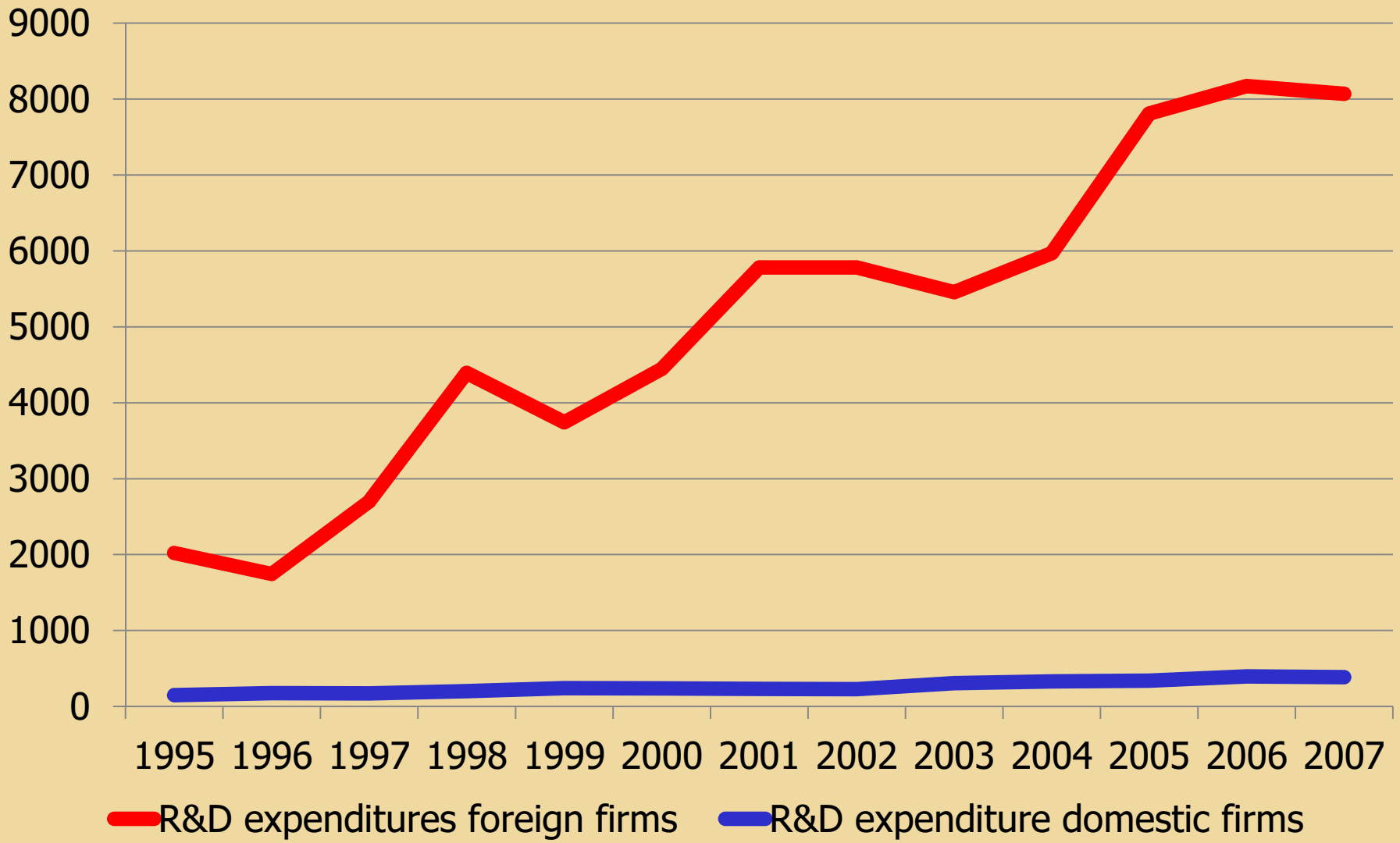


1995-2007 TRENDS: INCREASING SHARE OF R&D CONDUCTED BY FOREIGN FIRMS

- 87% (3,385) of R&D workers, compared to 13% (504) employed by domestic firms



R&D EXPENDITURES (CZK MIL.)



NATURE OF DOMESTIC AUTOMOTIVE R&D

- Small-scale development efforts and the technical support of production
- Technological complexity of automotive R&D decreased
- Domestic R&D capabilities significantly undermined between 1995-2007

CONCLUSIONS

- Limited chances of countries located outside the automotive industry core to attract sizeable higher-order R&D functions
- Disproportionately weak automotive R&D in ECE
- Continuing concentration in the West European core (Germany in particular)
- Automotive R&D concentration in the European auto core increased rather than decreased

CONCLUSIONS

- Czechia: similar weakness as the rest of ECE
  - Control of automotive R&D by foreign TNCs
  - Weak domestic R&D
  - Foreign ownership limits potential local and regional development effects of FDI in R&D
  - Diminished domestic automotive R&D capabilities
- Strategic coupling: the most successful cases of automotive R&D development

Thank you for your attention