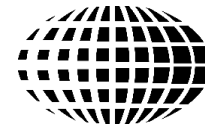


Development of transport networks in Central and Eastern Europe (1990-2015)



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Agenda

- Aims and methodology
- CEE 1990-2018: development of road and rail transport between metropolises
- CEE: accessibility changes
- Conclusions

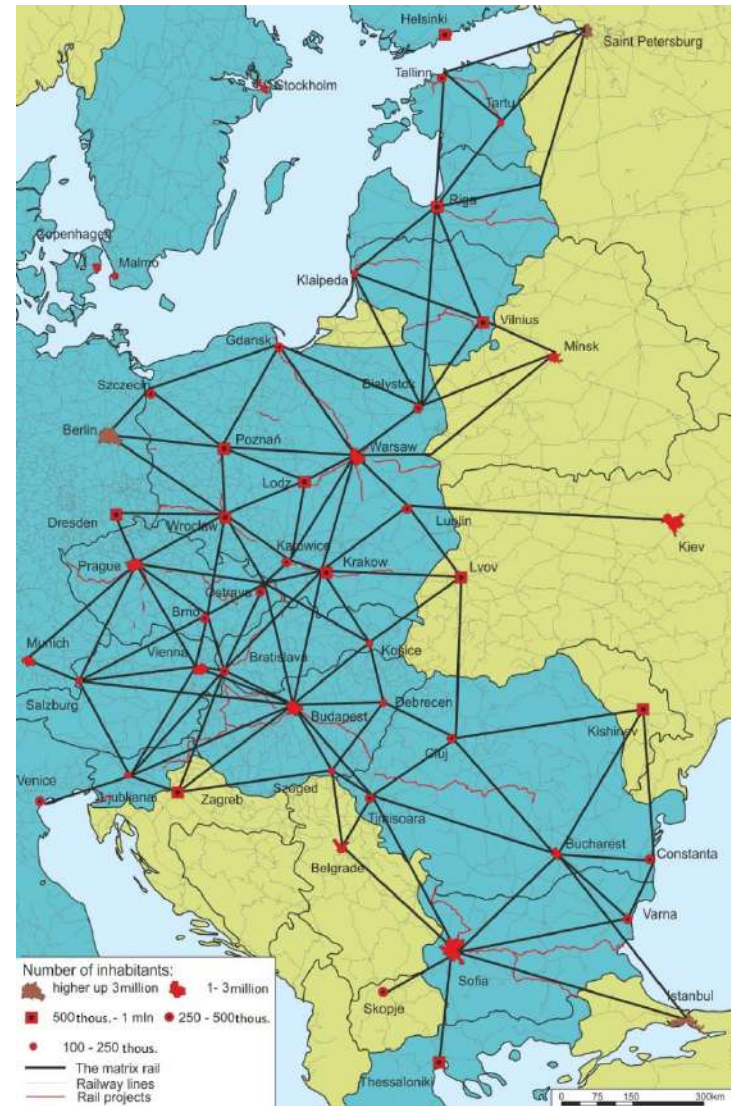
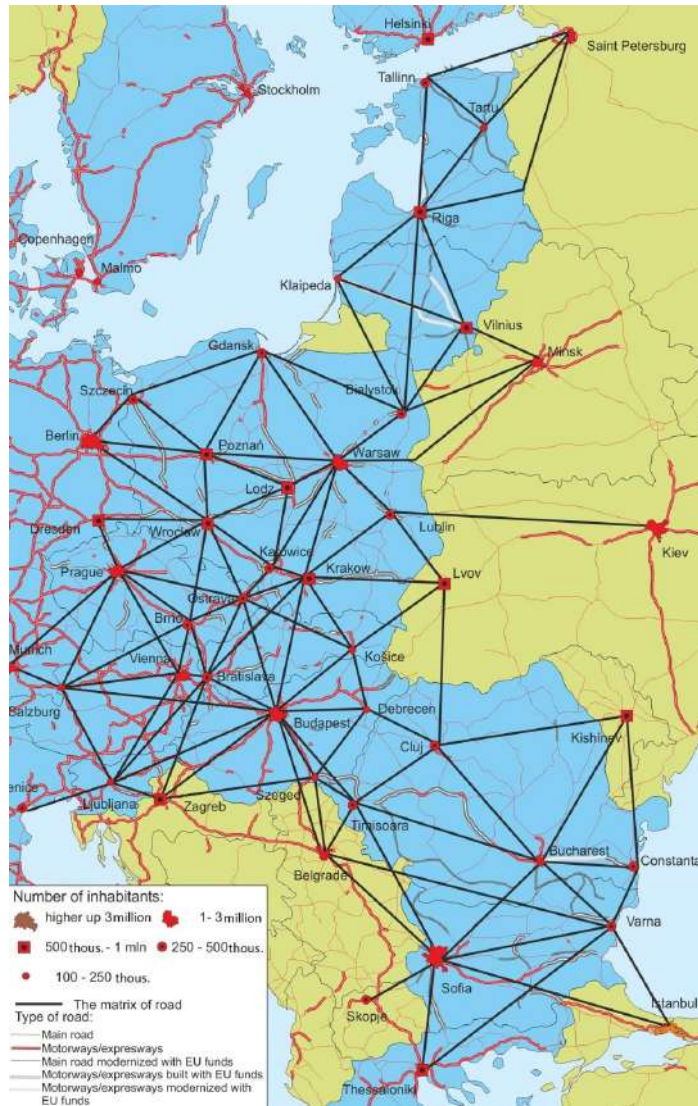
Aims

- Presentation of the development of transport networks 1990-2015 in Central and Eastern Europe
- Presentation of the CCE accessibility changes
- Answering the question: to what extent the development of transport infrastructure was a barrier for transformation processes – or, on the contrary, a factor accelerating it.
- Input to the discussion concerning the role of transport in regional development

Methodology and projects background

- The analysis is focused on road and railway networks
- Statistical data were available mainly since 2004
- The effects of new investment projects are evaluated with the use of accessibility indicators:
 - temporal accessibility (travel time changes between metropolises)
 - potential accessibility (based on the negative exponential distance-decay function)
- The paper is based on the several projects:
 - ESPON TRACC,
 - EU FP7 GRINCOCH,
 - Polish national sources (EURODAC),
 - report for VASAB (Spiekermann, Komornicki 2018)

Methods - GRINCOH



Methods - potential accessibility indicator

$$A_i = \sum_j g(M_j) f(c_{ij})$$

where A_i is the accessibility of unit i , $g(M_j)$ is the function determining the attractiveness of 'mass' measured e.g. in terms of the **population** of unit j , and $f(c_{ij})$ is a **distance decay function** representing the generalised cost (distance, **time**, cost or effort) needed to reach this 'mass'.

$$A_i = M_i f(t_{ii}) + \sum_j M_j f(t_{ij}) + \sum_k M_k f(t_{ik})$$

The diagram shows the equation $A_i = M_i f(t_{ii}) + \sum_j M_j f(t_{ij}) + \sum_k M_k f(t_{ik})$ with three colored ellipses and arrows pointing to definitions:

- A green ellipse around $M_i f(t_{ii})$ points to "Selfpotential of municipality i".
- A red ellipse around $\sum_j M_j f(t_{ij})$ points to "Intranational potential – including the travel time between two Polish municipalities i and j".
- A blue ellipse around $\sum_k M_k f(t_{ik})$ points to "International potential – including the travel time, including border waiting time, between municipality i and one of the transport units encompassing the territory of the whole European continent outside of Poland".

International potential – including the travel time, including border waiting time, between municipality i and one of the transport units encompassing the territory of the whole European continent outside of Poland

Intranational potential – including the travel time between two Polish municipalities i and j

Selfpotential of municipality i

$$f(t) = \exp(-\beta t)$$

Exponential distance decay function

The more locally we look, the shorter the trip length and sharper is the distance decay (with higher β values). This procedure results in the use of:

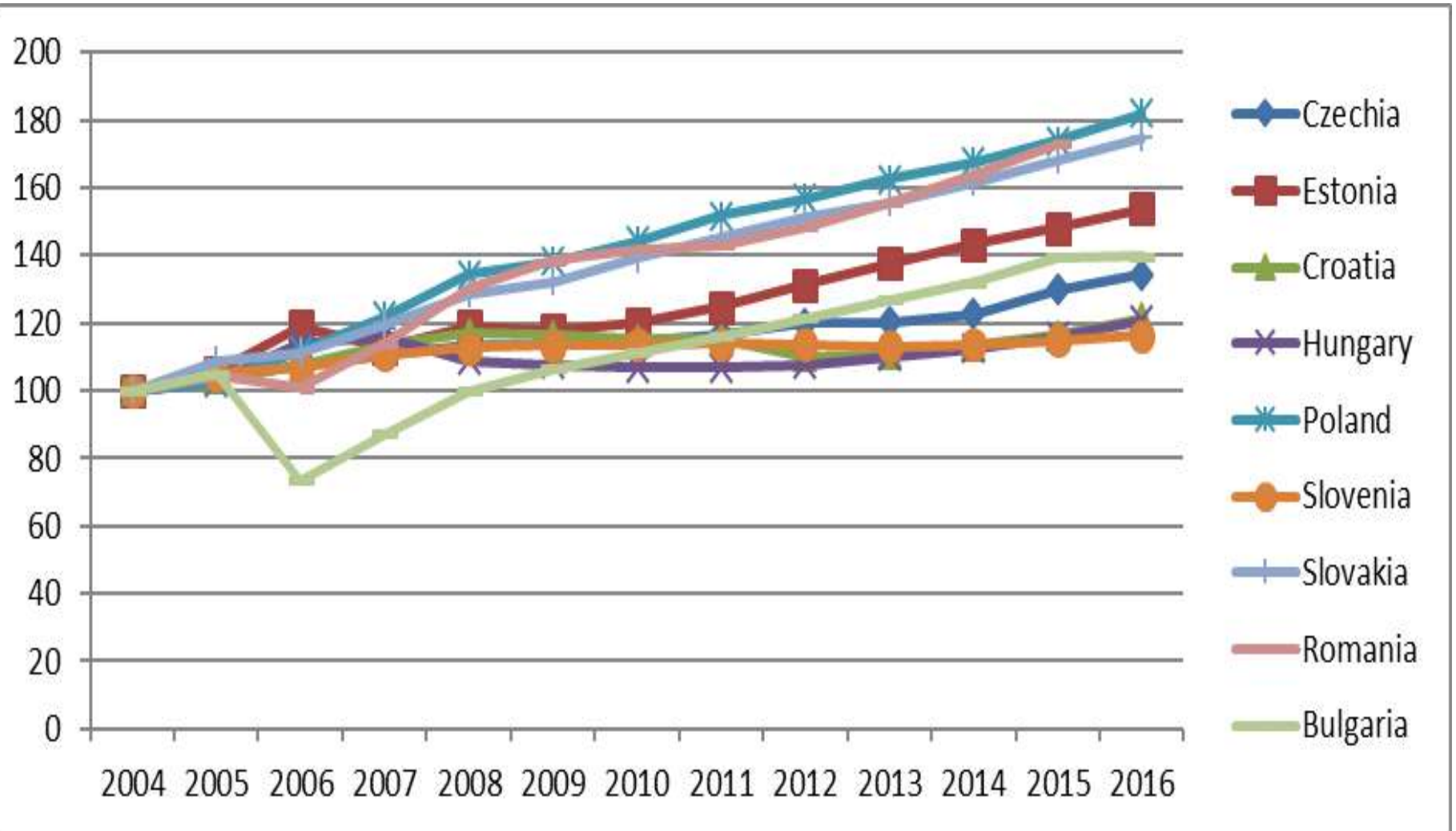
- $\beta = 0.02$ for short trips (intranational level)
- $\beta = 0.005$ for long trips (international level).

ROAD AND RAIL TRANSPORT

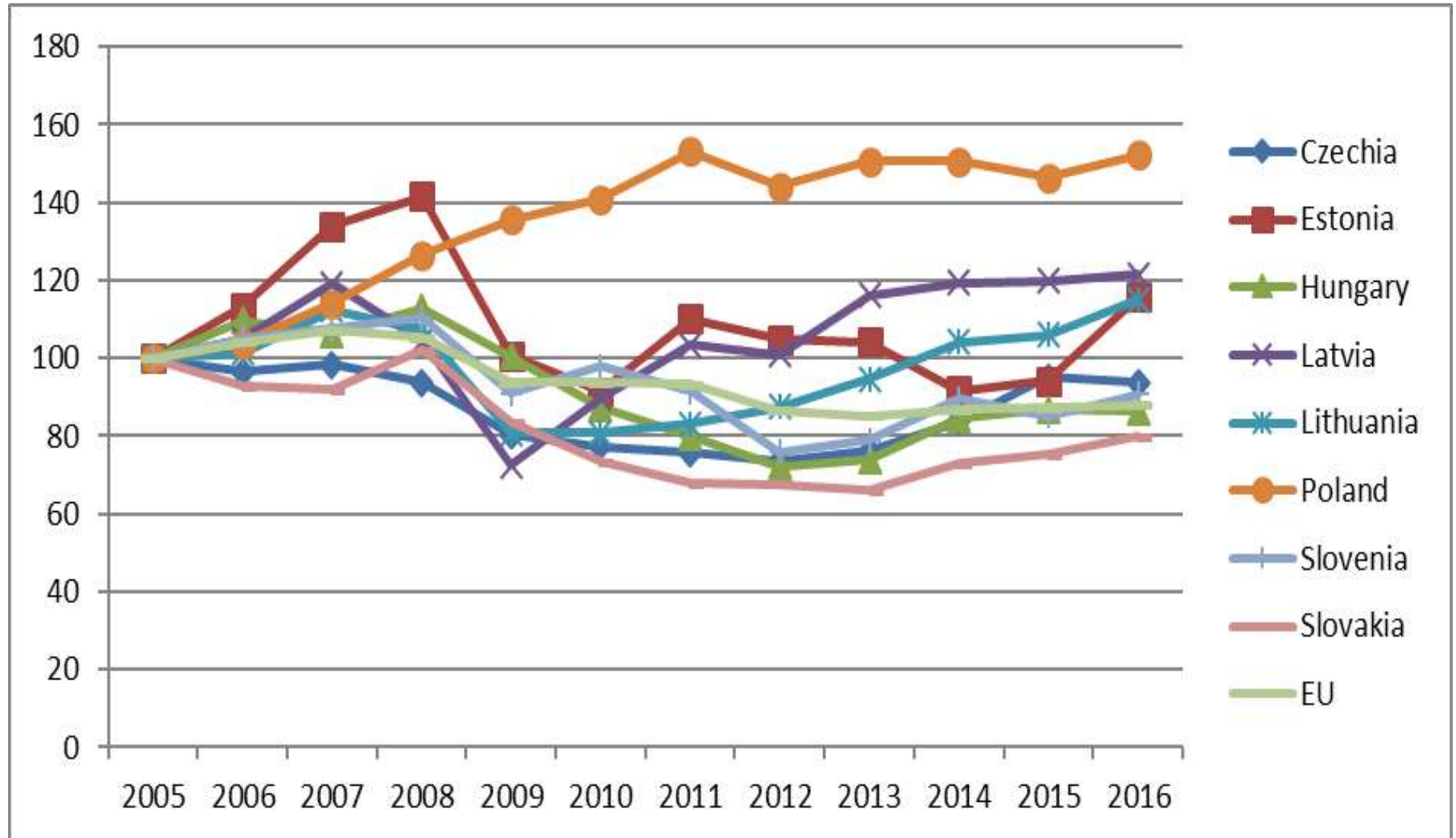
New factors in CEE transport development after 1990

- Shift in the directions of foreign trade from the countries of the region towards Western Europe
- Return to the natural patterns of the seaport catchments (e.g. transfer of Czech cargoes to Hamburg)
- New geopolitical barriers due to war in the former Yugoslavia
- De-concentration of production due to structural changes, which ultimately led to the dispersion of both cargo and passenger traffic
- Massive increase in private car ownership
- Deterioration in the economic situation of some public transport operators (lifted subventions, increased competition).

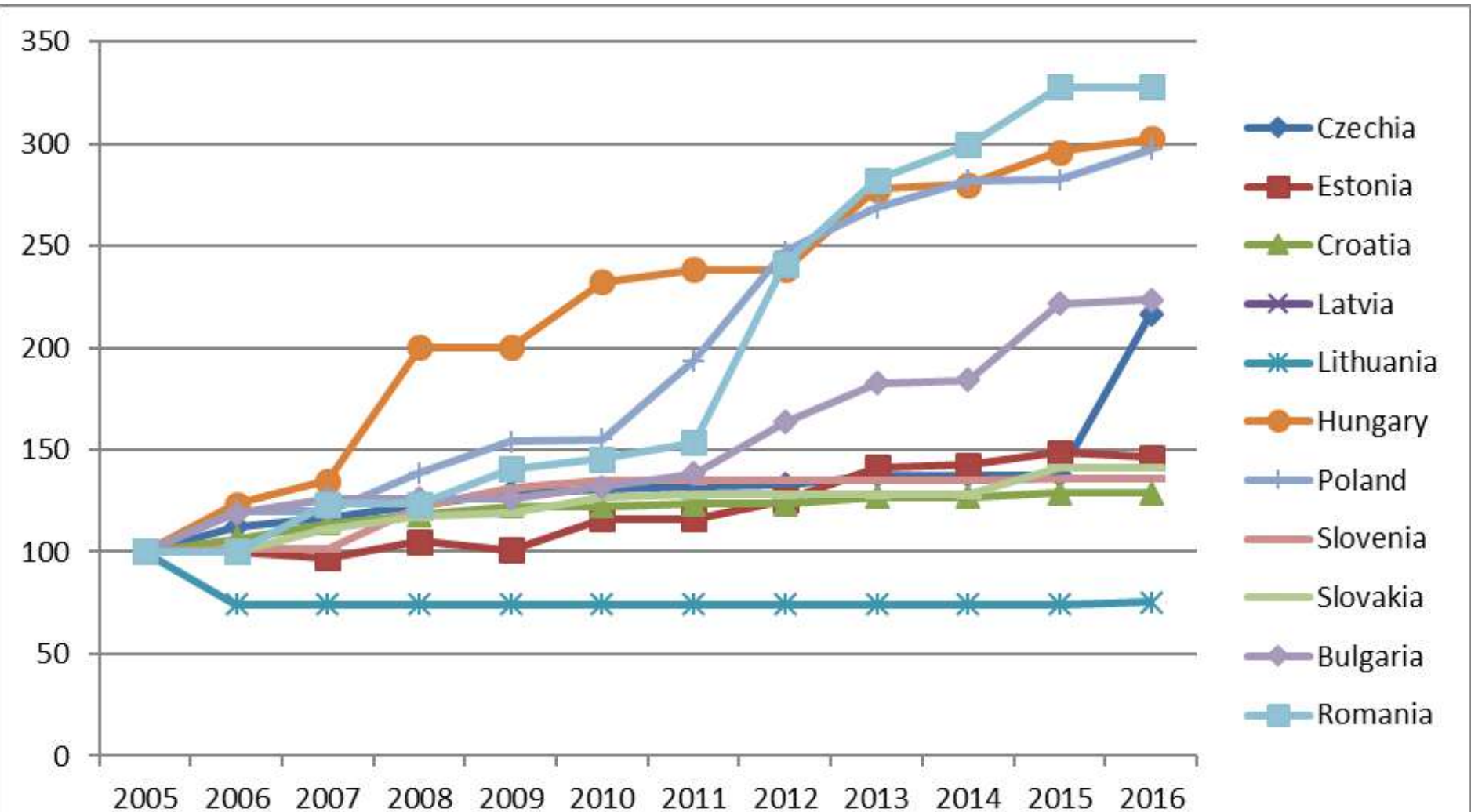
Private car ownership in the countries of Central Europe (2004-2016)



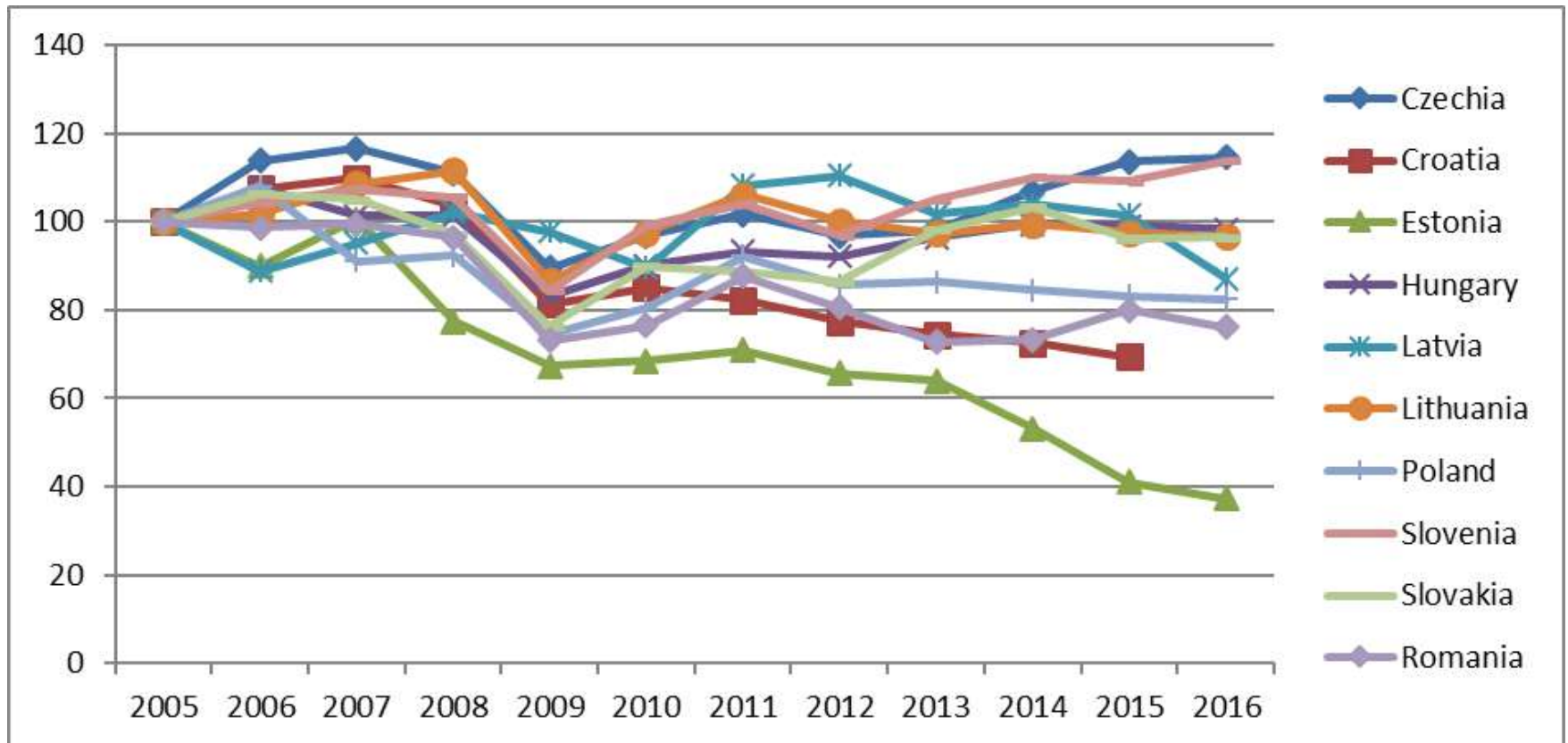
The dynamics of road cargo transport in the countries of Central Europe (2005-2016)



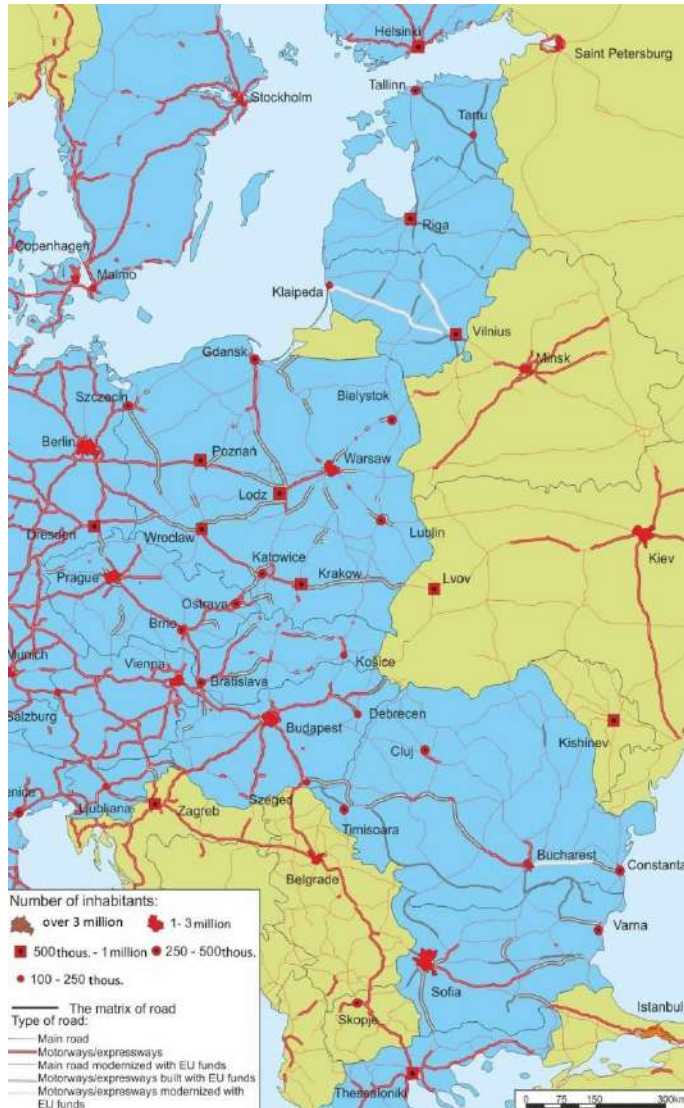
Length of the motorway networks in the countries of Central Europe (2005 = 100)



Dynamics of cargo transport by railways in Central and Eastern Europe (2005 = 100)



New investment road

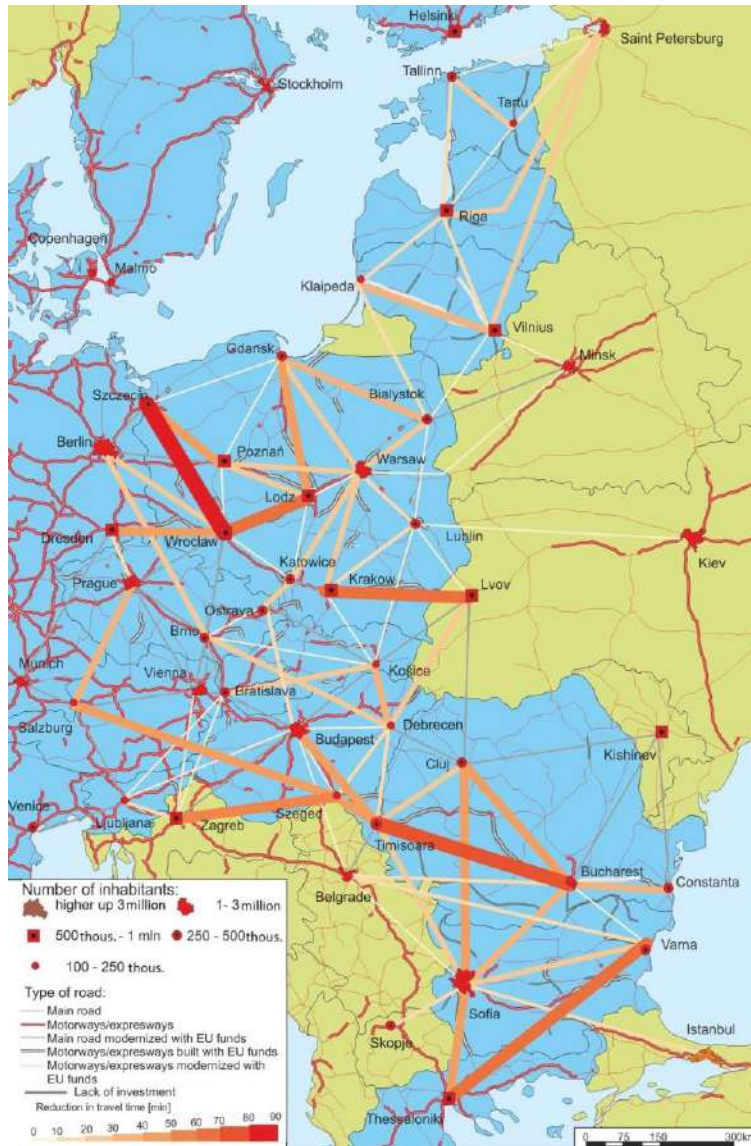


rail

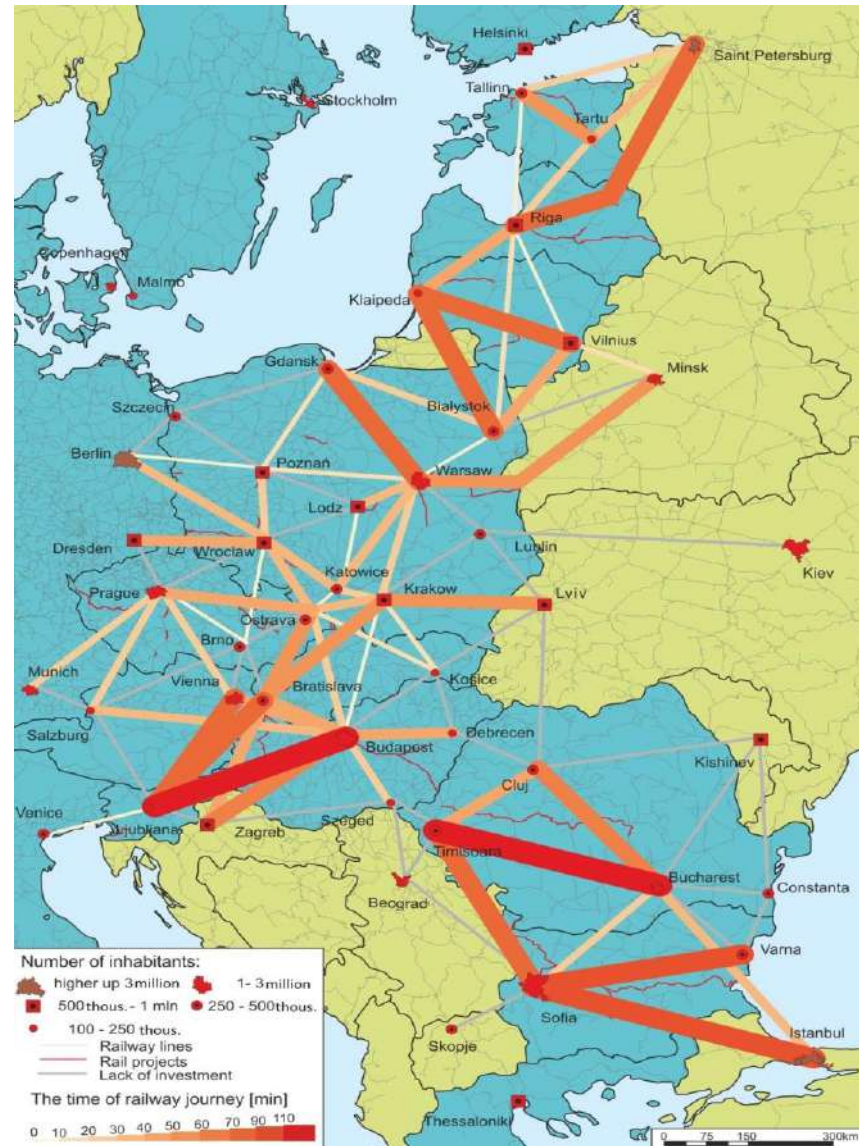


Changes in travel time

road



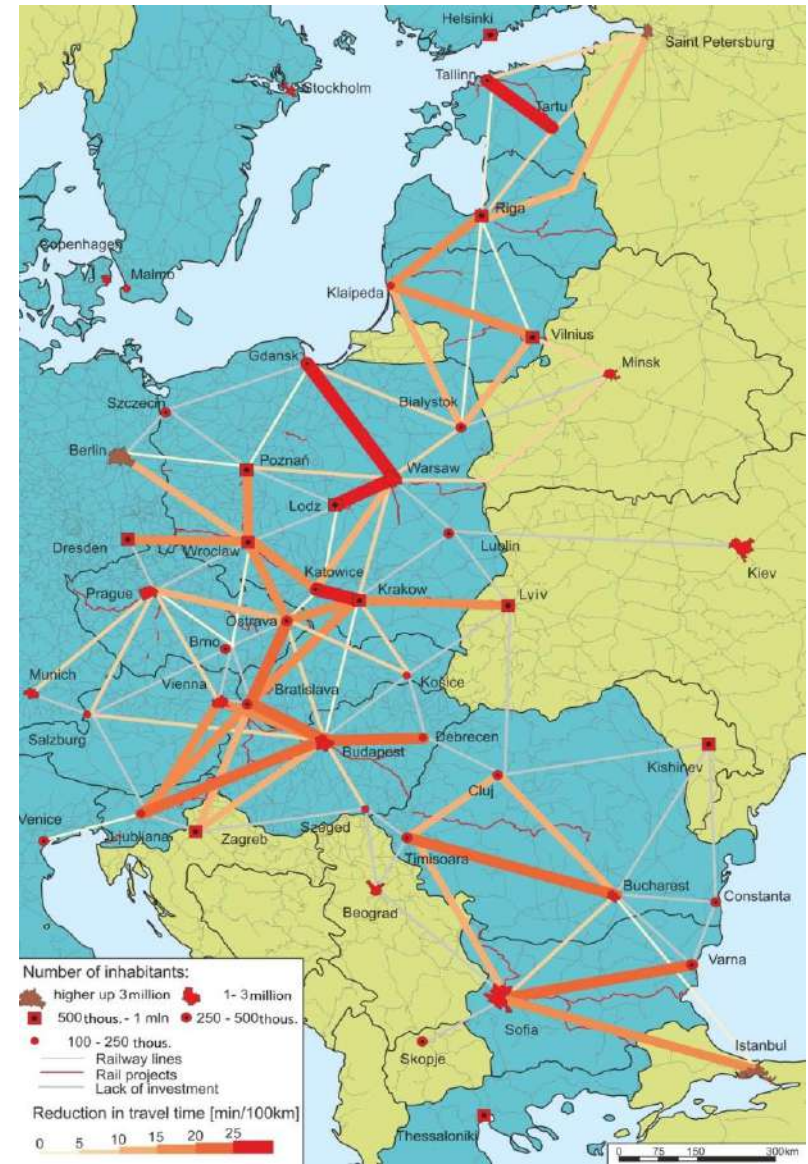
rail



Changes in travel time (for 100 km)

road

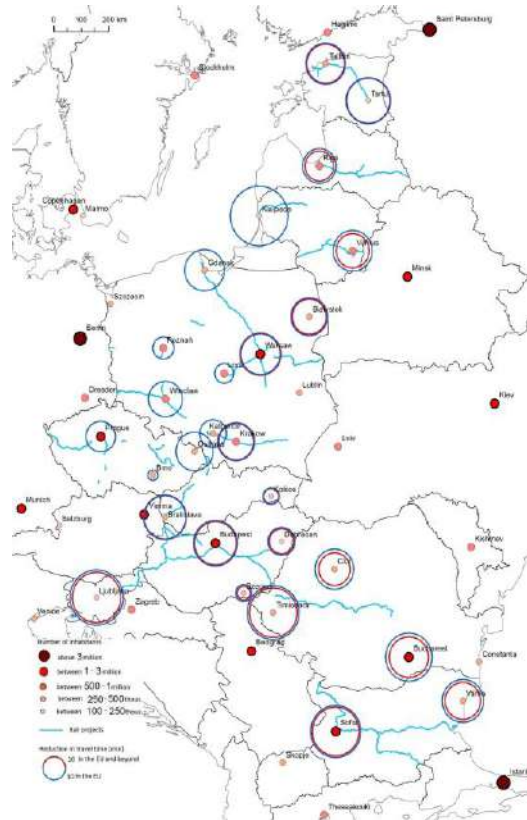
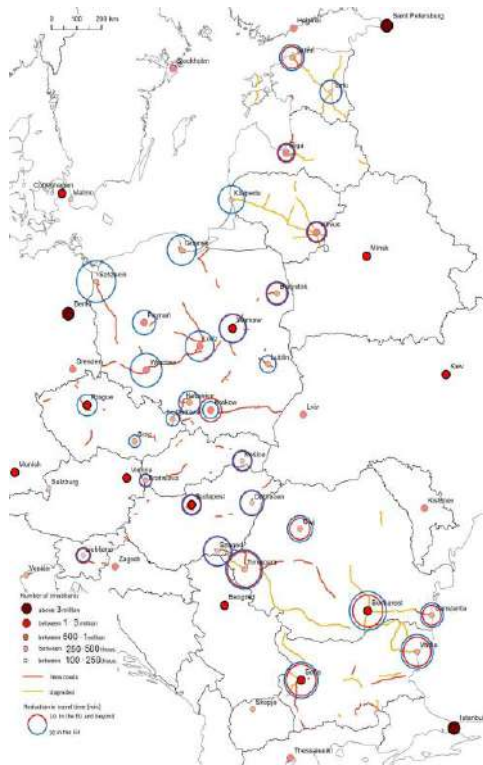
rail



Changes in travel time – main nodes

roads

rail



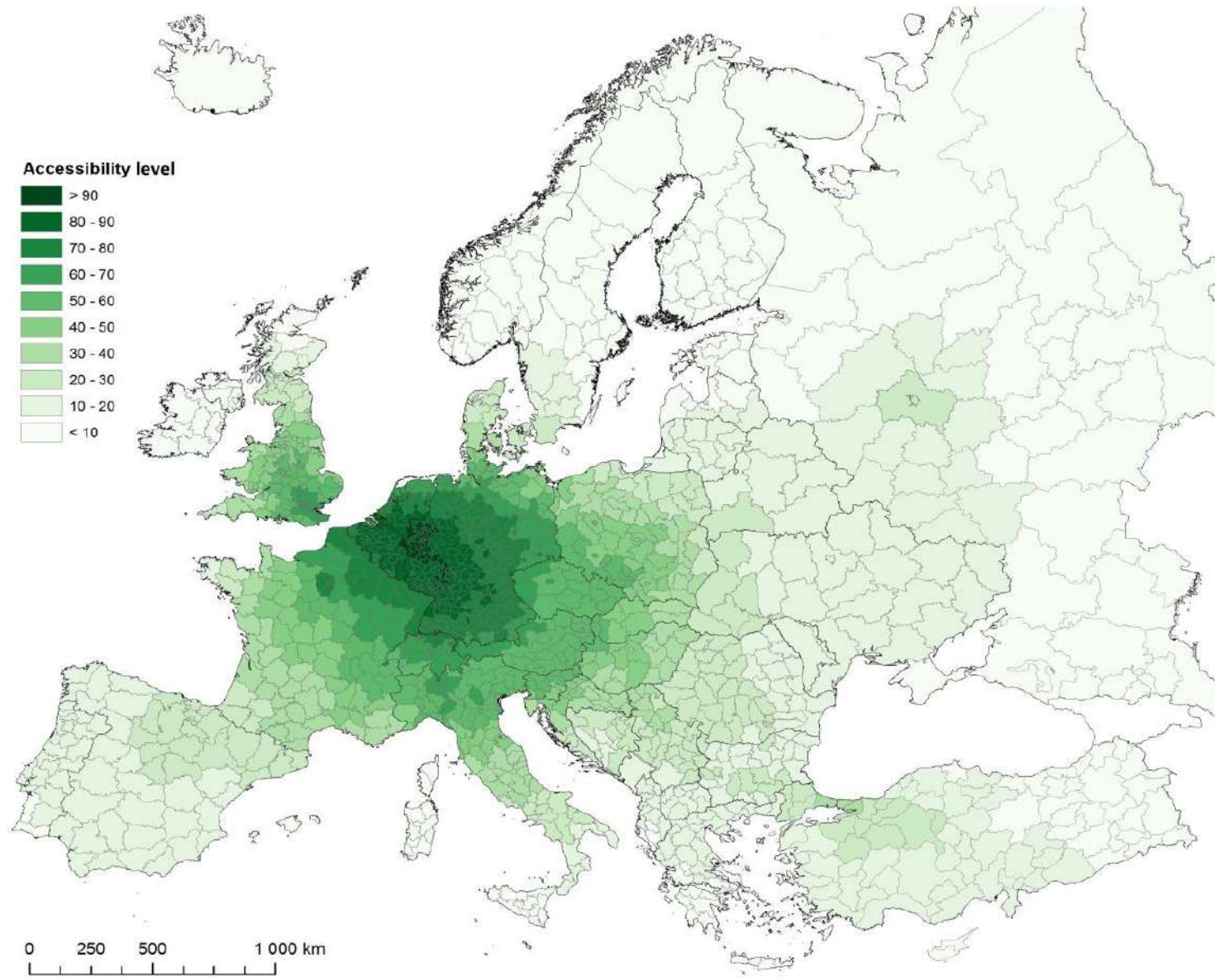
- Winners from Poland, Romania and Bulgaria (capital cities, Varna, Timisoara, Wroclaw, Szczecin)

The effects of the new investment

- Better connectivity **between old and new members** and only **in some cases between new member states**
- Connectivity through **external border** improved only in some places (PL-UA, HU-UA)
- **Rail** investment – **only modernization**, no new lines (including high speed);
- In rail transport **internal investment** dominated
- Rail systems of Baltic States as well as Romania and Bulgaria **remain isolated** from the rest of EU
- **Lack of the North-South** transport connections
- Where is **European transport policy**?

ACCESSIBILITY CHANGES

Road accessibility - Europe



BSR road and rail accessibility changes – demographic component

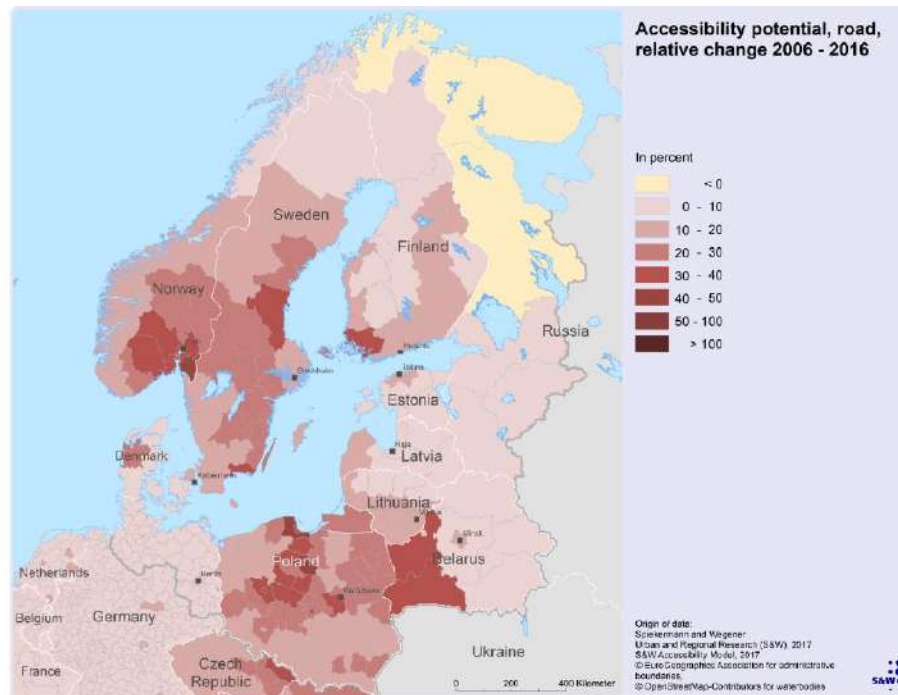


Figure 2.8 Accessibility potential, road, relative change 2006-2016.

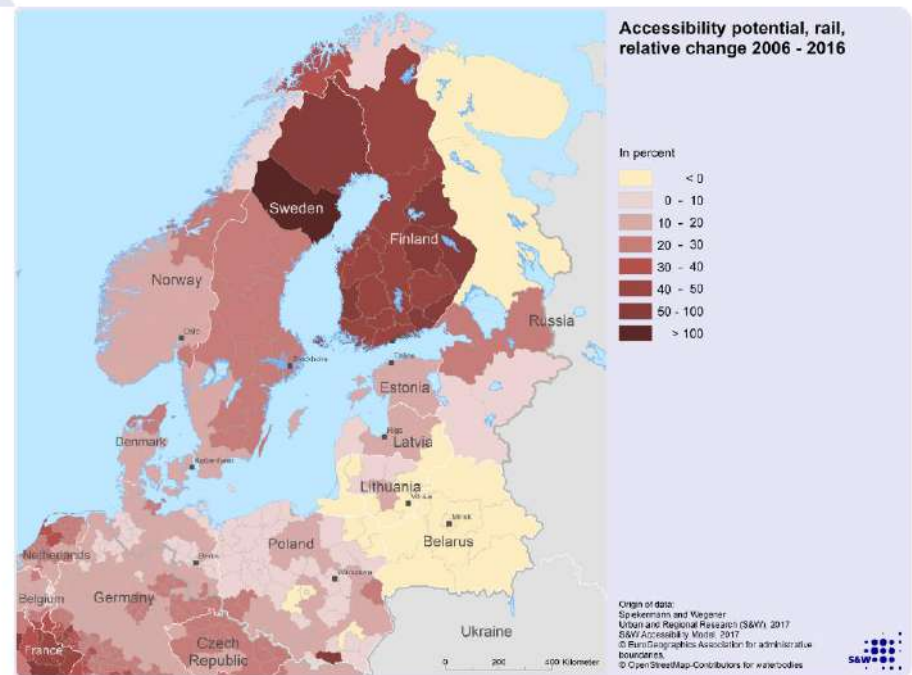
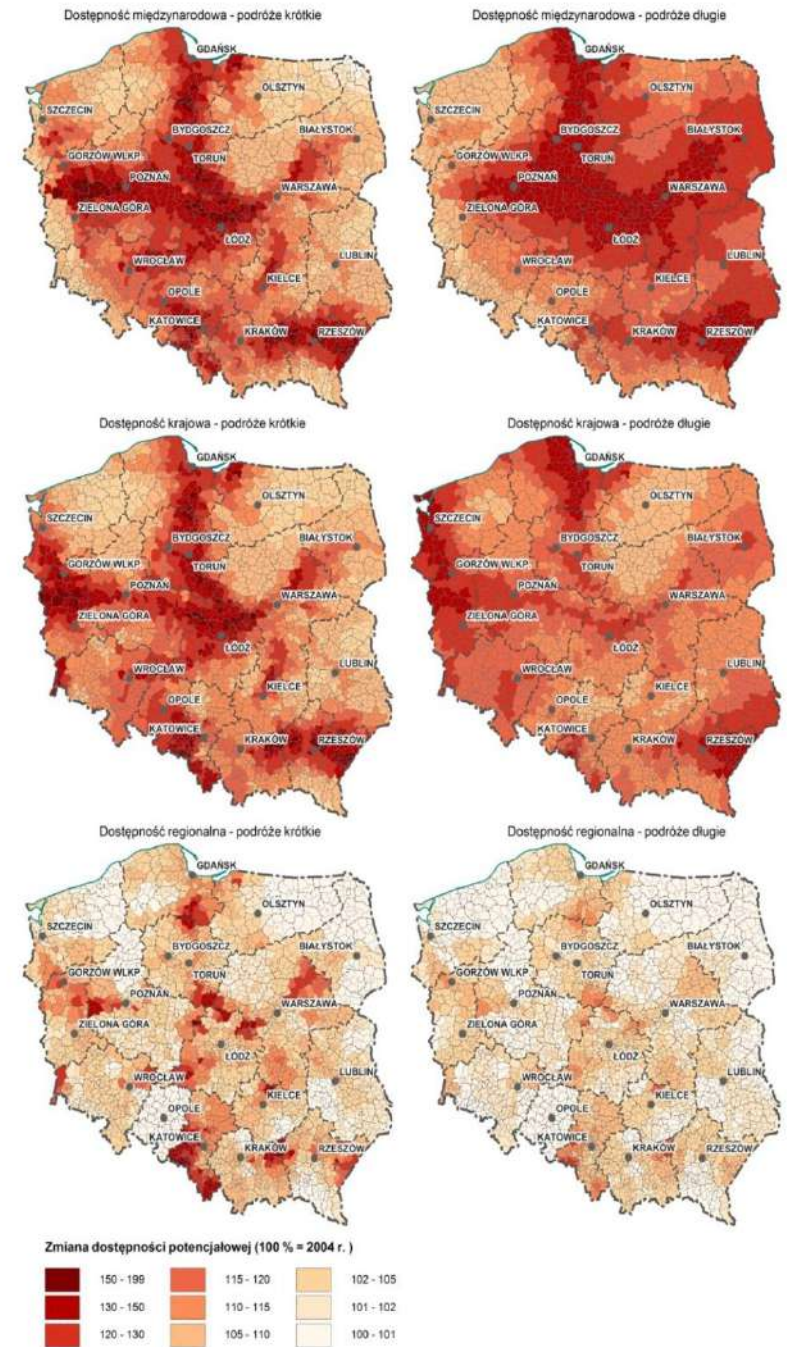


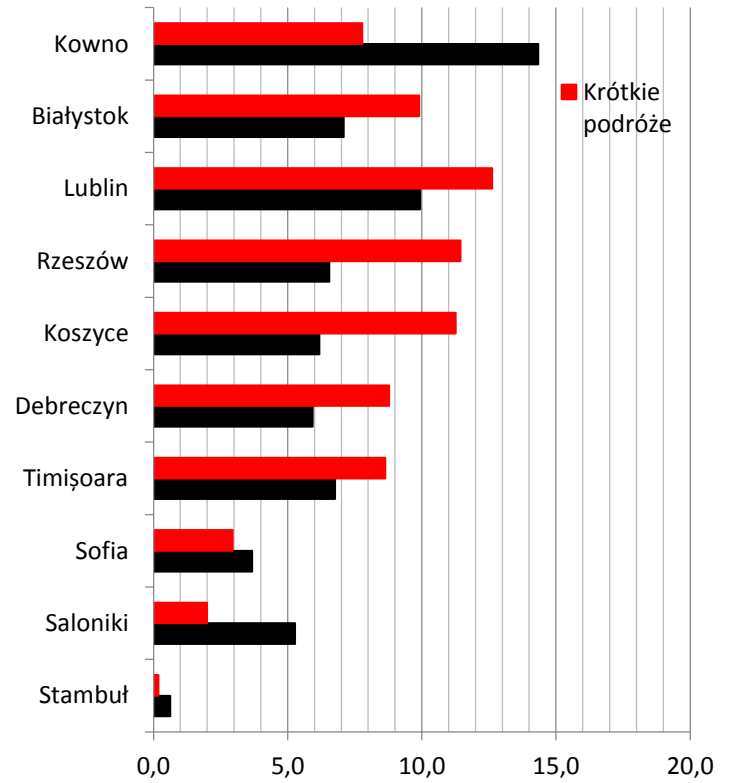
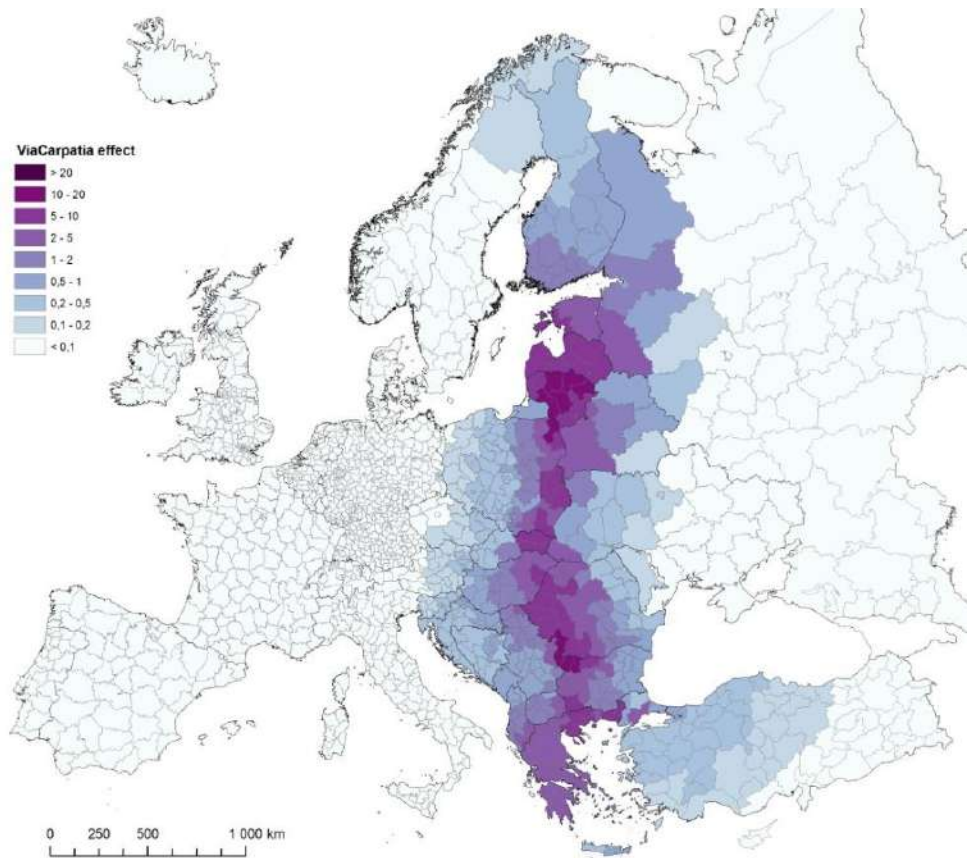
Figure 2.13 Accessibility potential, rail, relative change 2006-2016.

Accessibility changes (2004-2015)

- „Triple losers” (central Pomerania)
- „Triple winners” (central regions, south-east peripheries)



Example of the North-South project: Via Carpatia corridor ex ante evaluation (potential accessibility changes simulation)



CONCLUSIONS

Conclusions (1)

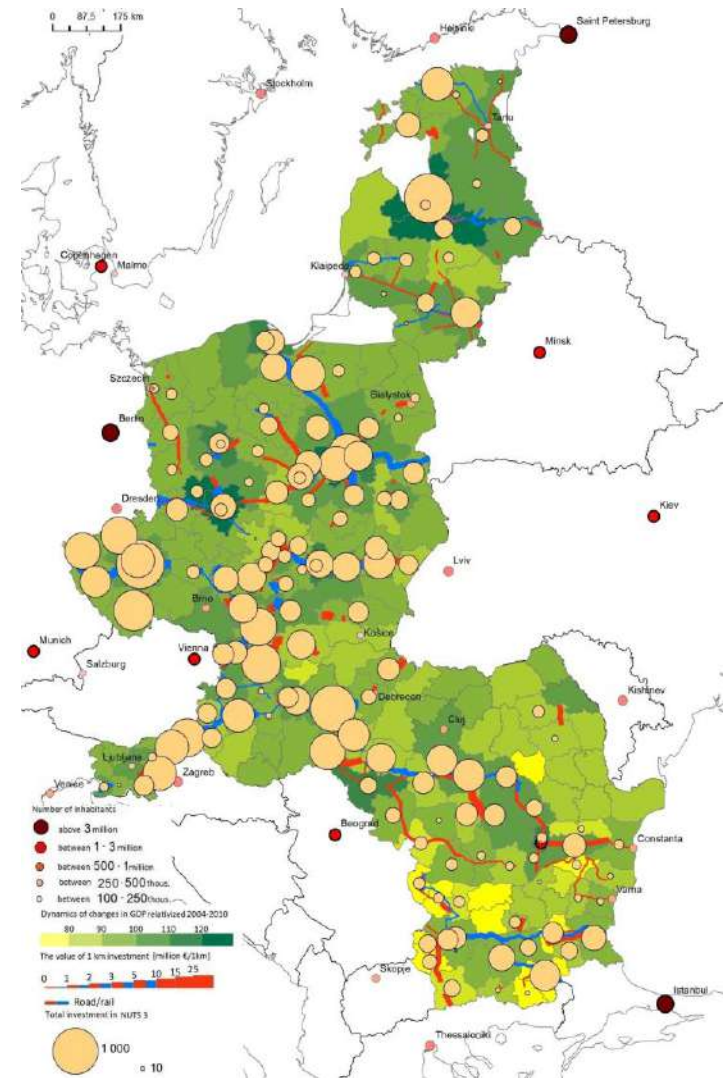
- The transport system of the countries of Central and Eastern Europe was not prepared for the systemic transformation of the year 1989.
- The dynamic economic development which began in the 1990s was slowed down by the state and the inadequacy of their transport infrastructure.
- The role of this factor was, however, moderate, because of unused reserves and resource (including cheap labour force).
- New investment (after 2004) brought differentiation in the levels of accessibility, with a clear distinction between the “winners” and the “losers”. Accessibility became a factor contributing to economic polarisation.
- In the second phase of transformation (after 2004) negative role of inappropriate infrastructure increased relatively with respect to the peripheral areas, where the scale of the new transport investment projects was smaller.
- The investment projects, increased the internal polarisation regarding accessibility both on the scale of the entire CEE macroregion and inside the particular countries (especially the bigger ones, like Poland and Romania).

Conclusions (2)

- The countries with an advanced level of transport network development concentrated on completing their road systems (Czechia, Hungary), or even moved the emphasis over to railway investments (Slovenia). In the countries in which the serious transport infrastructure development delays efforts were made to eliminate bottlenecks in both road and rail transport.
- Investment projects were mostly concentrated in the western part of the CEE area (Slovenia, Czechia, western Poland, and western Slovakia) and, within the particular countries, also more frequently in their western parts. This means, that investment projects appeared to be more a response to the already existing demand (from cargo and passenger traffic) than they were used as a tool of regional and/or spatial policy.
- The investments realised contributed to better integration of the transport systems in CEE countries with the old member states (mainly with Germany and Austria) and, to a lesser degree, to mutual integration between the accession countries. Links across the external boundary of the European Union improved only in a couple of locations.

Transport and economic development

- The spatial pattern of the investments and the analysed economic variables (GDP) might confirm the opinion of Crescenzi and Rodriguez-Pose (2012), that the developmental role of the large-scale linear infrastructure is significant mainly on the earlier stages of development.
- It is possible to formulate the hypothesis on the dynamic-spatial sequence regarding the dependence between investments into infrastructure and the development of regions and metropolises

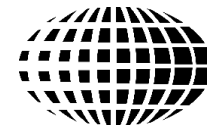


Influence of large linear transport investments on development

Stage of development of transport infrastructure	Investments (motorways, expressways, railways modernised to the speed of 160 km/h)	Influence on socio-economic situation of regions	Influence on socio-economic situation of metropolises
Stage I	Development of the basic infrastructure between the main centres and/or radial connections from these centres	Conditional acceleration of development (necessary, but not sufficient condition)	Significant acceleration of development
Stage II	Closing of the basic network systems	Conditional and limited influence on development	Conditional acceleration of development (necessary, but not sufficient condition)
Stage III. Variant A	Further extension (densification) of the basic network	Lack of influence	Conditional and limited influence on development

Thank you for your attention!

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