

# European integration and domestic regions: A geographical economics approach

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## Domestic regions – an international issue

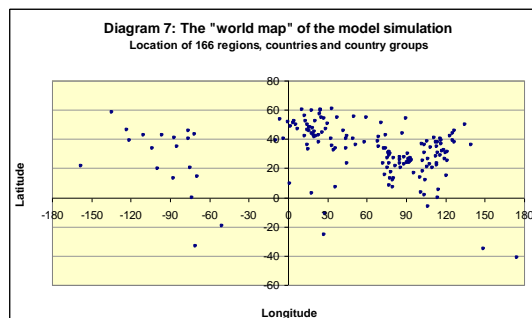
- Traditionally domestic concern
- But we can get new insights from a comparative + international perspective
- Regions are affected by international integration
- China and India – regions at the size of a large European country
  - Should they be compared to Luxembourg?

# Papers on European regions

- Output from ENEPO project, coordinated by CASE/Warzew
  - Regional inequality in Europe, 1995-2005 (NUPI WP748, 2008 + CASE S&A 374)
  - European integration and domestic regions: A numerical simulation analysis (WP749, 2009 + CASE S&A)
  - East-West Integration and the Economic Geography of Europe (WP750, 2009 + CASE S&A)
  - East-West Integration: A Geographical Economics Approach, Chapter 2 in Dabrowski & Maliszewska (eds), EU Eastern Neighbourhood, Springer 2011
  - Author of all: Arne Melchior

# China and India, using real map

- Globalization and the Provinces of China: the role of domestic versus international integration, Journal of Chinese Economic and Business Studies 2010
- Globalisation, Domestic Market Integration, and the Regional Disparities of India, NUPI Paper 780, 2010

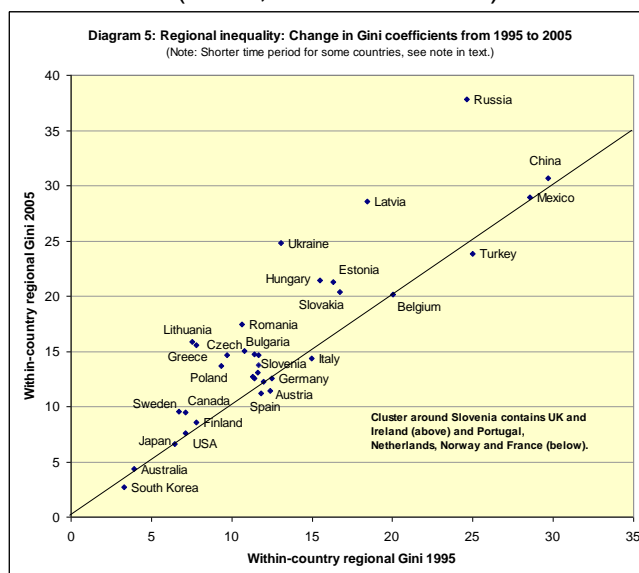


# NUPI regional data collection

Regional economic data for:

- EU-27 and EEA
- Russia, Ukraine, Croatia, Turkey, China, India
- Other OECD: Australia, USA, Canada, Japan, Korea, Mexico
- Sources: Regio/Eurostat, OECD, national sources
- >35 countries, comparative and comprehensive focus

## Regional inequality up in 22 of 35 (Ginis, 1995 and 2005)



# Map of change, Europe

Darker = more increase in regional inequality  
Covering EU-27, Norway, Ukraine, Croatia



## Integration and the regions: Earlier research ambiguous

- Integration = regional convergence
  - Theory: E.g. Krugman and Elizondo 1996, Crozet and Soubeyran 2004 (with asymmetric regions)
  - Empirics: Crozet and Soubeyran (2004, Romania), Redding and Sturm (2005, German unification)
- Or: Integration = regional divergence
  - Theory: Monfort and Nicolini 2000, Monfort and van Ypersele 2003, symmetrical regions
  - Empirics: Kanbur and Venables (2007, survey), Hanson (2003, Mexico), Egger et. al. (2005, CEA)

# One answer or many?

- Earlier research: Searching for a single answer
- Outcome here: Result depends on the type of integration.
  - Concepts: Spatial and non-spatial liberalisation
  - Also in Behrens et al. 2007
- Many regions: The question is not only *if* but also *where* there is agglomeration
- Need for multi-region modelling
  - Fujita and Mori (2005): Top priority in NEG (New Economic Geography)

## Outline

1. Model simulations
2. Empirical analysis

# Modeling approach

- Need for tractability
- Avoid multiple equilibria
  - Multiple equilibria: Potentially several
- Avoid catastrophic agglomeration
  - Example: Bosker et al. 2010: With interregional labour mobility, all European manufacturing is located in Île-de-France
- Therefore: New Trade Theory, not New Economic Geography (NEG) approach

# Models used

1. The "Home Market Effect" model of Krugman (1980), generalised to  $n$  regions
  - Two sectors, "numeraire" sector
  - Not well-behaved for wide parameter ranges
2. The "wage gap model"
  - No net trade effects, only intra-industry trade, only one sector
  - Market access differences show up in nominal and real wage differences
  - Well-behaved, used in the analysis for Europe
3. More complex model used for India and China

## Net trade or wage effects?

- Mostly NTT and NEG rely on *trade effects*
  - Market access affects specialisation and comparative advantage
- Alternative: *Wage* not trade effects
  - Effect first shown by Krugman (1980)
- Trade effects often supported by arbitrary asymmetries between sectors
  - E.g. free trade for numeraire sector
- Wage effects more empirically supported than trade effects (Head and Mayer 2004, survey)

## Comparing the two models

### **HME model**

- One factor, labour
- "Manufacturing" sector
- Numeraire sector
- Wage fixed and equal
- Number of firms endogenous
- Diversification assumed
- Net trade effects, net + intra-industry trade

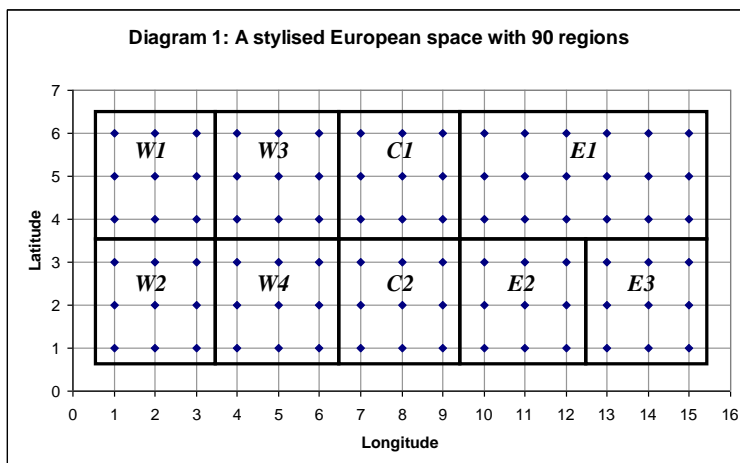
### **Wage gap model**

- One factor, labour
- "Manufacturing" sector
- Only one sector
- Wage endogenous
- Number of firms proportional to size
- Diversification non-issue
- Balanced intra-industry trade

# Research approach

- Not CGE, but numerical theory
- Alt. 1: Numerical model simulation with true geography
  - Example: 166-unit world economy model used in the study of China (own work)
  - Model predictions can be compared directly with data
- Alt. 2: Stylised representations of space
  - Easier to interpret
  - "Principal" hypotheses, not numerical
  - Chosen for Europe, with 1200 regions at NUTS3

## A synthetic landscape (each dot = one region)





## Technicalities, wage gap model

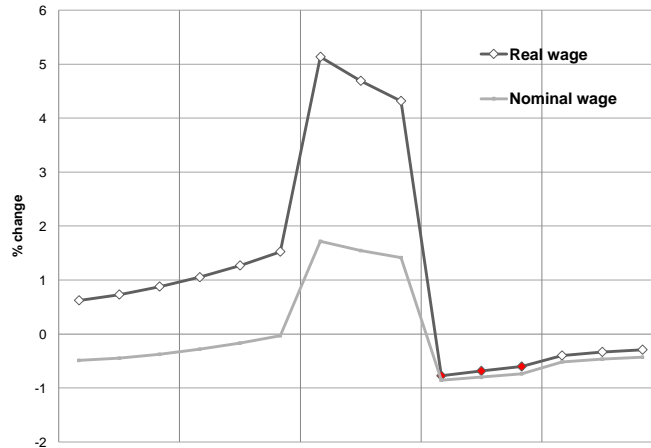
- Simulated with MATLAB
- Analytical solution only in special cases. Not so helpful.
- Standard algorithms do not work
- Genetic algorithm + Excel link
- Collapsed into one set of 90 equations
- Each run: 15-30 minutes, now much faster
- More regions: More time

## Scenarios (selected)

- WIDER: Regional integration between west and central Europe
- WTO: Reduction in multilateral trade barriers
- SPATIAL: Distance-related trade costs are reduced
- CAPITAL: Hub-and-spoke effects
- Simulated by changing trade costs between regions and countries
- Generates real and nominal wage changes

### WIDER integration: Changes from WEST

For regions along the 2nd latitude

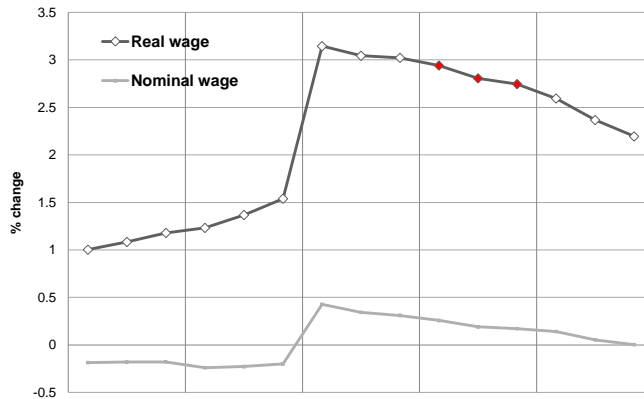


## WIDER, key words

- Standard integration effects:
- New members of trade bloc gain
  - "Wage shifting" not "production shifting"
- Real income gains also in former bloc
- "Agglomeration shadow": Loss for outsiders
- Regional gradients inside each country
  - Central Europe: More positive for the west

### WTO liberalisation: Changes from WEST

For regions along the 2nd latitude

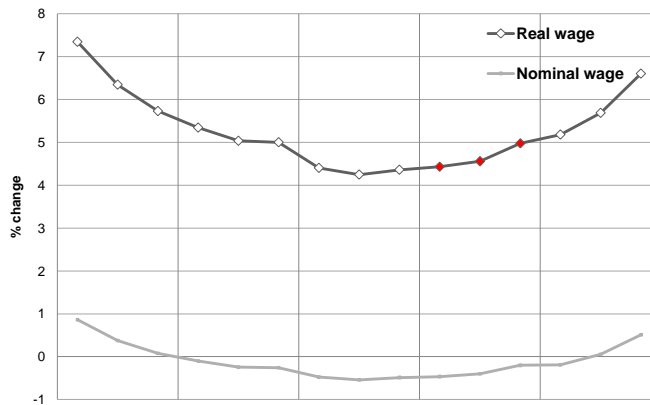


## WTO, key words

- WTO leads to "preference erosion" by reducing the relative advantage of being inside the trade bloc
- Therefore the gain is larger outside the WEST bloc
- and larger for regions close to this bloc

### SPATIAL liberalisation: Changes from WEST

For regions along the 2nd latitude

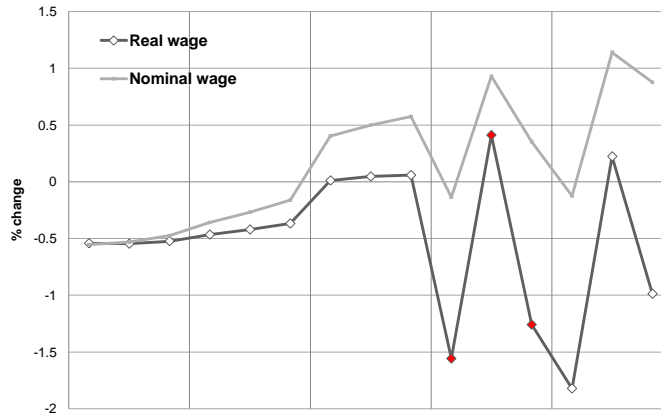


## SPATIAL, key words

- Reduction in distance-related trade costs leads to pan-European decentralisation
- Some nominal income loss in central areas
- Welfare/ real income gain in all regions
- U-shaped pattern
  - Different from the U-pattern examined in NEG

## CAPITAL effects in the east: Changes from WEST

For regions along the 2nd latitude



## CAPITAL effects, key words

- Shows change from WEST situation if some of the trade of E1-E3 has to be routed through capitals
- Stylised modeling of a hub-and-spoke pattern
- Arbitrary that is applies only to the east, could also be relevant for others
- Strong capital region effects in E2 and E3

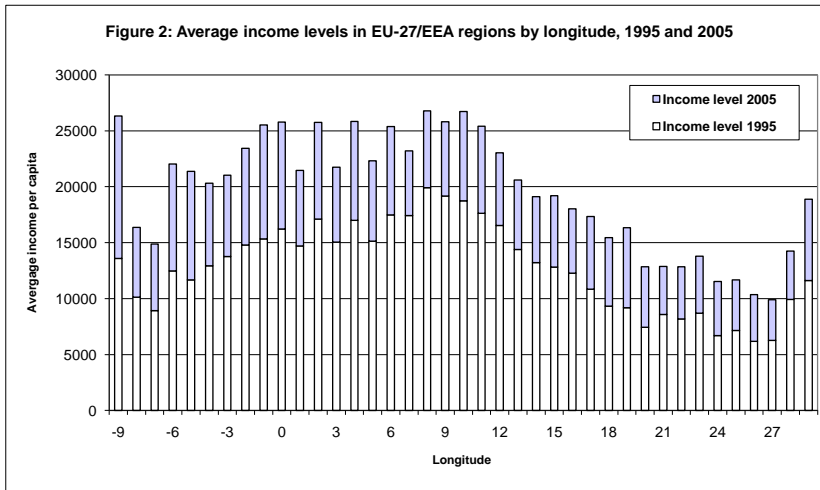
# Implications

- The impact varies strongly between scenarios
  - No general answer about international integration and the regions
- Standard country-level integration effects
  - Production-shifting (Puga, Venables, etc.) or "wage shifting"
  - Better integrated blocs are better off (Martin and Rogers 1995)
  - "Domino" effects (Baldwin etc.), "agglomeration shadow"
- In addition: Distinct region-level effects

## From theory to empirics

- Step 1: Comparison between scenarios and growth patterns
- Step 2: Regression analysis of regional growth
- Time period 1995-2005: Likely that more scenarios are relevant
  - WIDER gradually implemented
  - WTO implemented from 1995
  - SPATIAL: Uncertain but may result from internal market
  - CAPITAL: Empirically important

# Income levels 1995-2005, regional averages by longitude (for EU27/EEA)



## Reality vs. Simulation, levels

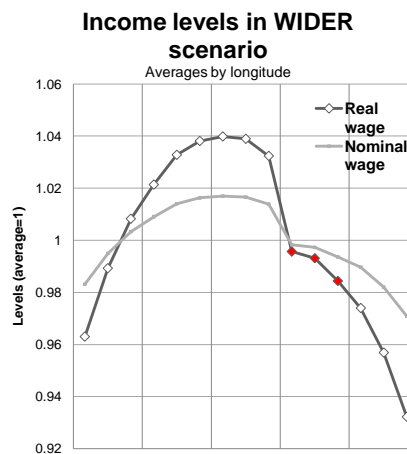
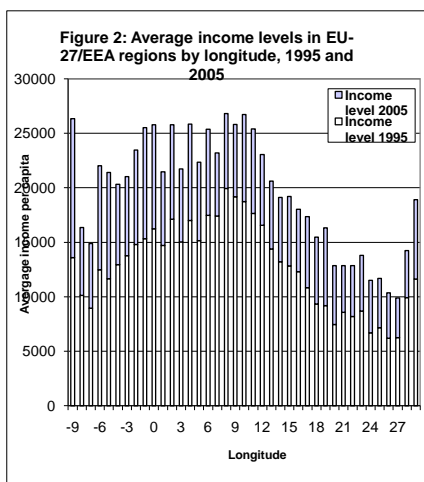
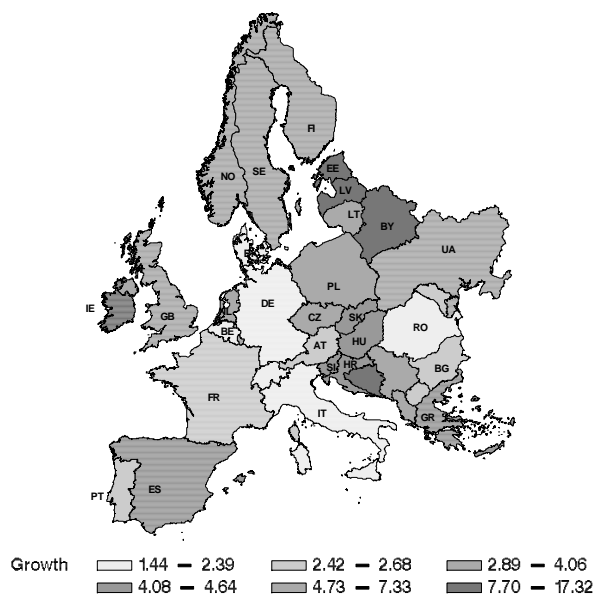


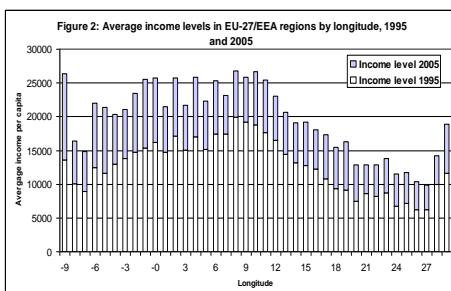
Figure 1: Europe: Growth in GDP (PPP), 1995–2005  
Annual growth rate averages



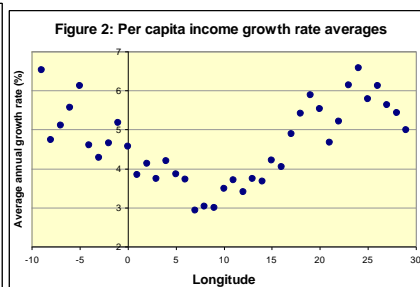
Data source: Eurostat/World Development Indicators.

## Europe: V-shaped pattern

Levels of per capita income by longitude



Growth in per capita income by longitude, 1995-2005





## First impression, step 1

- U-shaped pattern conforms with SPATIAL
  - Monetary integration, implementation of the EU internal market?
  - Has Europe finally "become smaller"?
  - Alternative: Neoclassical convergence
- Eastern growth 2000-2005 conforms with WIDER
- CAPITAL, in conformity with evidence

## Step 2: Country-level regressions

- Descriptive regressions: Does growth within countries have an east-west or north-south gradient?
  - Is the U-shape in SPATIAL also reflected inside countries?
  - Does WIDER lead to more growth in western Poland?
- Controlling for
  - agglomeration around capital region (CAP)
  - agglomeration around economic centre point (CORE)

## Regressions continued

- $g_i = \alpha + \gamma_1 * LON_i + \gamma_2 * LAT_i + \gamma_3 * CAP_i + \gamma_4 * CORE_i + \varepsilon_i$
- $g$ =growth rate (average over period)
- Also run with CAP and CORE in log form or with quadratic term added, and robust regressions to check for outliers
- Results for 24 European countries, including Russia, Ukraine and Turkey
- At NUTS3 level, from 14 to 414 observations
- Right-hand side variables constant or with little change; therefore cross-section approach

## Results, EU15 + Norway

- We do find the expected east-west gradients in many countries
- We also find a CORE effects which is not easy to explain from the model
- But the evidence provides tentative support for the SPATIAL hypothesis
- Has to be followed up with specific research on distance-related trade costs

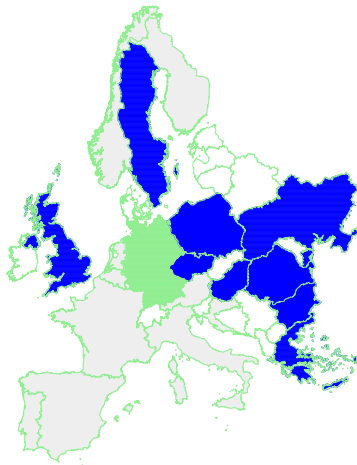
## East-west gradients of growth

Blue=western, green=eastern, grey=not significant, white=not covered



## CAPITAL effects

Blue=CAPITAL effect, green=reversed effect, grey=not significant, white=not covered



## Conclusion

- Some support for a mixed scenario with WIDER + SPATIAL + CAPITAL
- Tentative and not conclusive
- Western Europe: The "invisible hand" at work
- Central Europe: Mixed, still transition