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Interregional migration within the European Union
in the aftermath of the Eastern enlargements:
a spatial approach

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This seminar series is an activity in the framework of FIW ('Forschungsschwerpunkt Internationale Wirtschaft'), which is a project designed to build a center of excellence in research on International Economics, funded by the Austrian Ministry of Science, Research and Economy (BMWFV).

Interregional Migration within the European Union in the Aftermath of the Eastern Enlargements: A Spatial Approach

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Part II: recent developments and
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Part I

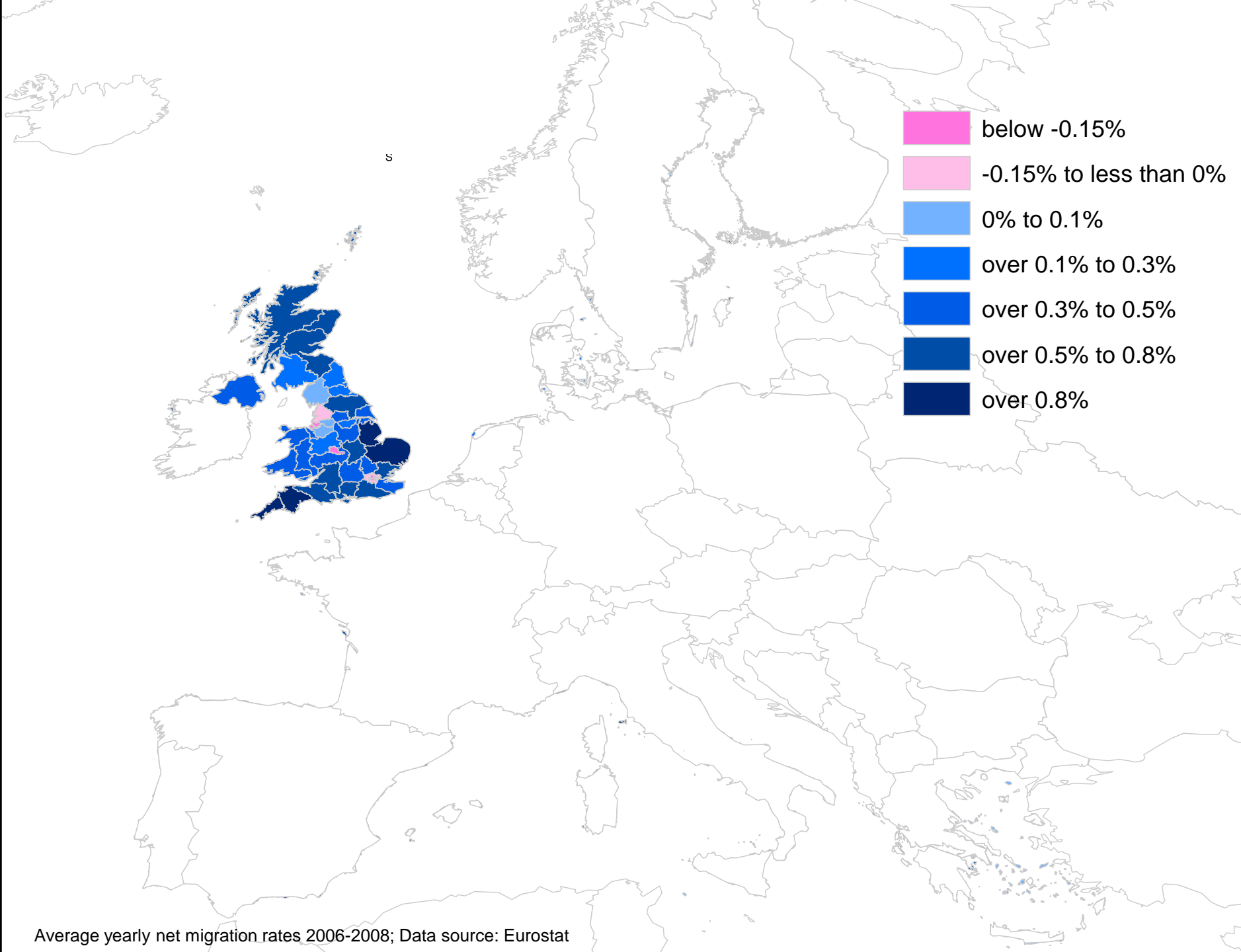
- Paper presentation
 - Motivation and objectives of the study
 - The model framework
 - Spatial econometric specification
 - Results

Motivation

- EU emphasises the benefits of inter-regional migration and the need of mobilising its existing human resources.
- Enlargement of the EU led to statistically increased wage disparities.
- Studies on interregional migration that include EU15 and NMS are scarce.

Objectives

- Develop a model that simultaneously considers source and destination regions.
- Transform the model into a spatial econometric specification that accounts for the role of distance.
- Identify the determinants of interregional migration and the role of distance.



Model assumptions

- Interdependence: If a potential migrant decides to take action because the value of a particular variable within the destination region is expected to increase his or her utility, then it must be that he or she prefers that value relative to the value in other regions.
- Distance: Affects migration patterns, as it increases (i) the direct costs of moving as such, (ii) opportunity costs, (iii) information costs, (iv) psychic costs and, furthermore, (v) migrants often follow past migrants, who may have moved to near destinations.

Respecification of Greenwood's (1978) model

$$I_{i,t} = \gamma_1 X_{1,i,t-1} + \gamma_2 X_{2,i,t-1} + \dots$$

$$\Omega_{i,t} = \beta_1 X_{1,i,t-1} + \beta_2 X_{2,i,t-1} + \dots$$

$$M_{i,t} = I_{i,t} - \Omega_{i,t}$$

<i>O</i>	Out-migration
<i>I</i>	In-migration
<i>M</i>	Net-migration
<i>X</i>	Explanatory variable
β, γ	Coefficients

In-migration and out-migration

$$I_{i,t} = \sum_{j=1}^n w_{ij} \Omega_{j,t}$$

$$\sum_{i=1}^n w_{ij} = 1 \forall j$$

$$\sum_{i=1}^n I_{i,t} = \sum_{i=1}^n O_{i,t}$$

Net-migration

$$\mathbf{M} = \mathbf{I} - \mathbf{\Omega}$$

$$\mathbf{I} = \mathbf{W}\mathbf{\Omega}$$

$$\mathbf{M} = \mathbf{W}\mathbf{\Omega} - \mathbf{\Omega}$$

$\mathbf{\Omega}$	Vector of out-migration values
\mathbf{I}	Vector of in-migration values
\mathbf{M}	Vector of net-migration values
\mathbf{W}	Column standardised weight matrix

Spatial econometric specification

$$M_{i,t} = \beta_1 \sum_{j \neq i}^n w_{ij} X_{1,j,t-1} + \beta_2 \sum_{j \neq i}^n w_{ij} X_{2,j,t-1} + \dots \\ - \beta_1 X_{1,i,t-1} - \beta_2 X_{2,i,t-1} - \dots$$

$$\mathbf{y} = \mathbf{X}\hat{\boldsymbol{\beta}} + \mathbf{W}\mathbf{X}\hat{\boldsymbol{\beta}}' + \boldsymbol{\varepsilon} \quad \rightarrow \text{spatial lag of X model (SLXM)}$$

$$\boldsymbol{\varepsilon} = \rho \mathbf{W}\boldsymbol{\varepsilon} + \boldsymbol{\varphi} \quad \rightarrow \text{spatial Durbin error model (SDEM)}$$

Column-standardised weight matrices

$$\left\{ \begin{array}{l} w_{ij} = \delta_{ij}^{-r} / \sum_{i=1}^n \delta_{ij}^r \text{ if } \delta_{ij} \leq \delta_j^*(k) \wedge w_{ij} \neq w_{ii} \\ w_{ij} = 0 \text{ if } \delta_{ij} > \delta_j^*(k) \vee w_{ij} = w_{ii} \end{array} \right. \rightarrow \text{Method 1}$$

$$\left\{ \begin{array}{l} w_{ji} = \delta_{ij}^{-r} / \sum_{j=1}^n \delta_{ij}^r \text{ if } \delta_{ij} \leq \delta_i^*(k) \wedge w_{ij} \neq w_{ii} \\ w_{ji} = 0 \text{ if } \delta_{ij} > \delta_i^*(k) \vee w_{ij} = w_{ii} \end{array} \right. \rightarrow \text{Method 2}$$

	Non spatial	Method 1, SLXM	Method 1, SDEM	Method 2, SLXM	Method 2, SDEM
Constant	-0.0122 (0.0523)	-0.0124 (0.0607)	-0.0156 (0.0181)	-0.0123 (0.0628)	-0.0158 (0.0167)
Human capital	0.0002 (0.9832)	0.0173 (0.0434)	0.0173 (0.0343)	0.0168 (0.0508)	0.0170 (0.0384)
Unemployment	-0.0284 (0.0001)	-0.0360 (0.0000)	-0.0354 (0.0000)	-0.0366 (0.0000)	-0.0360 (0.0000)
Income	0.0019 (0.0027)	0.0019 (0.0067)	0.0023 (0.0012)	0.0019 (0.0067)	0.0023 (0.0011)
Growth	0.0007 (0.001)	0.0007 (0.0004)	0.0007 (0.0003)	0.0007 (0.0007)	0.0007 (0.0004)
Density	-0.0003 (0.2153)	0.0005 (0.0509)	0.0005 (0.0829)	0.0005 (0.0522)	0.0005 (0.0864)
W_Human capital		-0.1968 (0.0002)	-0.1786 (0.0022)	-0.1945 (0.0002)	-0.1701 (0.0040)
W_Unemployment		0.1457 (0.0083)	0.1565 (0.0089)	0.1412 (0.0102)	0.1592 (0.0085)
W_Income		0.0006 (0.7590)	-0.0011 (0.5896)	0.0006 (0.7489)	-0.0014 (0.5140)
W_Growth		-0.0081 (0.0000)	-0.0067 (0.0002)	-0.0079 (0.0000)	-0.0066 (0.0003)
W_Density		0.0036 (0.2852)	0.0056 (0.1100)	0.0035 (0.3008)	0.0059 (0.0982)
Spatial autocorr.			0.8623 (0.0049)		0.8954 (0.0027)
Residual SE	0.0047	0.0040	0.0039	0.0041	0.0039
F-statistic	10.86 (0.0000)	16.41 (0.0000)		15.91 (0.0000)	
Wald			103.05 (0.0000)		192.38 (0.0000)
LIK	989.39	1029.61	1033.58	1028.07	1032.59
AIC	-1964.79	-2035.22	-2041.15	-2032.14	-2039.17
BP	1.7534 (0.8821)	20.8906 (0.0219)	16.3578 (0.0898)	21.1137 (0.0203)	16.0478 (0.0983)

	r = 0 SLXM	r = 0 SDEM	r = 0.25 SLXM	r = 0.25 SDEM
Constant	-0.0192 (0.0026)	-0.0203 (0.0009)	-0.0155 (0.0159)	-0.0175 (0.0053)
Human capital	0.0098 (0.2275)	0.0106 (0.1770)	0.0132 (0.1108)	0.0138 (0.0819)
Unemployment	-0.0279 (0.0000)	-0.0269 (0.0000)	-0.0311 (0.0000)	-0.0304 (0.0000)
Income	0.0026 (0.0001)	0.0027 (0.0000)	0.0022 (0.0011)	0.0024 (0.0002)
Growth	0.0006 (0.0038)	0.0006 (0.0015)	0.0006 (0.0019)	0.0006 (0.0009)
Density	0.0004 (0.1591)	0.0003 (0.1698)	0.0005 (0.0744)	0.0004 (0.0964)
W_Human capital	-0.2282 (0.0001)	-0.2178 (0.0005)	-0.2092 (0.0002)	-0.1973 (0.0011)
W_Unemployment	0.0680 (0.2339)	0.0796 (0.1712)	0.1200 (0.0429)	0.1316 (0.0327)
W_Income	0.0039 (0.0732)	0.0024 (0.2825)	0.0022 (0.2955)	0.0007 (0.7664)
W_Growth	-0.0055 (0.0004)	-0.0047 (0.0015)	-0.0073 (0.0000)	-0.0062 (0.0003)
W_Density	-0.0013 (0.7151)	0.0007 (0.8515)	0.0011 (0.7714)	0.0031 (0.4123)
Spatial autocorr.		0.74359 (0.0637)		0.7963 (0.0279)
Residual SE	0.0041	0.0040	0.0040	0.0039
F-statistic	15.23 (0.0000)		16.15 (0.0000)	
Wald		21.96 (0.0000)		40.008 (0.0000)
LIK	1025.90	1027.62	1028.82	1031.23
AIC	-2027.80	-2029.24	-2033.63	-2036.47
BP	22.6245 (0.0122)	19.2323 (0.0374)	22.4155 (0.0131)	18.4249 (0.0482)

	Method 1, SLXM	Method 1, SDEM	Method 2, SLXM	Method 2, SDEM
Constant	-0.1069 (0.0000)	-0.1065 (0.0000)	-0.1067 (0.0000)	-0.1059 (0.0000)
Human capital	0.0090 (0.3084)	0.0083 (0.3279)	0.0091 (0.3045)	0.0084 (0.3246)
Unemployment	-0.0321 (0.0007)	-0.0306 (0.0008)	-0.0334 (0.0005)	-0.0317 (0.0006)
Income	0.0105 (0.0000)	0.0106 (0.0000)	0.0105 (0.0000)	0.0106 (0.0000)
Growth	0.0004 (0.0409)	0.0004 (0.0228)	0.0004 (0.0559)	0.0004 (0.0311)
Density	-0.0002 (0.5127)	-0.0002 (0.5961)	-0.0002 (0.5124)	-0.0002 (0.6096)
Employment	-0.0026 (0.7459)	-0.0018 (0.8207)	-0.0039 (0.6326)	-0.0029 (0.7094)
Price level	0.0106 (0.0001)	0.0105 (0.0000)	0.0106 (0.0001)	0.0104 (0.0000)
Young population	0.0278 (0.0340)	0.0209 (0.0977)	0.0281 (0.0326)	0.02100 (0.0976)
Restrictions	-0.0027 (0.0043)	-0.0026 (0.0051)	-0.0029 (0.0025)	-0.0028 (0.0031)
W_Human capital	-0.1299 (0.0151)	-0.1234 (0.0316)	-0.1253 (0.0187)	-0.1177 (0.0401)
W_Unemployment	0.1833 (0.0011)	0.1817 (0.0017)	0.1775 (0.0015)	0.1776 (0.0021)
W_Income	-0.0017 (0.3983)	-0.0026 (0.1997)	-0.0016 (0.4288)	-0.0025 (0.2058)
W_Growth	-0.0071 (0.0001)	-0.0060 (0.0007)	-0.0067 (0.0001)	-0.0056 (0.0014)
W_Density	0.0053 (0.1076)	0.0064 (0.0558)	0.0050 (0.1335)	0.0061 (0.0675)
Spatial autocorr.		0.8097 (0.0219)		0.8237 (0.0159)
Residual SE	0.0039	0.0037	0.0039	0.0037
F-statistic	14.59 (0.0000)		14.32 (0.0000)	
Wald		48.1404 (0.0000)		57.9910 (0.0000)
LIK	1042.46	1045.09	1041.38	1044.29
AIC	-2052.91	-2056.17	-2050.77	-2054.58

Summary

- Net-migration responds positively to household income, GRP growth, population density and human capital, and negatively to unemployment.
- Spatially lagged variables' coefficients confirm the model by displaying contrary signs.
- Spatial effects are most pronounced when the cut-off number of neighbours is set at 125.

Conclusions

- Row-standardisation of spatial weight matrices is by no means a self-evident or obvious choice.
- Considering the importance of interregional migration with respect to demographic, social and economic dynamics, data availability is remarkably scarce.
- The present paper provides a framework to study interregional migration patterns despite limited data availability.

Publication

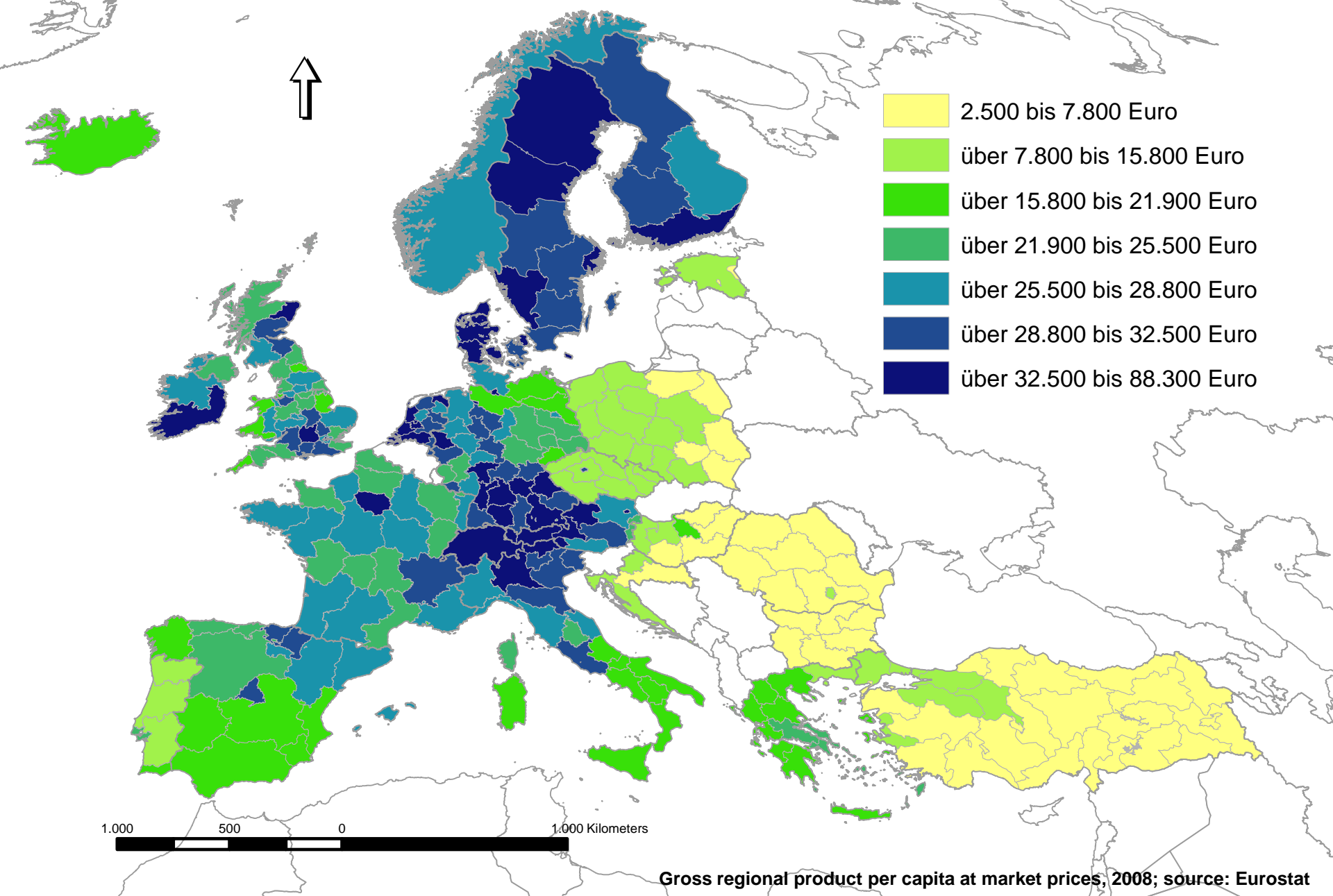
Sardadvar, S. and Rocha-Akis, S. (2016):
Interregional migration within the European
Union in the aftermath of the eastern
enlargements: a spatial approach

Review of Regional Research 36 (1), DOI:
10.1007/s10037-015-0100-1

Part II

- Recent developments and challenges
 - The EU's core-periphery divide
 - Neoclassical theory
 - Myrdal's theories and long run prospects

GRP per capita 2008, NUTS2



Core-periphery relation

Myrdal (1957):

- core and periphery regions jointly constitute a system
- they depend on each other
- the core dominates the periphery economically and politically

Handelsblatt

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Stand: Schluss

„Verlorene Generation“ flieht nach Deutschland

Junge Südeuropäer haben in ihren Heimatländern derzeit kaum Jobchancen. Eine Studie der Internationalen Arbeitsorganisation ILO spricht von einer „verlorenen Generation“. Diese setzt sich ins boomende Deutschland ab.

Heike Anger, Dietrich Creutzburg
Berlin

Gelinge in Europa der Schuldenabbau, dann gebe es keinen Grund für Bedrohungsszenarien, sagte Bundesfinanzminister Wolfgang Schäuble am Wochenende auf dem Katholikentag in Mannheim. „Ich möchte dringend davor warnen, den jungen Leuten einzureden, sie gingen mit schlechteren Ausgangsbedingungen in ihr Leben als frühere Generationen.“

Was für deutsche Jugendliche zutrifft, klingt für ihre Altersgenossen in Südeuropa derzeit wie Hohn. Dort hat die Jugendarbeitslosigkeit



aus Spanien legten um 52 Prozent zu, die aus Portugal um 28 Prozent.

Die ILO-Studie liefert nun argumentative Unterstützung für jene in Europa und den USA, die gegen den als zu einseitig empfundenen Sparkurs von Kanzlerin Angela Merkel Front machen. „Die seit der Wirtschaftskrise eingeschlagene Sparpolitik behindert eine rasche Erholung der Arbeitsmärkte für Jugendliche“, heißt es darin. Die Uno-Organisation empfiehlt den Europäern eine aktive Arbeitsmarktpolitik, wie sie derzeit vor allem Frankreichs Präsident François Hollande präferiert – etwa Lohnzuschüsse oder Steuervorteil-

TOP-NEWS DES TAGES

Spanien entdeckt neues Haushaltsloch

Spaniens Budgetdefizit ist höher als bislang angegeben. Madrid entdeckte ein paar unbezahlte Rechnungen. **SEITE 14**

Renaissance der britischen Autowerke

BMW (Mini), Honda, Tata und Toyota: Autokonzerne investieren wieder in ihre britischen Fabriken. **SEITE 20**



Kohle-Stiftung braucht mehr Kapital

Die Kohle-Stiftung braucht wegen der anhaltend niedrigen Zinsen mehr Kapital als bislang geplant. **SEITE 23**

Facebook-Aktie ohne Fantasie



Ernüchterung für den Facebook-Gründer Mark

Different views

“The new quality of immigration is a godsend. It helps our country, making it younger, more creative and more international. This process benefits everyone: The young immigrants, who can start off in their jobs, and the economy as a whole, as qualified employees are able to fill job vacancies.”

**Ursula von der Leyen, German minister of labour and social affairs
(Der Spiegel 9/2013)**

“Italy is envied by the world for its entrepreneurs and engineers. Our researchers are spread around the world. I want them to come back, so they can give our country some hope.”

**Beppe Grillo, founder of the Italian movement *Five Stars*
(Handelsblatt, 13 March, 2013)**

Core-periphery relations

Myrdal (1957):

- Investment flows to advanced regions.
- Well educated workers migrate from the periphery to the core.

Krugman (1991): Economic integration increases or triggers regional disparities.

→ The location of firms (physical capital) and workers (labour) becomes endogenous.

Neoclassical growth theory

Assumptions of standard neoclassical models:

- Closed economies
- Homogeneous labour
- No mobility costs

→ Convergence hypothesis

- Convergence between regions is likely due to similarity (Barro and Sala-i-Martin 1995, López-Bazo 2003).
- Labour migration accelerates convergence between regions (Barro and Sala-i-Martin 2004).

Human capital

Plays a paramount importance in accounting for regional differences in development (Gennaioli et al., 2013).

Can result in a major spatial reallocation of factors (Faggian and McCann, 2009).

A city's or a region's stock of human capital is often the main determinant of its economic and social future (Prager and Thisse, 2012).

Macroeconomic production function

$$Q = K^a H^b L^c \quad a > 0, b > 0, c > 0, a + b + c = 1$$

Any increase in production factors increases total output.

Labour immigration increases total labour supply, increases total human capital stock, has no effect on total physical capital stock.

→ Labour immigration increases total output, and vice versa for emigration.

Q	total output (GDP)
K	total physical capital stock (machinery, equipment, etc.)
H	total human capital stock (amassed education and skills)
L	total labour supply (number of working people)
a, b, c	output elasticities

Production per worker

labour immigration does **not** alter **total physical capital stock**

labour immigration necessarily **increases total human capital stock**

labour immigration necessarily **decreases the physical capital stock per worker**

$$k = K/L, h = H/L \Rightarrow \frac{Q}{L} = \frac{K^a H^b L^c}{L^a L^b L^c} \Rightarrow q = k^a h^b$$

q output per worker (GDP per capita)
 k physical capital stock per worker
 h human capital stock per worker (e.g. measured as average schooling years)

labour immigration necessarily **increases total labour supply**

labour immigration's effect on GDP per capita depends on the **skills of the immigrants**

labour immigration's effect on the human capital stock depends on the **skills of the immigrants relative to the current residents**

Marginalism

$$\frac{\partial Q}{\partial K} = aK^{a-1}H^bL^c > 0$$

$$\frac{\partial Q / \partial K}{\partial H} = abK^{a-1}H^{b-1}L^c > 0$$

$$\frac{(\partial Q / \partial K) / \partial H}{\partial b} = aK^{a-1}H^{b-1}L^c (1 + b \ln(H)) > 0, H \geq 1$$

- Q total output
 K total physical capital stock
 H total human capital stock
 L total labour supply
 a, b, c output elasticities

Human capital accumulation

The compensation for human capital is received by workers in addition to their compensation for raw labour:

$$v_{i,t} = \frac{\partial Q_{i,t}}{\partial L_{i,t}} + \frac{\partial Q_{i,t}}{\partial H_{i,t}} = q_{i,t} \left(c + \frac{b}{h_{i,t}} \right)$$

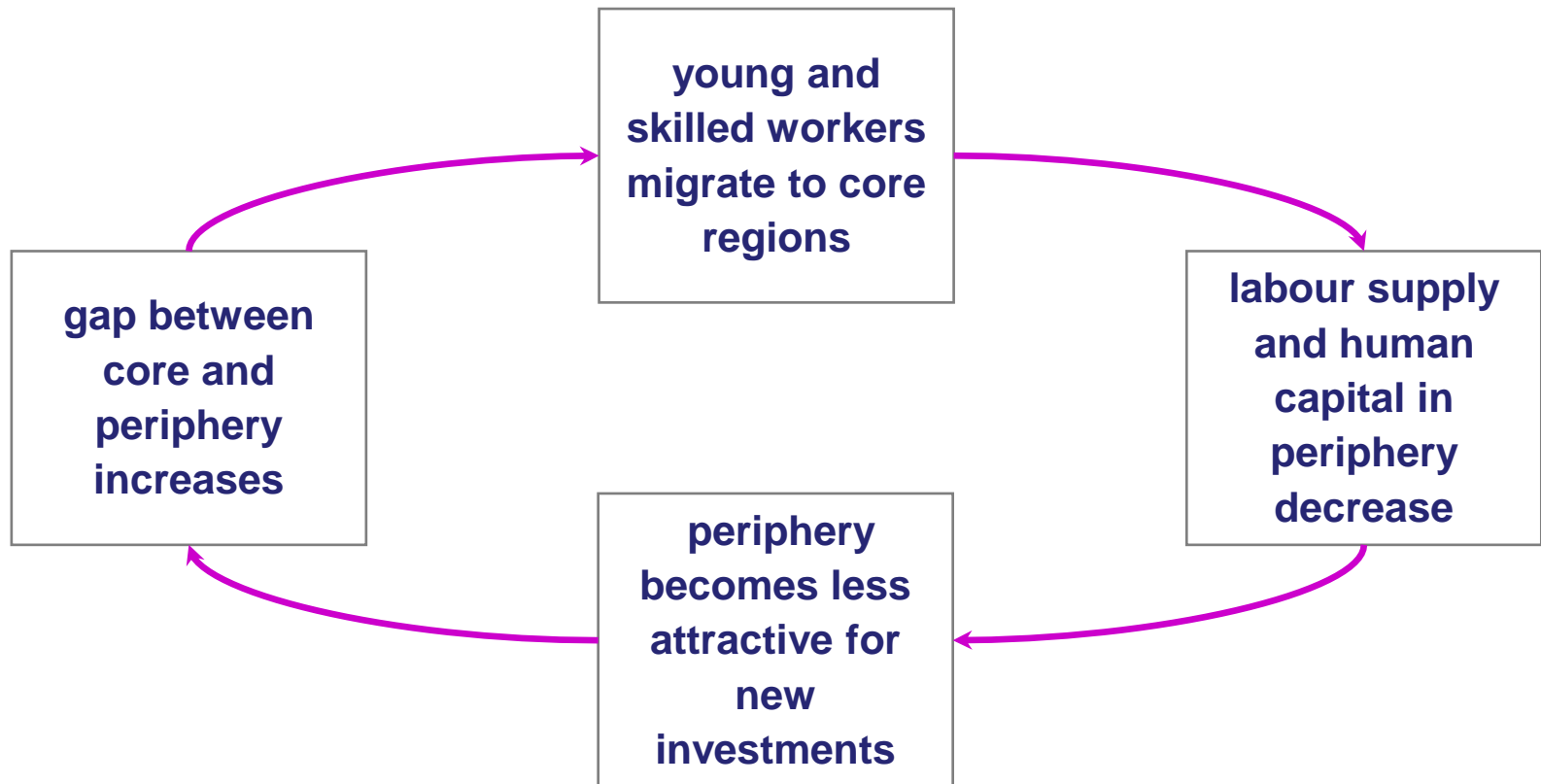
Human capital suppliers follow wages, not marginal productivity:

$$\frac{dh_{i,t}}{dt} = s_{H,i} q_{i,t} + \lambda (v_{i,t} - v_{j,t}) - \delta h_{i,t}$$

v	human capital wage
L	total labour stock
h	human capital stock per worker
s_H	human capital investment rate (educational spending rate)

Circular causation

based on Myrdal (1957)



Summary of results

- Human capital determines a region's attractiveness for mobile factors, which includes human capital.
- Skilled workers find better opportunities in core regions → under free market forces, people follow their own interests → regions with initially high factor endowments benefit from economic integration.
- Migration of skilled workers tends to increase existing spatial inequalities.

Publications

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