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groningen



# Do jobs-follow-people or people-follow-jobs?

*Presentatie voor de RSA Nederland bijeenkomst 'Mobiliteit en infrastructuur in polycentrische stedelijke gebieden', Antwerpen, 24 april 2014.*

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# Overview

- › Motivation
- › Theoretical debate
- › Dutch context
- › Results Meta-analysis 64 empirical studies of the Carlino-Mills model for jobs-follow-people versus people-follow-jobs
- › Conclusion and discussion



## Classis question about regional growth still in debate

Literature: do “jobs-follow-people or people-follow-jobs” (Borts and Stein 1964; Steinnes and Fisher 1974) or related “chicken-or-egg” (Muth 1971). Later *The Determinants of County Growth* by Carlino and Mills (1987) with lagged adjustment framework. The question relates to questions like:

- › Do people move for amenities and quality-of-life factors or economic factors (e.g. Lowry, 1966; Partridge 2010).
- › Is the residential location decision made before or after the job location decision (e.g., Deding et al. 2009).
- › Are employment locations really exogenous to residential locations? Or vice-versa (as assumed in the monocentric city model).



## Duelling theoretical models

- › New Economic Geography (Krugman, 1991): falling transport cost lead to concentration
  - › Amenity migration (Graves, mid1970s): people are moving to nice places, warm climates
  - › Agglomeration effects, attractiveness of (big) cities (Gleaser et al, 2001 etc., Florida, 2003)
  - › Storper & Scott (2009): people only move to nice places with suitable employment
- Partridge (2010): for the US, Graves is the winner!



## Policy relevance

- › The question what determines growth plays a central role in policy discussions as to whether catering to the wishes of firms and improving the business climate of a place is a better strategy than catering to wishes of people and improving the people climate of a place when aiming to stimulate local or regional growth.
- › Core – periphery debate in The Netherlands: is the Randstad area with Amsterdam/Rotterdam the engine of national growth or an area at risk with (too) high cost?
- › Changing policy focus from only economic goals like GDP, income and (un-)employment to broader goals like well-being and quality of life



## Modelling do ‘jobs follow people’ or ‘people follow jobs’?

- › Late 1960s variety of techniques were put forward, but in a small and fragmented group of studies.
- › Late 1980s, the number of research studies has rapidly grown and there has been relatively little disagreement about the choice of methodology due to the publication of *The Determinants of County Growth* by **Carlino and Mills** (1987), which marked a radical departure from previous causality studies in two respects.
- › To illustrate the importance of the publication: it was the most cited regional science article of 1987.  
Isserman (2004)



# effects of migration on economic development\*

- migration of (unskilled) labour
- migration of high skilled specialists ("brain drain")

## short to medium term effects (comparative-static changes)

*changes in the level of accumulable input factors  
(physical capital, human skills)  
relative to labour*

(K/dL)

### short run labour market effects

### remittances effects

### public transfer effects

### trade effects

*impact on  
wages*

*impact on  
(un)employment*

quantity and  
substitution  
effects

allocation  
effects

distribution  
effects

allocation  
effects

distribution  
effects

## medium to long term effects (dynamic processes)

*changes in the accumulation of input factors  
(physical capital, human skills)*

- migration induced changes in capital investment
- migration induced changes in human skill formation
- migration induced changes in technology

*impact on  
relative prices  
(terms of trade)*

### economic growth effects

### structural change effects

*impact on  
(change of)  
production  
structure*

*impact on  
long term  
"steady state"  
level of per capita  
wealth  
(GDP/POP{d[K/L]})*

*impact on  
development  
process  
(convergence  
or divergence)  
(d[GDP/POP])*

\*in the host and sending country. Note that effects of emigration on the economy of the sending country as a rule mirror effects of immigration on the economy of the host country



## Innovative features of the Carlino-Mills models:

- › First, US nationwide analysis of population–employment interactions at a very detailed spatial scale (county level).
- › Second, and even more importantly, it was the first study to investigate these interactions by using a **simultaneous equations model** similar to the one introduced by Steinnes and Fisher (1974), but with a **lagged adjustment framework built in**.
- › **Criticism:** the identification of the simultaneous equations system is often problematic because of the lack of good instruments and that the results may therefore not be reliable (see, e.g., Rickman 2010).



## Carlino-Mills model structures

$$\bar{E}_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 (I + \bar{W}_1) \bar{P}_t + \alpha_3 \bar{W}_2 \bar{E}_t + \alpha_4 S_{t-1} + u_t \quad (1)$$

$$\bar{P}_t = \beta_0 + \beta_1 P_{t-1} + \beta_2 (I + \bar{W}_1) \bar{E}_t + \beta_3 \bar{W}_2 \bar{P}_t + \beta_4 T_{t-1} + v_t \quad (2)$$

$$\bar{E}_t = E_t - \delta_1 E_{t-1} \quad \text{changes: } \delta_1 \text{ and } \delta_2 = 1 \quad (3)$$

$$\bar{P}_t = P_t - \delta_2 P_{t-1} \quad \text{end-of-period levels: } \delta_1 \text{ and } \delta_2 = 0 \quad (4)$$

$$\bar{W}_1 = \delta_3 W \quad \text{spatial cross-regressive system } \delta_3 = 1 \quad (5)$$

$$\bar{W}_2 = \delta_4 W \quad \text{spatial autoregressive system } \delta_4 = 1 \quad (6)$$



# Taxonomy of Carlino-Mills model specifications

levels vs changes with/without cross/spatial autoregressive lags

	$\bar{E}_t/\bar{P}_t$ (LHS)	$\bar{E}_t/\bar{P}_t$ (RHS)	$\bar{W}_1$	$\bar{W}_2$	Introduced by:
	$\delta_1/\delta_2^*$	$\delta_1/\delta_2^*$	$\delta_3^{**}$	$\delta_4^{***}$	
a	0	0	0	0	Carlino & Mills (1987)
b	1	0	0	0	Mills & Carlino (1989)
c	1	1	1	0	Boarnet (1992)
d	0	0	1	0	Luce (1994)
e	0	0	0	1	Vias (1998)
f	1	1	1	1	Henry et al. (2001)
g	1	0	0	1	Carruthers & Mulligan (2008)
h	1	1	1	1	Kim (2008)

Note: LHS (RHS) refers to variables on the left-hand-side (right-hand side) of the equations.

\* 0 = population/employment *levels* and 1 = population/employment *changes*. \*\* 0 = *without* spatial cross-regressive lags and 1 = *with* spatial cross-regressive lags. \*\*\* 0 = *without* spatial autoregressive lags and 1 = *with* spatial autoregressive lags. See also Equations (1)–(6).

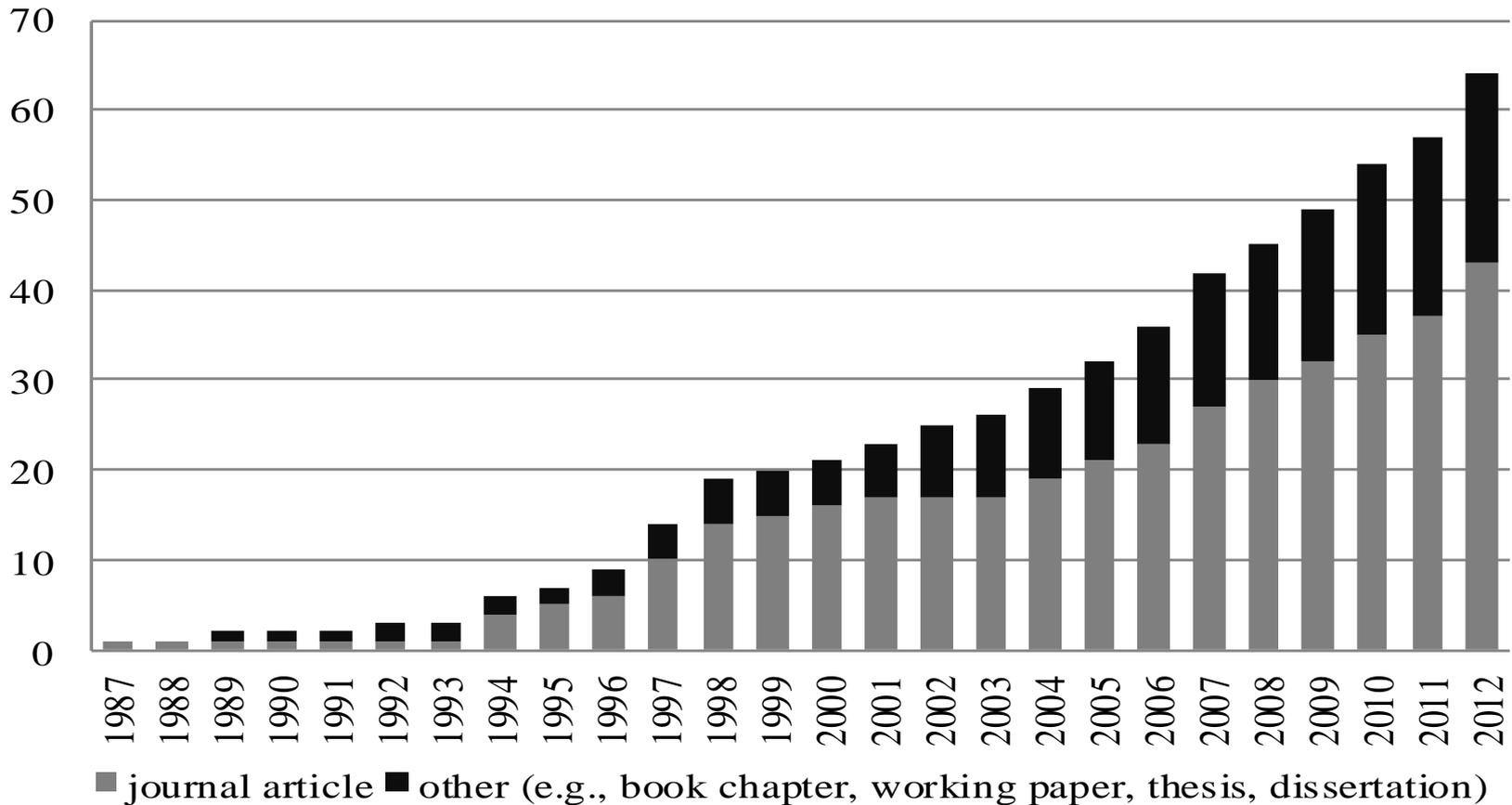


## Meta-analysis

- › *“The application of statistical techniques to collections of empirical findings from previous studies for the purpose of integrating, synthesising, and making sense of them” (Wolf, 1986)*
- › We will use a multinominal logit model and base the interpretation on the marginal effects obtained from this model



# Meta-analysis based on 64 studies with 321 results





## 43 Journal articles

- 7 x Journal of Regional Science
- 5 x Annals of Regional Science
- 4 x Journal of Urban Economics
- 3 x Agricultural and Resource
- 3 x Papers in Regional Science
- 2 x Geographical Analysis
- 2 x Growth and Change
- 2 x Reg. Science and Urban Economics
- 2 x Review of Regional Studies
- 1 x Economic Analysis and Policy
- 1 x Food Economics
- 1 x International Regional Science Review
- 1 x Journal of Develop. Entrepreneurship
- 1 x Journal of Economic Research
- 1 x Journal of Leisure Research
- 1 x Journal of Transport Geography
- 1 x Land Use Policy
- 1 x Public Finance Quarterly
- 1 x Région et Développement
- 1 x Review of Agric. and Environ. Studies
- 1 x Transportation Research A
- 1 x Urban Geography



# Carlino-Mills model with simultaneous equations: possible outcomes

$$\tilde{P}_t = a_0 + a_1 P_{t-1} + a_2 (I + \tilde{W}) \tilde{E}_t + \dots + u_t$$

$$\tilde{E}_t = b_0 + b_1 E_{t-1} + b_2 (I + \tilde{W}) \tilde{P}_t + \dots + v_t$$

**$a_2 > 0$  (people follow jobs)**

**$b_2 > 0$  (jobs follow people)**

	<b><math>b_2 \leq 0</math></b>	<b><math>b_2 &gt; 0</math></b>
<b><math>a_2 \leq 0</math></b>	No interaction	<b>jobs follow people only</b>
<b><math>a_2 &gt; 0</math></b>	<b>people follow jobs only</b>	<b>dual causality</b>

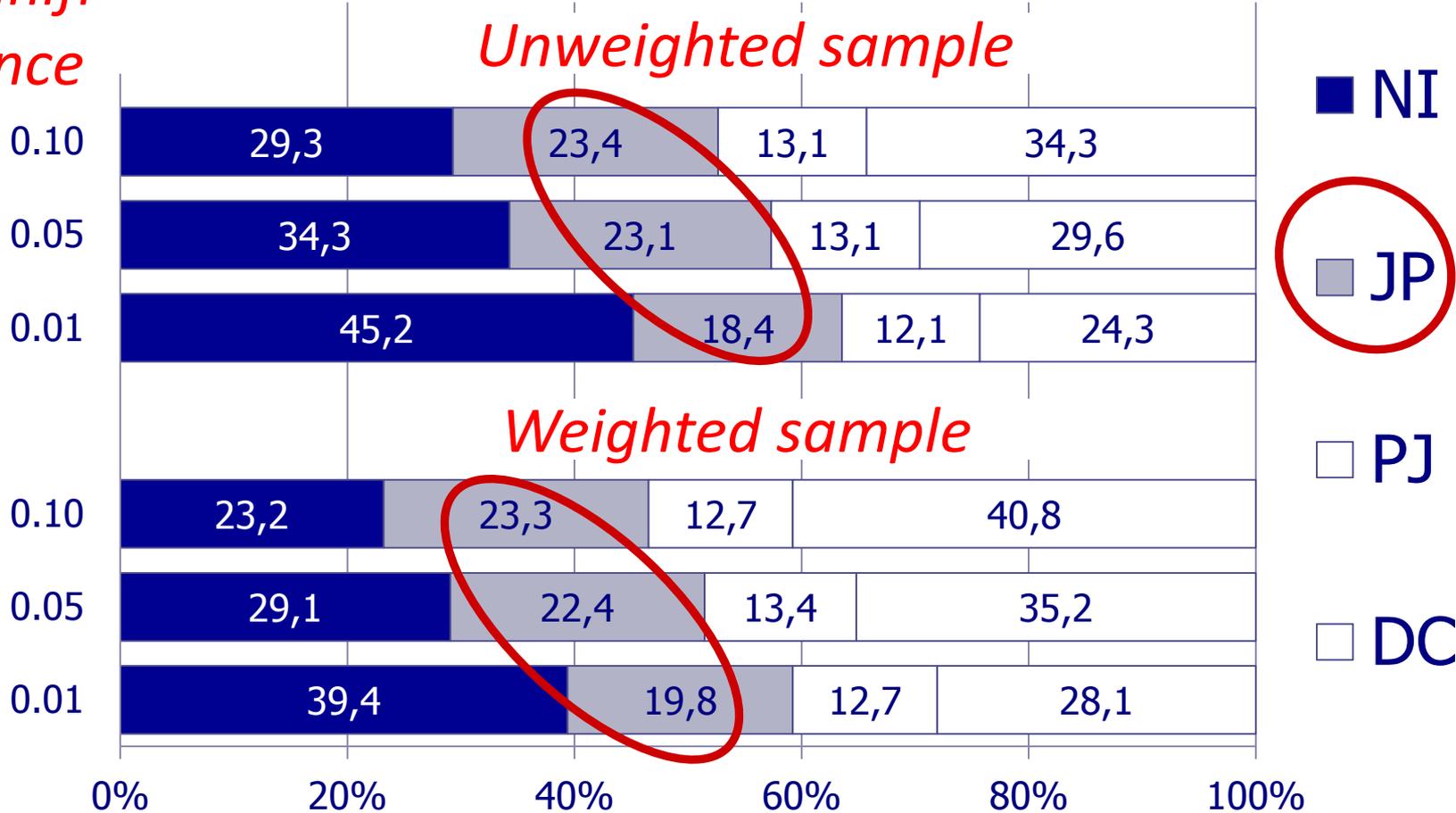


# Classification of the results

*Signifi-  
cance*

*Unweighted sample*

*Weighted sample*



Results are weighted based on the dataset used



## Meta analysis with control variables

- › Model specification: changes/levels, spatial weights
- › Area scaling: densities VS shares
- › Linear VS Non-linear (mostly logarithm) specification
- › Two or more equations in the simultaneous system
- › Weightmatrix: flows vs distance/no
- › Geographical area: (parts of) US, Europe
- › Area size: small – medium – large
- › Period: 1970s + 1980s VS 1990s + 2000s
- › With Land use, Income, Economic variables included
- › Total population/employment vs subgroups
- › Journal vs non-journal articles
- › **Note: only studies with results at 5% significance are used for the multivariate meta analysis**



## Distribution of study results across selected study factors (in %)

	NI	JP	PJ	DC	n
<i>Substantive study factors</i>					
US West	<b>56.7</b>	24.0	9.6	9.6	104
US East	24.4	22.2	20.0	33.3	90
Non-US	35.9	28.2	11.5	24.4	78
Entire US*	2.0	14.3	10.2	73.5	49
<i>Small sized area obs.</i>					
Small sized area obs.	<b>80.6</b>	8.1	9.7	1.6	62
Medium sized area obs.*	29.1	23.6	14.3	33.0	182
Large sized area obs.	9.1	33.8	13.0	<b>44.2</b>	77
<i>1970s + 1980s data</i>					
1970s + 1980s data	<b>41.4</b>	21.7	12.7	24.2	157
<i>1990s + 2000s data*</i>					
1990s + 2000s data*	27.4	24.4	13.4	34.8	164
<i>Subgroups</i>					
Subgroups	<b>50.0</b>	24.1	12.1	13.8	58
Total pop/emp data*	30.8	22.8	13.3	33.1	263

\* Reference group in logit regression

**% >40%**



## Distribution of study results across selected study factors (in %)

<i>Methodological study factors</i>	NI	JP	PJ	DC	n
<b>LHS &amp; RHS levels</b>	22.2	<b>61.1</b>	7.4	9.3	54
<b>RHS changes &amp; LHS levels</b>	10.2	18.4	10.2	<b>61.2</b>	49
<b>LHS &amp; RHS changes*</b>	<b>42.7</b>	14.7	15.1	27.5	218
<b>Densities</b>	17.9	21.7	17.0	<b>43.4</b>	106
<b>Shares*</b>	<b>42.3</b>	23.7	11.2	22.8	215
<b>Non-linear functional form</b>	19.8	16.0	7.4	<b>56.8</b>	81
<b>Linear functional form*</b>	39.2	25.4	15.0	20.4	240
<b>Flow matrix</b>	24.5	15.1	18.9	<b>41.5</b>	53
<b>Other*</b>	36.2	24.6	11.9	27.2	268
<b>With SAR</b>	26.9	13.5	5.8	<b>53.8</b>	52
<b>Without SAR*</b>	35.7	24.9	14.5	24.9	269
<b>2+ Equations</b>	31.8	7.6	12.1	<b>48.5</b>	66
<b>2 Equations*</b>	34.9	27.1	13.3	24.7	255



## Distribution of study results across selected study factors (in %)

	NI	JP	PJ	DC	n
<b>Land use variables included</b>	<b>44.4</b>	23.7	11.1	20.7	135
<b>Land use variables excluded*</b>	26.9	22.6	14.5	36.0	186
<b>Income variables included</b>	21.5	25.6	14.4	38.5	195
<b>Income variables excluded*</b>	<b>54.0</b>	19.0	11.1	15.9	126
<b>Economic variables included</b>	35.6	26.4	12.0	25.9	216
<b>Economic variables excluded*</b>	31.4	16.2	15.2	37.1	105
<i>External study factors</i>					
<b>Non-journal article</b>	<b>47.1</b>	21.2	10.6	21.2	104
<b>Journal article*</b>	28.1	24.0	14.3	33.6	217



# Estimation results multinomial logit model (marginal effects at the means)

	NI	JP	PJ	DC
<i>Substantive study factors</i>				
<b>US West</b>	.586 (.103)	.149 (.099)	.100 (.049)	-.835 (.097)
<b>US East</b>	.329 (.094)	.137 (.137)	.369 (.139)	-.835 (.109)
<b>Non-US</b>	.226 (.091)	.476 (.189)	.098 (.116)	-.800 (.134)
<i>Entire US*</i>				
<b>Small sized area obs.</b>	.614 (.137)	-.150 (.143)	.025 (.070)	-.489 (.124)
<b>Large sized area obs.</b>	-.164 (.109)	-.050 (.281)	.692 (.260)	-.478 (.135)
<i>Medium sized*</i>				
<b>1970s + 1980s data</b>	.092 (.076)	-.111 (.112)	.026 (.107)	-.007 (.085)
<i>1990s + 2000 data*</i>				
<b>Subgroups</b>	.729 (.085)	-.329 (.098)	-.102 (.064)	-.298 (.079)

In parentheses the standard errors.

Significant at the 5% level



<i>Methodological study factors</i>	<b>NI</b>	<b>JP</b>	<b>PJ</b>	<b>DC</b>
<b>LHS &amp; RHS levels</b>	-0.256 (.100)	0.700 (.144)	-0.309 (.081)	-0.134 (.115)
<b>RHS changes &amp; LHS levels</b>	0.127 (.396)	0.238 (.295)	-0.296 (.086)	-0.069 (.183)
<i>LHS &amp; RHS changes*</i>				
<b>Densities</b>	-0.256 (.095)	-0.161 (.117)	0.104 (.135)	0.313 (.158)
<i>Shares*</i>				
<b>Non-linear function form</b>	-0.217 (.091)	-0.260 (.106)	-0.100 (.086)	0.576 (.155)
<i>Linear</i>				
<b>Flow matrix</b>	-0.381 (.052)	-0.083 (.142)	-0.066 (.108)	0.530 (.210)
<i>Other, like distances*</i>				
<b>With SAR</b>	0.086 (.131)	0.033 (.164)	-0.080 (.090)	-0.038 (.087)
<b>2+ Equations</b>	-0.249 (.121)	-0.119 (.183)	0.120 (.122)	0.248 (.238)
<b>Land use variables incl.</b>	0.119 (.086)	0.000 (.090)	-0.144 (.078)	0.025 (.073)
<b>Income variables incl.</b>	0.384 (.112)	-0.252 (.172)	-0.090 (.126)	-0.043 (.143)
<b>Economic variables incl.</b>	-0.254 (.091)	0.212 (.108)	0.042 (.099)	0.000 (.126)
<i>External study factors</i>				
<b>Non-journal article</b>	0.083 (.095)	-0.193 (.119)	-0.088 (.077)	0.198 (.120)

In parentheses the standard errors.

Significant at the 5% level



## Conclusions and discussion

- › Empirical evidence from 64 studies on jfp-pfj still mixed and inconclusive
- › One third each for no-interaction, jfp+pfj, dual causality
- › Jobs-follow-people > people-follow-jobs (about 2x more)
- › Data matter: results vary by geographic location of the regions, spatial resolution and population and employment characteristics, but not by time period
- › Methodology: results vary by levels vs changes, functional form, specification weightmatrix, standardization by density or shares, number of equations, inclusion of other variables; but not by SAR
- › No difference by publication type



## Suggestions for future research on jfp-pfj

- › Use models that permit causality running in different directions and test robustness with alternative models
- › Non-linear models with more than two equations and standardized in densities lead to better results than simple CM models, but are more difficult to implement
- › Include variables for land use, spatial policies, income and economic conditions. Natural and cultural amenities, location and demographics are less important
- › W-matrix with flows is preferred, but less exogenous
- › Meta-analysis on size of the parameters instead of sign
- › **Or: Microlevel analysis of underlying processes based on firm-employer micro-data**

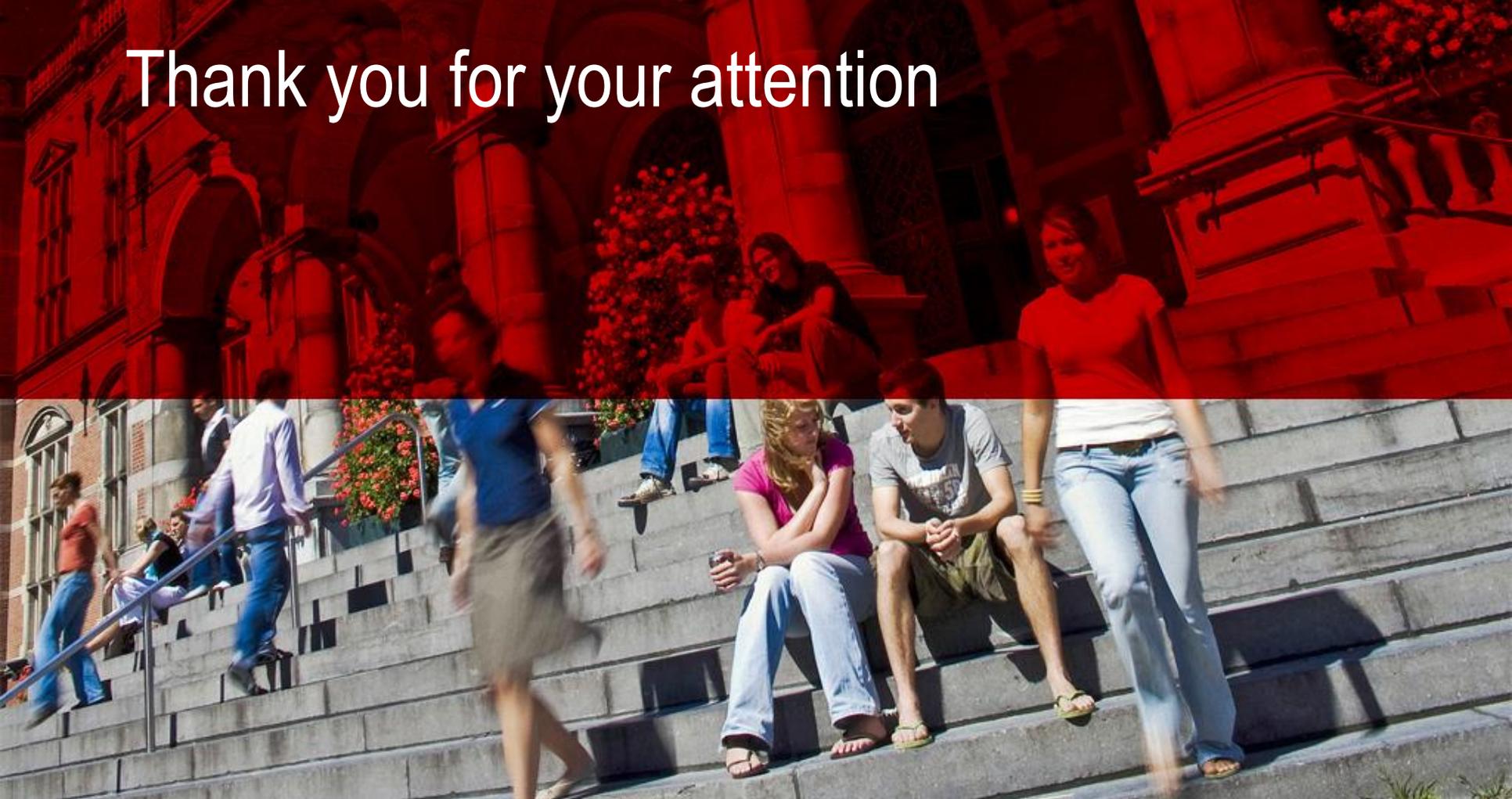


## Policy relevance

- › The question: improve the business climate for firms or the living conditions for the people?
  - depends on the characteristics of the region
  - place based policies needed.
- › Most likely improving both is needed
- › Dutch context: is investing in the Randstad more profitable than outside the Randstad?
- › From economic or well-being perspective?



Thank you for your attention

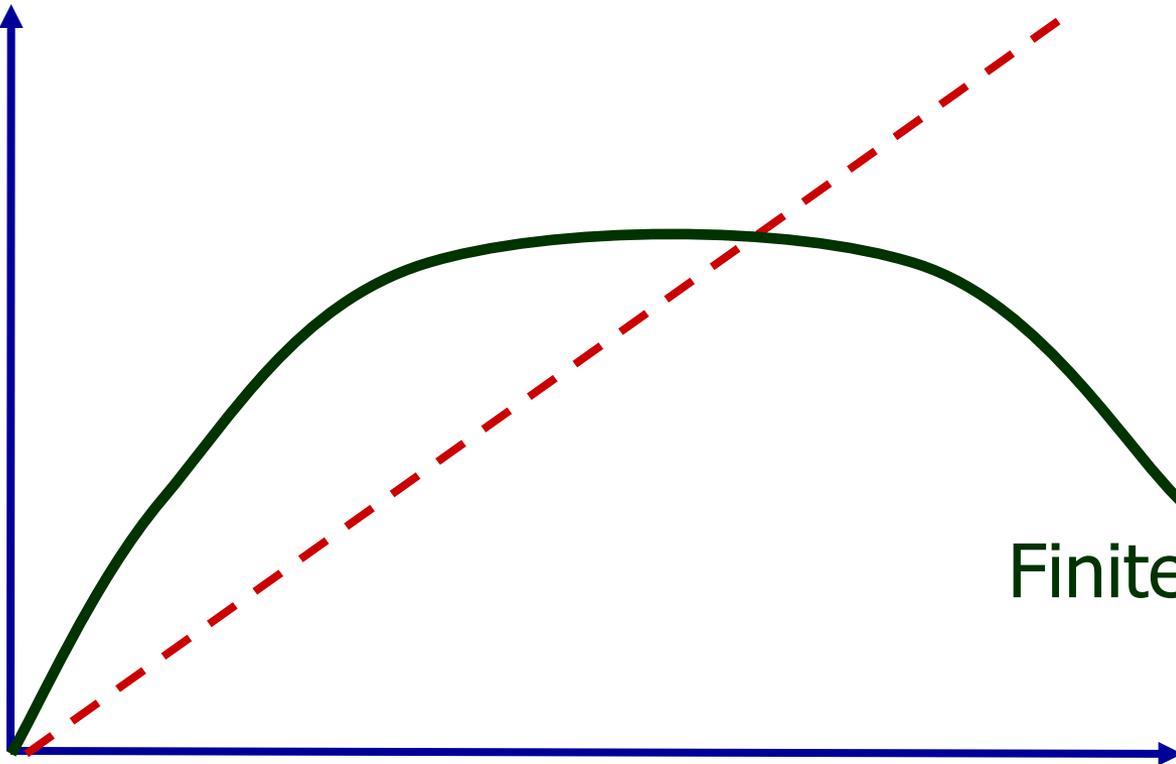




# Agglomeration and growth

*Growth*

Linear unfinite growth?



Finite growth?

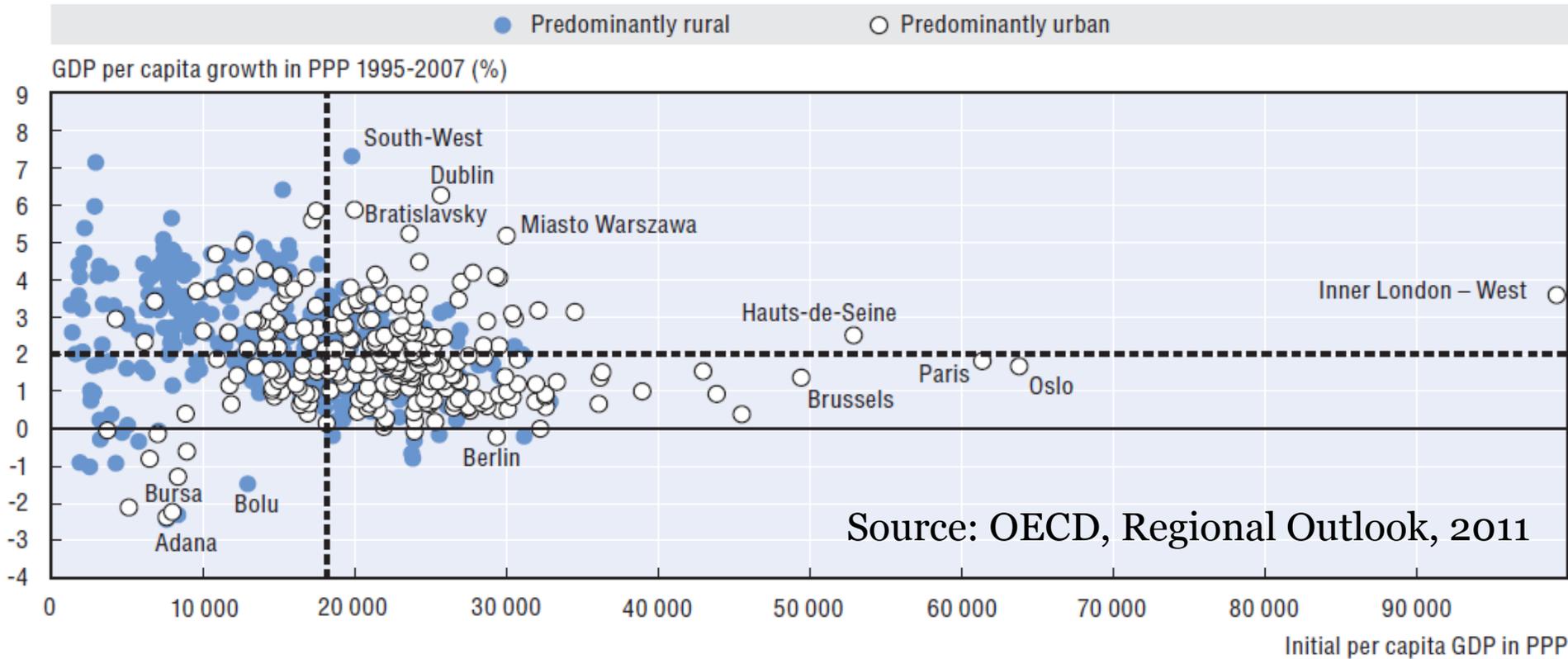
*Size*

Trade off between agglomeration benefits vs congestions cost?



Figure 1.4. **A large variation of regional growth profiles, 1995-2007**

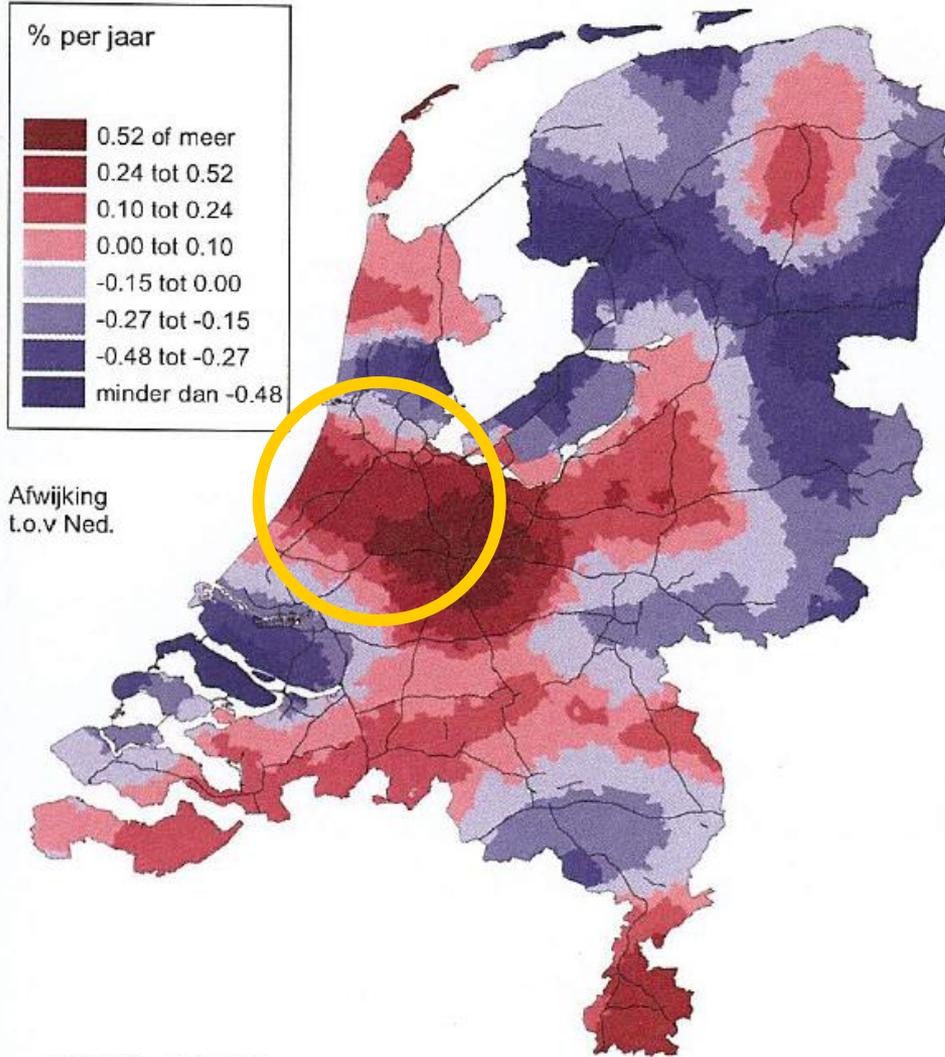
Predominantly urban and rural regions, 1995-2007



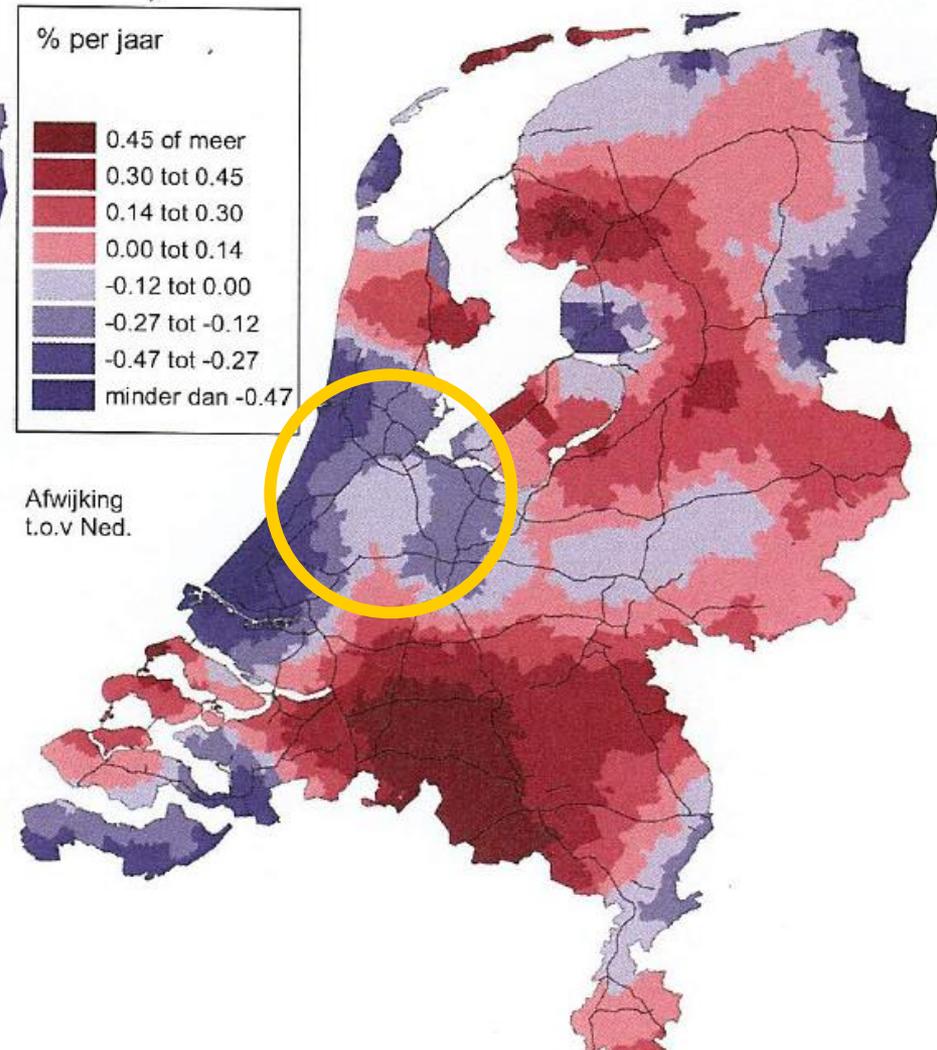
Big cities have higher initial GDP, but NOT higher growth rates!  
Opportunities for growth are observed in all type of regions!



# Changes in the employment rates 1973-1995 vs 1995-2010



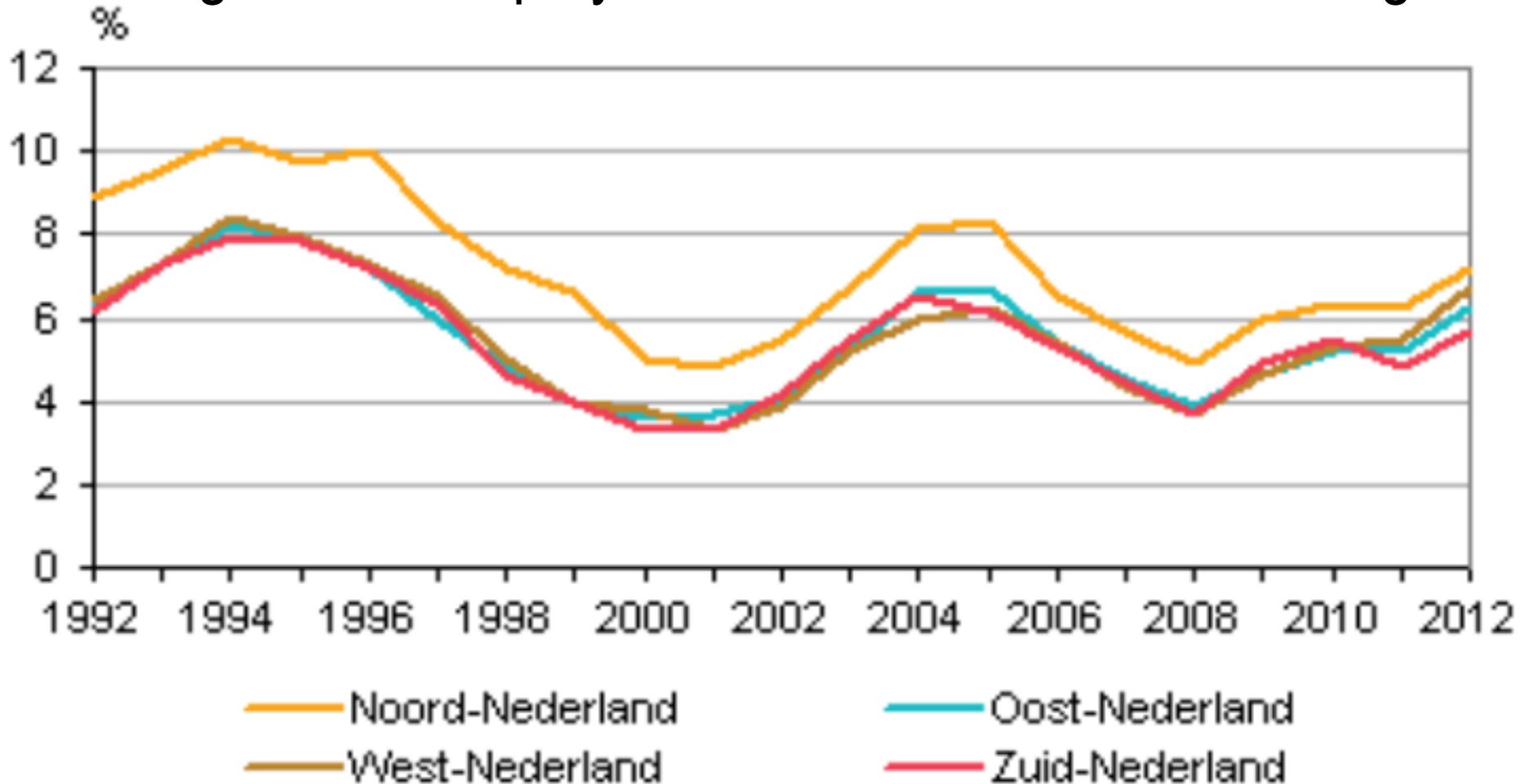
a. 1973-1995



b. 1995-2010 Source: Bureau Louter, 2011

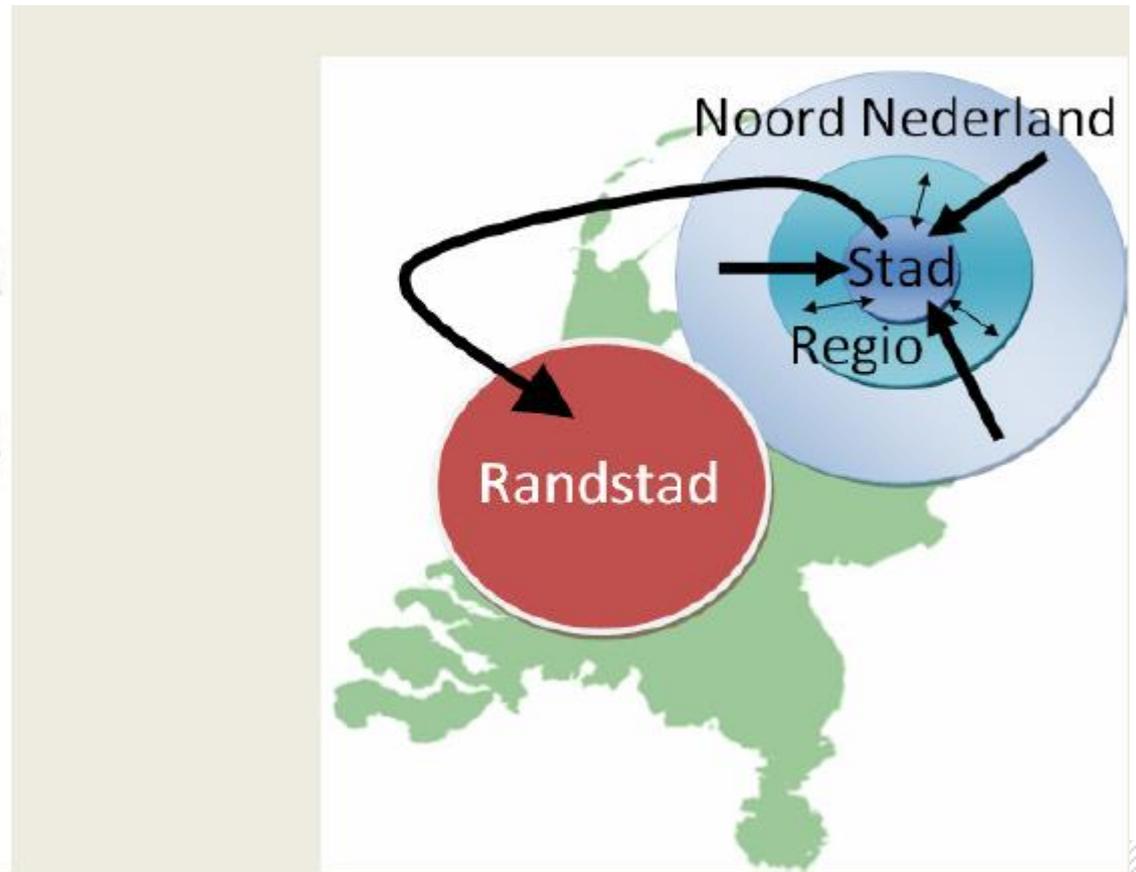
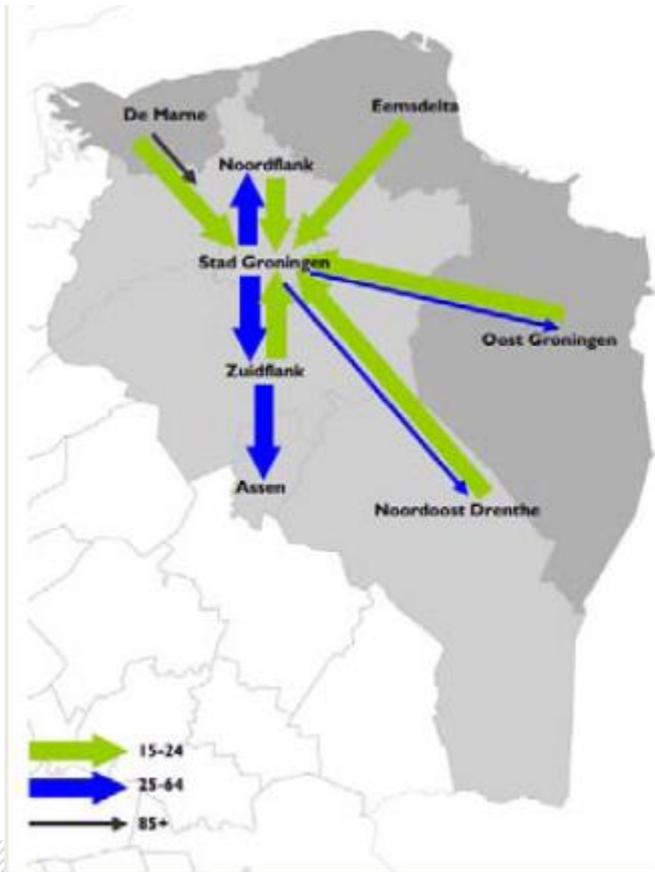


# Regional unemployment differences are narrowing





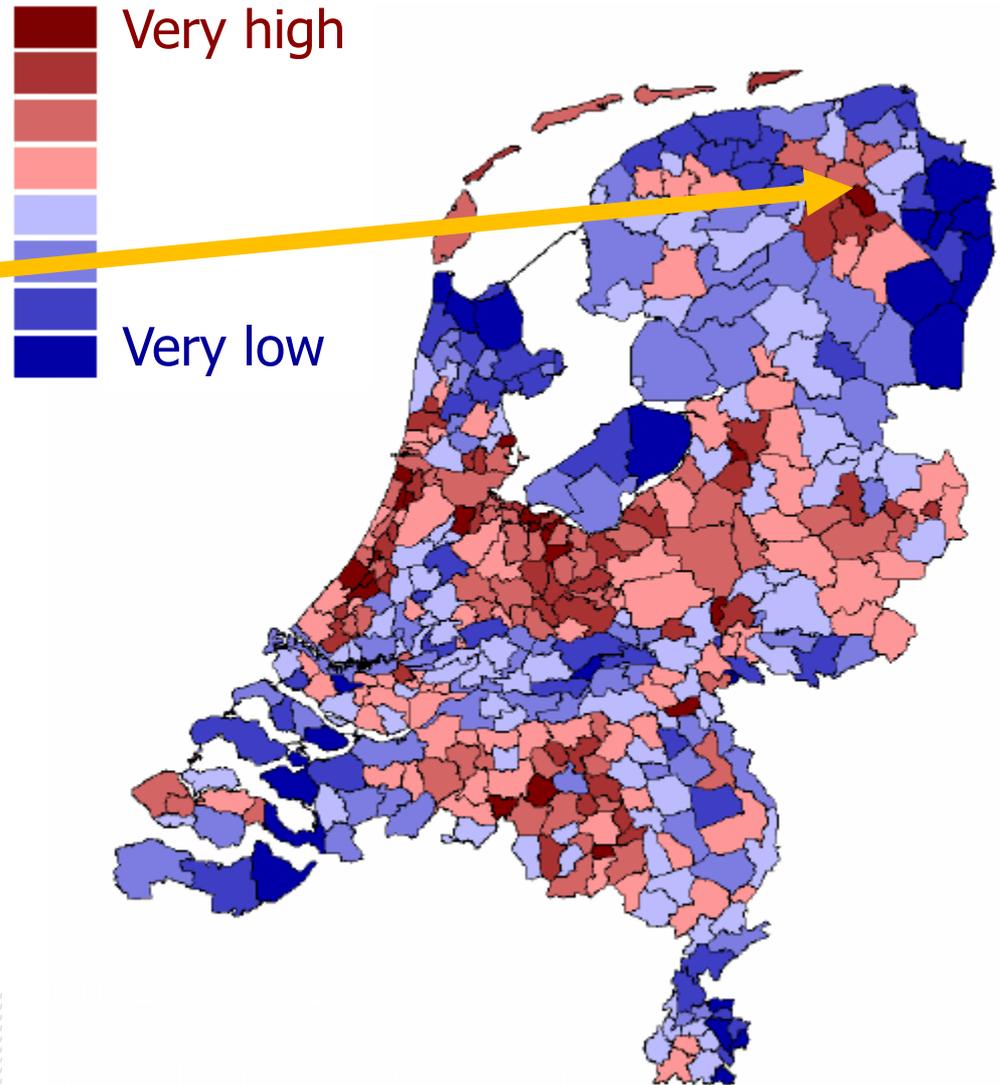
# Migration: the escalator model (sorting)





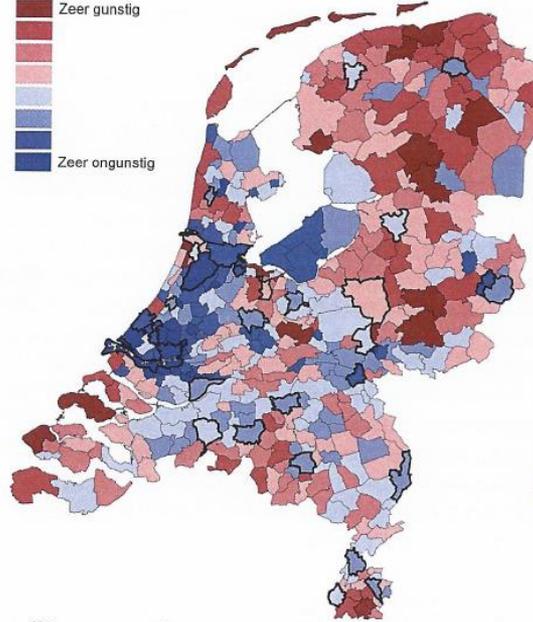
# Residential preferences Municipality of Haren nr.1 in The Netherlands

However recently:  
“Massive Facebook  
party Project X Haren  
in sleepy Dutch town  
turns into riot”

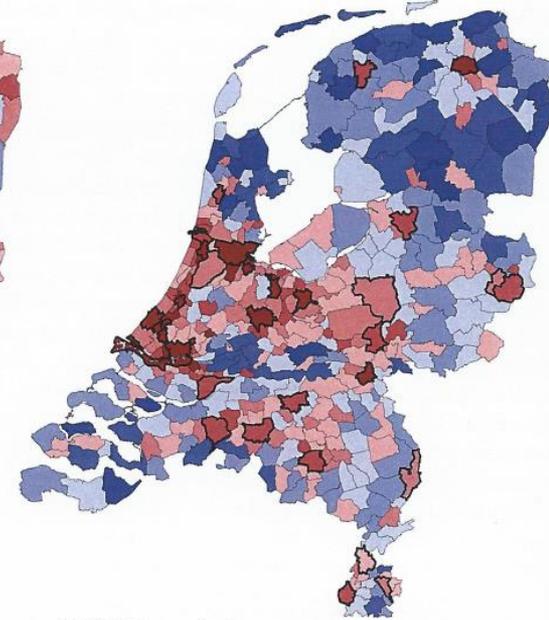




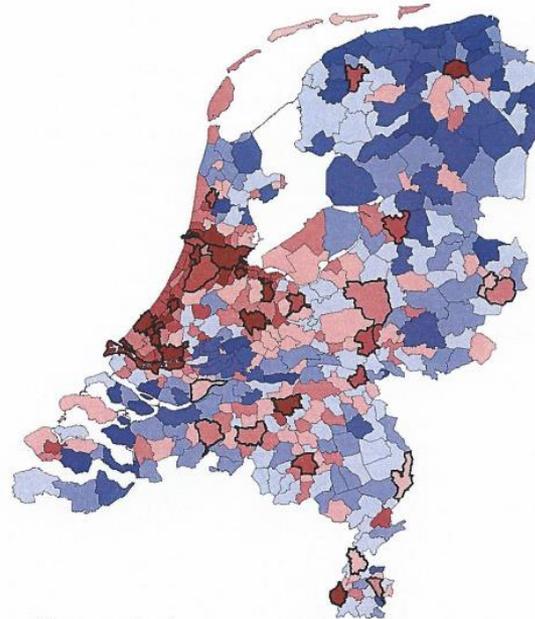
Figuur 1.6 Kaartbeelden scores per rubriek  
Score  
Zeer gunstig  
Zeer ongunstig



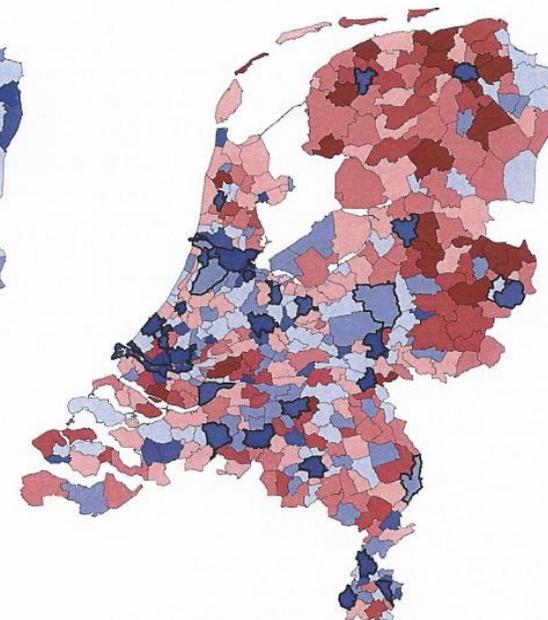
a. Woonomgeving



b. Basisvoorzieningen



c. Plusvoorzieningen



d. Overlast en veiligheid

# Scores Residential Preferences

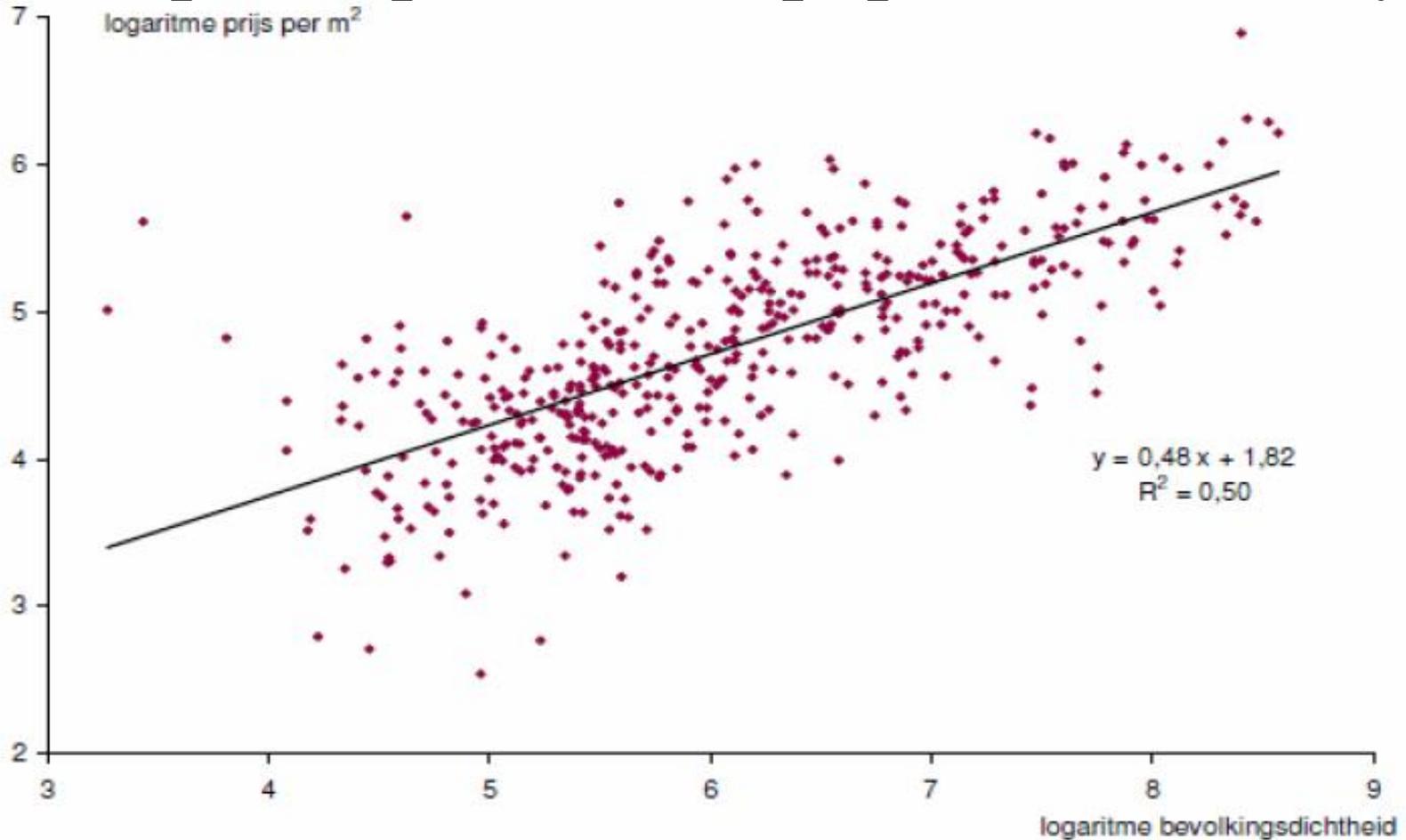
Rural area / City

Neighbourhood	+	-
Basic services	-	+
Plus services	-	+
Safety & Crime	+	-

Preferences differ!  
But also prices!



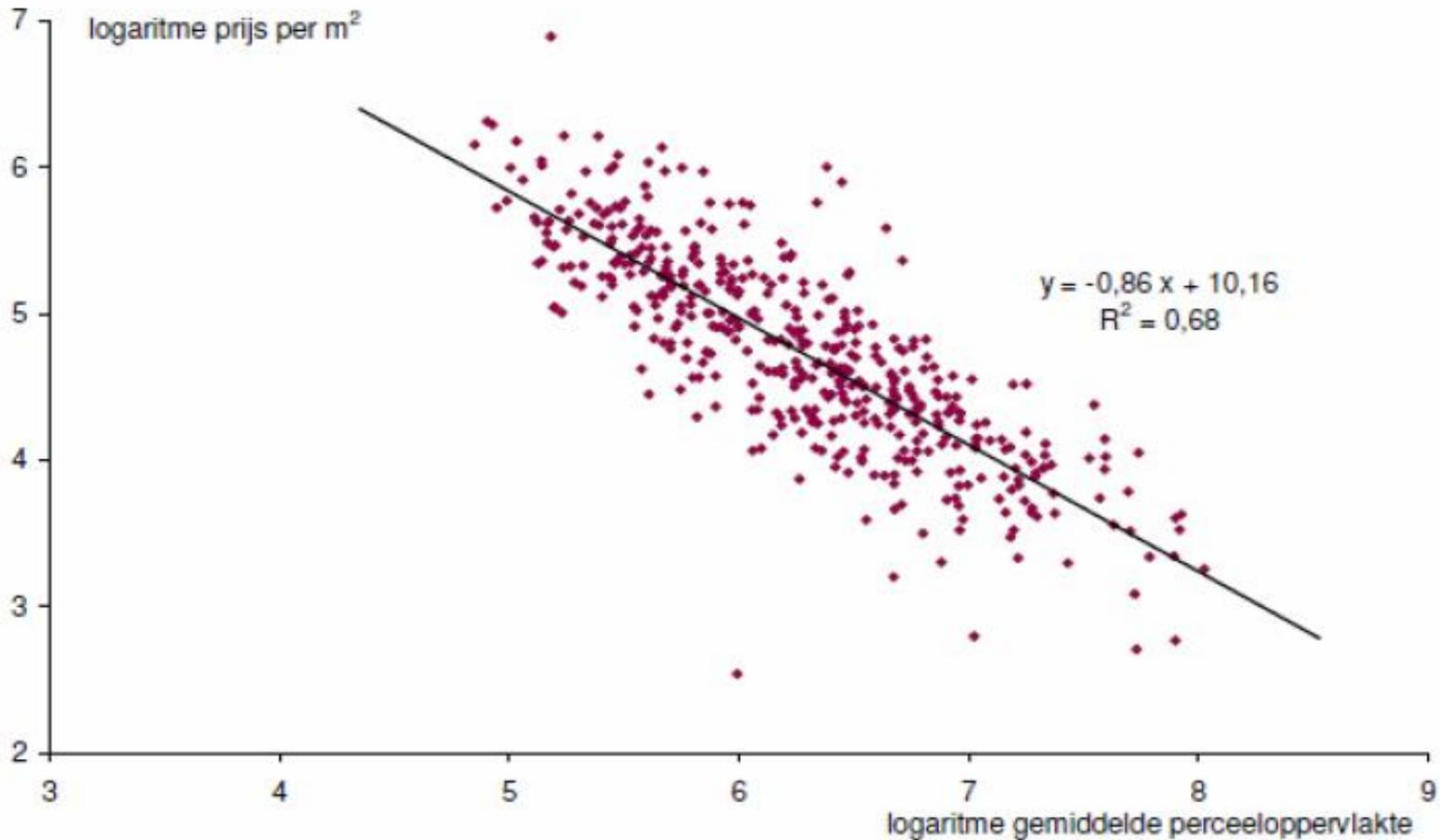
# Landprices per m<sup>2</sup> and population density



Source: Stad en Land, CPB, 2010



# Landprices per m<sup>2</sup> and lotsize



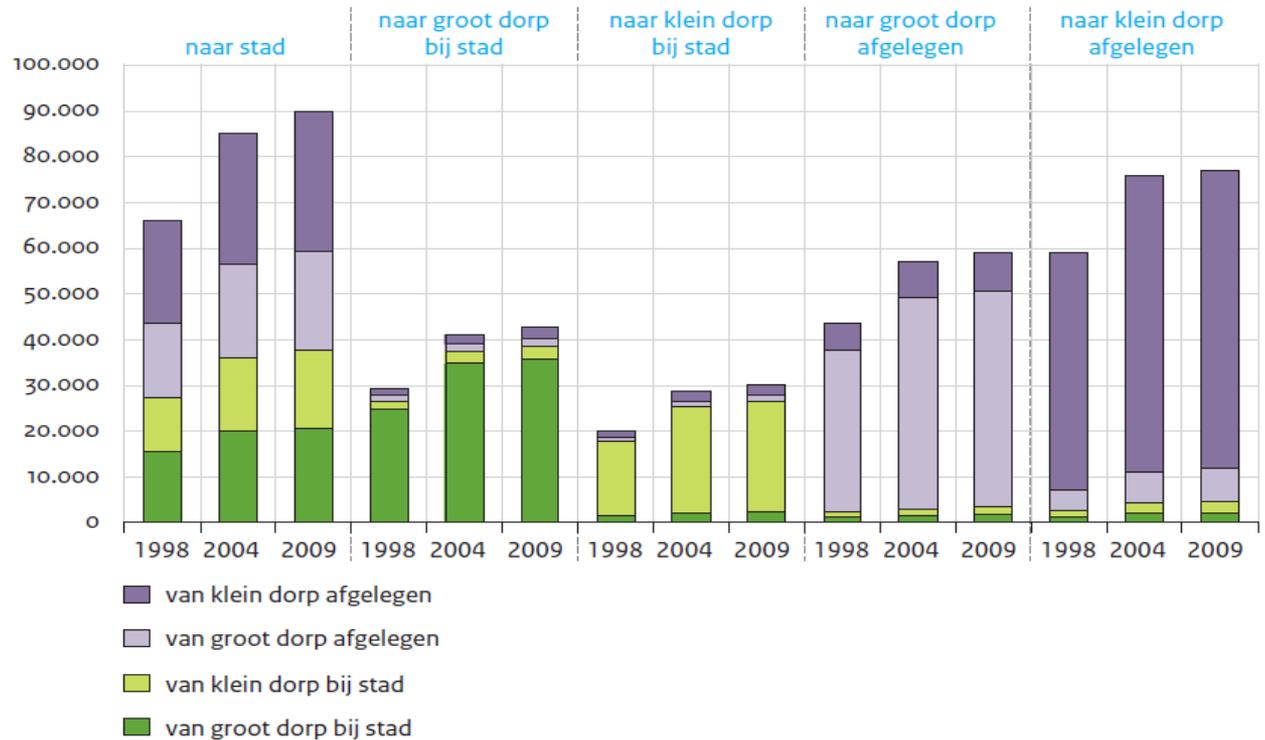
Source: Stad en Land, CPB, 2010



The city wins, but there is a complex underlying spatial process of sorting!

→ but also: birds of a feather flock together!

## Migration by type of village / town



a De migratie van en naar het buitenland is hier buiten beschouwing gebleven

Bron: CBS (Maatwerkbestand GBA) SCP-bewerking

Bron: SCP, Dorpenmonitor, 2013.



Commuting distances  
 increase, especially  
 for higher educated.

New working  
 arrangements:  
 change form daily  
 face-to-face contact to  
 a frequency 1-2 days  
 per week  
 → ICT Broadband!

Legenda

