

The role of cities for regional development

Regional policy in an increasingly spiky world



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A spiky world indeed

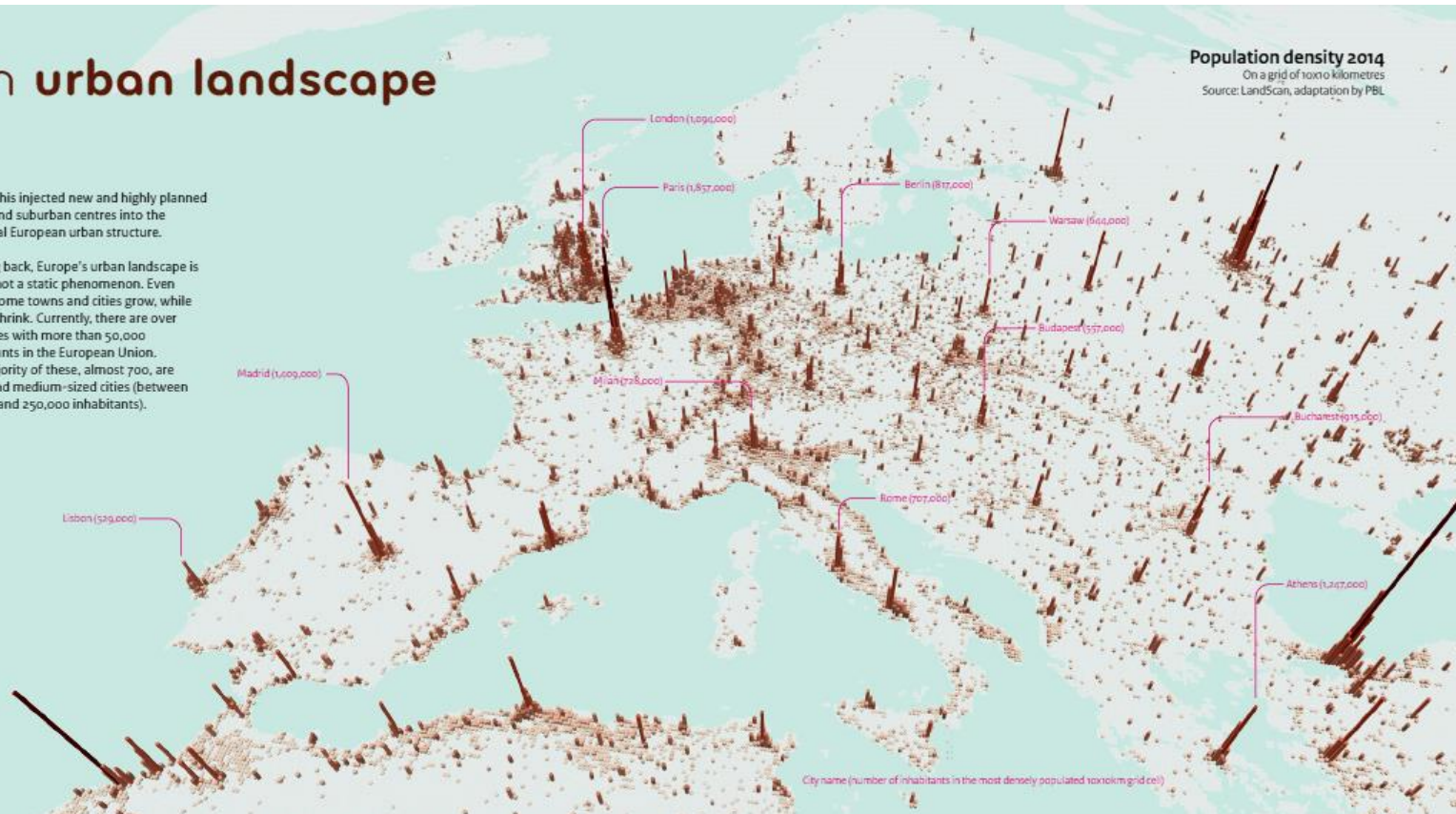
The European urban landscape

The urban landscape of Europe is characterised by a large diversity of small, medium-sized and large cities. Compared to other parts of the world, many urban regions in Europe have a polycentric structure where multiple towns and cities are in close proximity to one another. In other cases, a single large city – typically a nation's capital – dominates its surrounding region, resulting in a more monocentric pattern. In a few regions, a linear urbanisation pattern can be discerned, such as in areas bordering the Mediterranean Sea and Italy's Adriatic coast.

Europe's urban structure is the result of many underlying factors. Some settlements date back to the Roman Empire, where they functioned as administrative centres. Other towns and cities developed during the Middle Ages as regional marketplaces at strategic locations along trade routes, often close to a river or harbour. As a result of political, demographic and economic developments, towns and cities flourished (and therefore expanded) in some periods, whereas other periods were characterised by decline (Benevolo, 1995; Rutte and Abrahamse, 2016). Over the course of the 20th century, cities spilled over into their surrounding regions. Several countries built so-called new towns. Milton Keynes in the United Kingdom, Almere in the Netherlands and Nowa Huta in Poland are examples of

these. This injected new and highly planned urban and suburban centres into the historical European urban structure.

Looking back, Europe's urban landscape is clearly not a static phenomenon. Even today, some towns and cities grow, while others shrink. Currently, there are over 800 cities with more than 50,000 inhabitants in the European Union. The majority of these, almost 700, are small and medium-sized cities (between 50,000 and 250,000 inhabitants).



Urbanization as a dominant trend

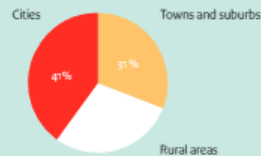
Most Europeans live in urban areas

According to the harmonised definition by Eurostat and the OECD, urban areas — defined as cities, towns and suburbs — provide a home to 72% of the EU-28's population; 41% live in cities and 31% in towns and suburbs. Over the past 50 years, the urban population has continued to grow. However, the strongest growth took place in towns and suburbs. Many people have settled in the newly developed residential areas surrounding the existing cities. In contrast to the urban growth rates, the rural population showed a steady decline throughout the past decade. The share of people living in rural areas has decreased from 35% in 1960 to 28% in 2010.

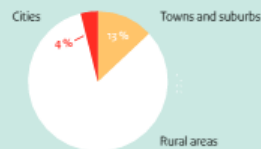
What is the degree of urbanisation?

The degree of urbanisation is a density-based classification originally introduced in 1991 to distinguish densely populated areas with more than 50,000 inhabitants (cities), intermediate urbanised areas (towns and suburbs) and thinly populated areas (rural areas). In 2011, work carried out by the European Commission, Eurostat and the OECD resulted in a harmonised definition of the degree of urbanisation which is based on more precise population data (see appendix).

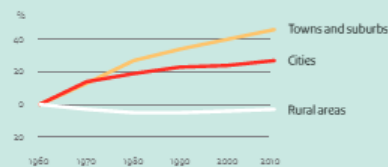
72% of the EU population lives in urban areas...



...on 17% of the land area.

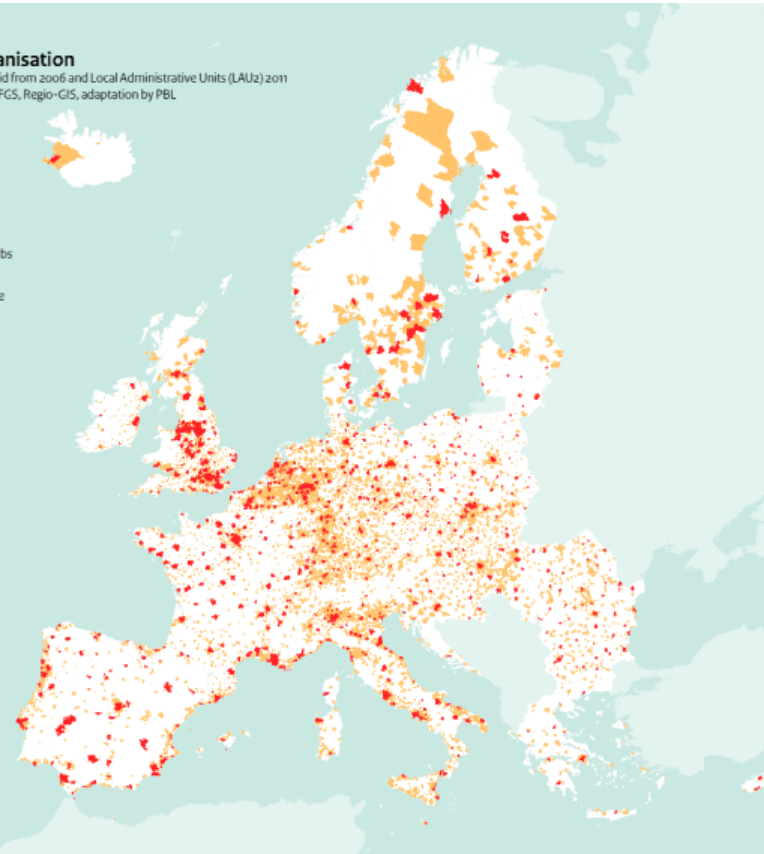


The urban population is growing.



Degree of urbanisation

Based on population grid from 2006 and Local Administrative Units (LAU2) 2011
Source: Eurostat, JRC, EFCS, Regio-GIS, adaptation by PBL

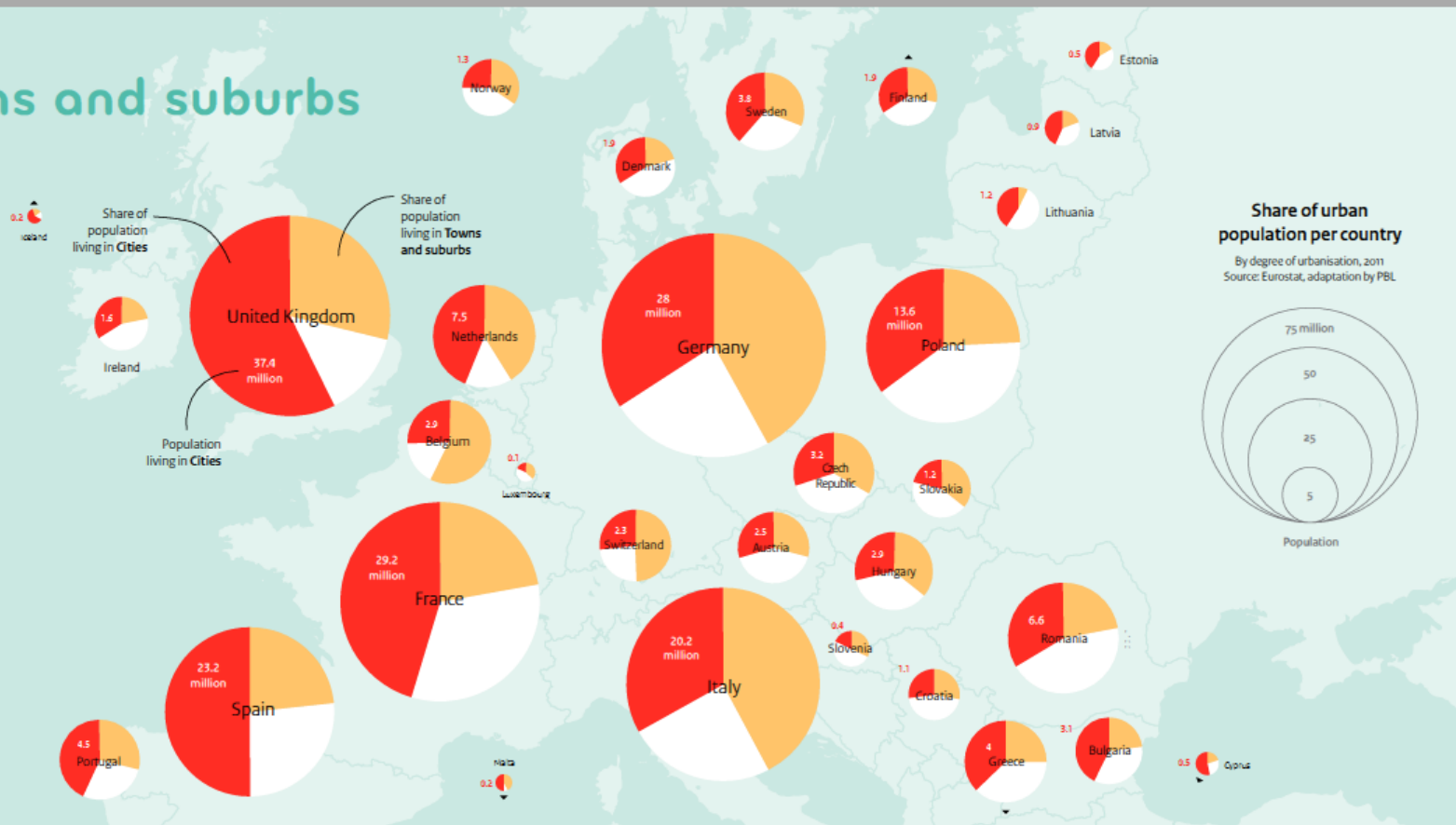


Taking place all across Europe

Cities, towns and suburbs

Compared to other parts of the world, Europe is highly urbanised. However, urbanisation levels vary from country to country. In general, western and northern Europe are more urban than the rest. The most urbanised region of Europe is sometimes called the Pentagon because it lies between the cities London, Paris, Milan, Munich and Hamburg. Over three quarters of the population live in urban areas in Germany, the United Kingdom, the Netherlands and Belgium. Eastern Europe, in contrast, is less urbanised. In Poland, Slovenia, Slovakia and Romania, over 40% of the population still lives in rural areas.

Eurostat and the OECD subdivide urban areas into two main categories: cities, and towns and suburbs. The share of the population living in cities is largest in the United Kingdom, Iceland, Malta and Spain, whereas in Slovenia and Slovakia it is the smallest. In the category of towns and suburbs, Belgium and Switzerland have the largest share, but also in Germany, the Netherlands, Italy and Malta over 40% of the population lives in towns and suburbs.



Engines of employment growth

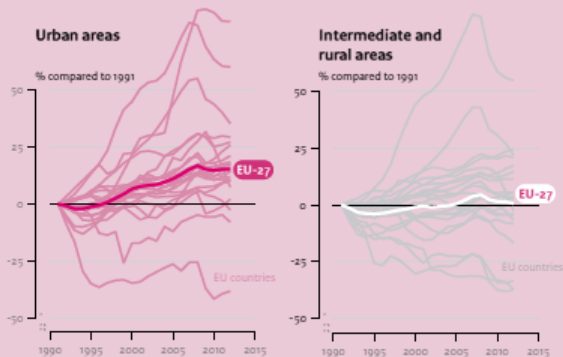
Stronger job growth in urban areas

For centuries, people have migrated to cities to find work, and this trend continued into the 21st century. In the first decade of this millennium, European cities, on balance, outperformed rural areas in terms of job growth. The gap between urban and rural areas is widening; the difference in job growth in the 1990–2012 period in both area types across Europe (EU-27) was almost 15% (PBL, 2016).

Monitoring this trend is important in the context of both the European Union's smart growth and inclusive growth agendas. With these agendas the EU aims, among other things, to raise Europe's employment rate (75% employment rate for people aged 20 to 64, by 2020). This requires not only the creation of more jobs, especially for women, young people and older and low-skilled workers, but also a modernisation of labour markets, and investment in education and skills training.

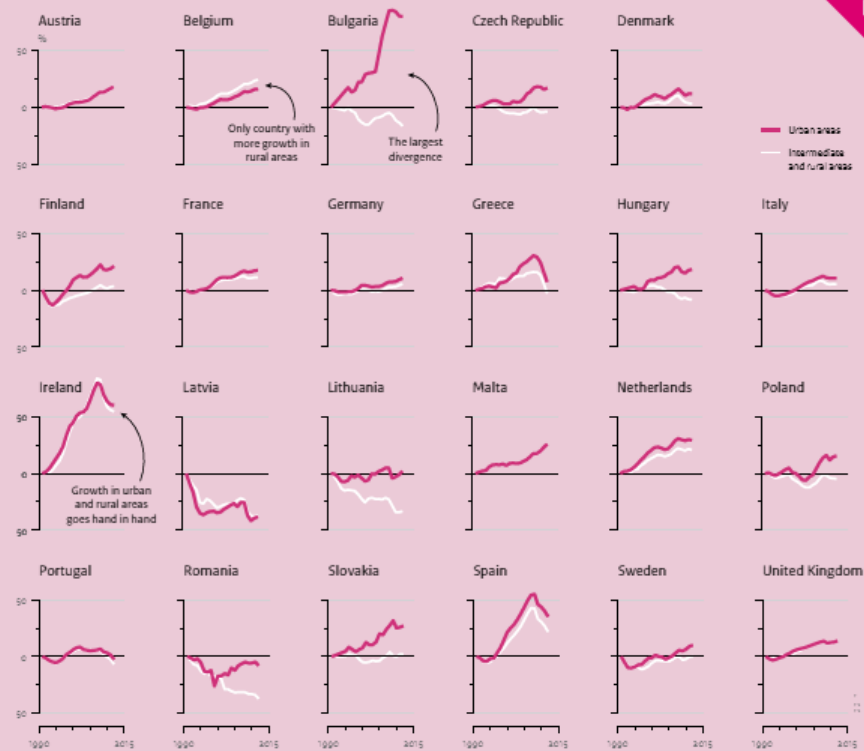
As 'engines' of the European economy, cities have a key role to play in translating EU and national smart and inclusive growth policy objectives into concrete action. In terms of job growth, different European urban areas show different developments. Geography and differences in the structure of national economies matter. In the 1990–2012 period,

Change in the number of jobs in the EU-27



job growth in rural and urban regions virtually went hand in hand in Ireland, Portugal, Austria and the United Kingdom. At the other end of the spectrum, urban regions in Bulgaria, Romania, Poland, Slovakia, Hungary and Lithuania performed far better than their rural counterparts over the same time period. Romanian and

Lithuanian rural regions, for instance, lost over 30% of their jobs. The Netherlands follows the EU average, albeit somewhat less pronounced in its divergence and at a higher overall growth rate. The only country which seems to defy the trend is Belgium; here, rural job growth outperformed that of the cities.



Source: Cambridge Econometrics, adaptation by PBL

But also decline in some places

Growth and decline in metropolitan areas

Changes in the size of the population in cities are the result of natural processes (births and deaths) and migration. In most European metropolitan areas, the population is growing. Cities in Europe are also becoming more culturally and ethnically diverse, as a result of the free movement of citizens within the European Union and the influx of migrants and asylum seekers from non-EU countries. Most EU cities saw an increase in the share of non-national inhabitants in recent decades.

In the 2000–2010 period, the strongest population growth took place in London, Madrid and Paris. But also Dublin, Toulouse, Oslo and metropolitan areas in Spain gained in population. However, not all metropolitan areas have been growing. In the same period, population numbers in Athens, Tallinn, Genova and a number of cities in Poland and Germany declined.

How are metropolitan areas defined?

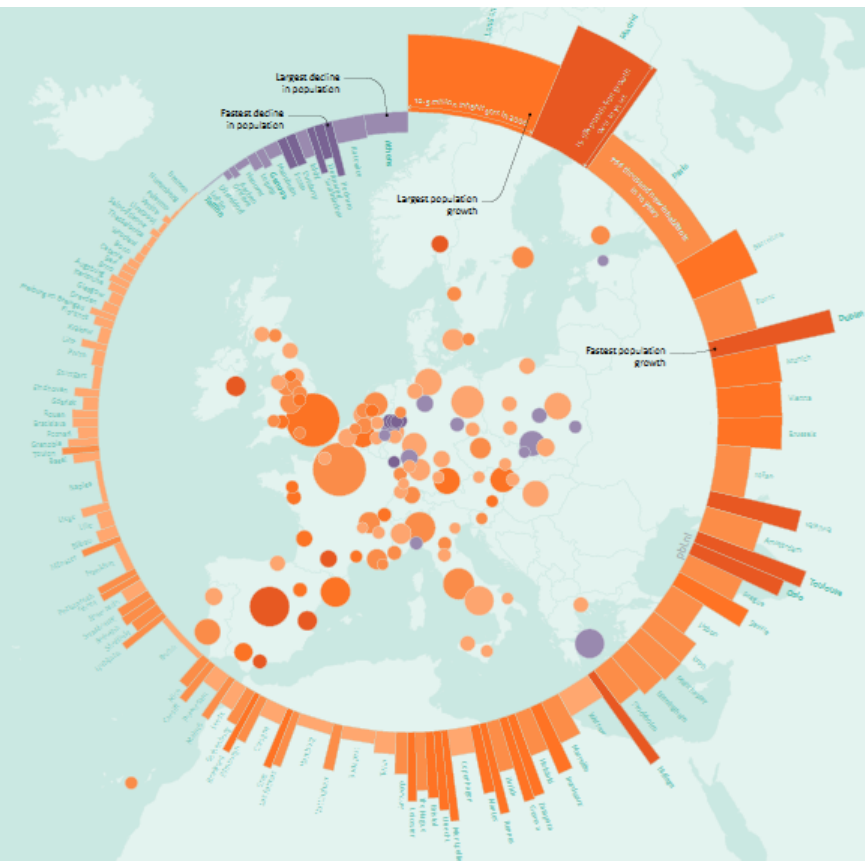
The OECD database contains detailed data on 114 metropolitan areas in Europe. According to the OECD definition, metropolitan areas are urban areas with more than 500,000 inhabitants. The OECD, in cooperation with the European Commission and Eurostat, has developed a harmonised definition of urban areas that overcomes previous limitations linked to administrative definitions (OECD, 2012). According to this definition, an urban area is a functional economic unit characterised by densely inhabited 'cities' with more than 50,000 inhabitants and 'commuting zones' whose labour market is highly integrated with nearby cities.



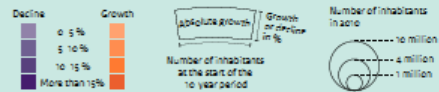
City



Commuting zone



Population change for the 114 metropolitan areas in Europe, 2000–2010
Source: OECD Metropolitan Explorer, adaptation by PBL



The big policy debates

- People vs place based policies
- Top-sector policy vs smart specialization strategy
- Concerns about segregation and gentrification vs sorting
- The future for Europe(an Cohesion Policy)
- **NEED FOR A SOLID EVIDENCE BASE**

This presentation

- Agglomeration externalities – some background
- Micro-evidence from wages
 - Aggregate results (for Dutch context)
 - Differentiation according to education level
- From wages to land rents
- Policy implications

A rough sketch of the literature

- Huge theoretical literature on agglomeration economies, focusing on sharing, matching and learning
- Potentially huge policy implications (markets fail)
- Many attempts to identify effects empirically
 - Spatial and temporal variation
 - Aggregation levels
 - Research methods
 - Density and / or more refined measures

Some evidence from meta-analyses

- Melo et al. on density-productivity relationship
 - On average elasticity of about 5%, but huge variation
- De Groot et al. on scale, diversity and competition
 - Builds on literature following Glaeser et al. (1992)
 - Based on more than 300 studies
 - Elimination of irrelevant ones leaves 73 studies (1992–2009)
 - These contain 392 estimated equations with 786 estimates

Evidence from Glaeser literature

- Attempt to address relevance of Jacobs, Marshall-Arrow-Romer (MAR) and Porter externalities
- Overall conclusion: The jury is still out...
- ... but some specific results emerge:
 - Initially clear evidence for Jacobs externalities
 - If anything: upward trend
 - Increasing evidence for MAR externalities
 - Heterogeneity according to sector and stage of development

Agglomeration and wage differences

- Based on Dutch micro-data (following Combes et al.)
- Description of spatial wage differences
- Key notion: wages reflect productivity
- Identification of sources
 - Spatial allocation of individuals
 - Agglomeration economies

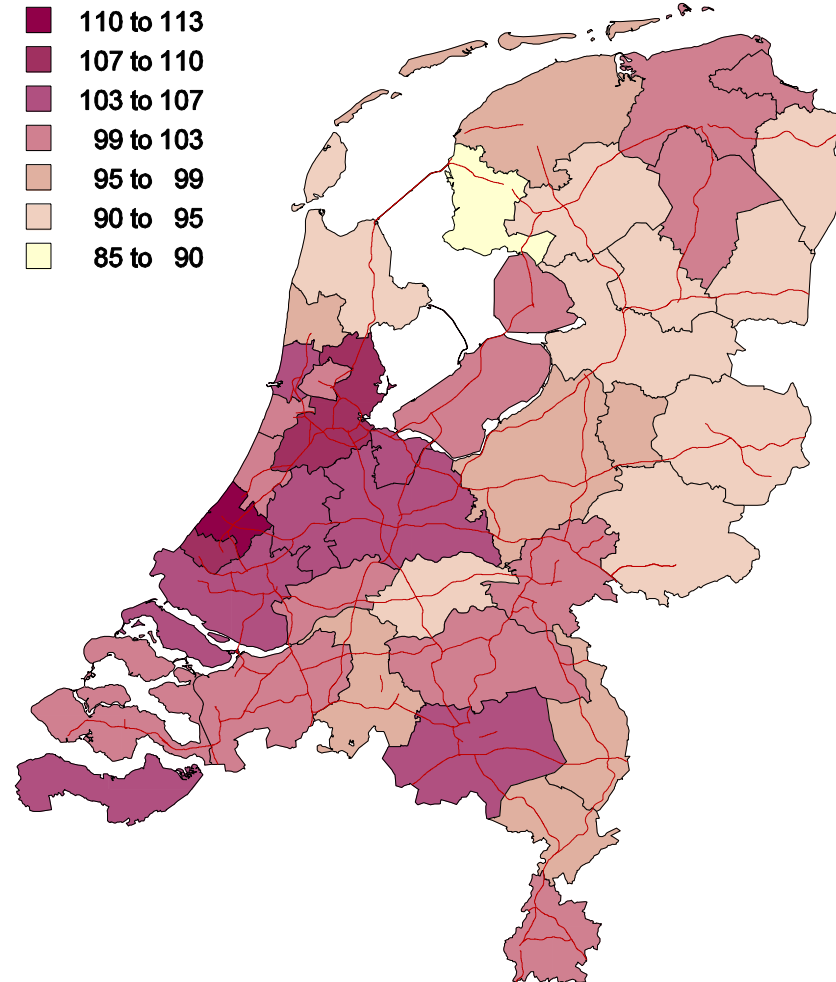
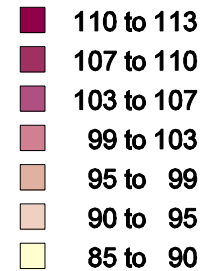
Questions addressed

- What part of spatial wage disparities is due to differences in labor market composition?
 - Skills, experience
 - Gender, age, ethnic background
 - Type of work
- What part is due to agglomeration forces?
 - Density
 - Specialization
 - Diversity
 - Competition

Data

- Micro data from Statistics Netherlands (CBS)
- Tax records + labor market survey
 - Covers 2000–2005
 - 70.000 observations per year
 - Hourly wage
 - Industry, age, work location (NUTS 3)
 - Extra information on job type and education
- Regional aggregations – NUTS 3 and municipalities

The labour market

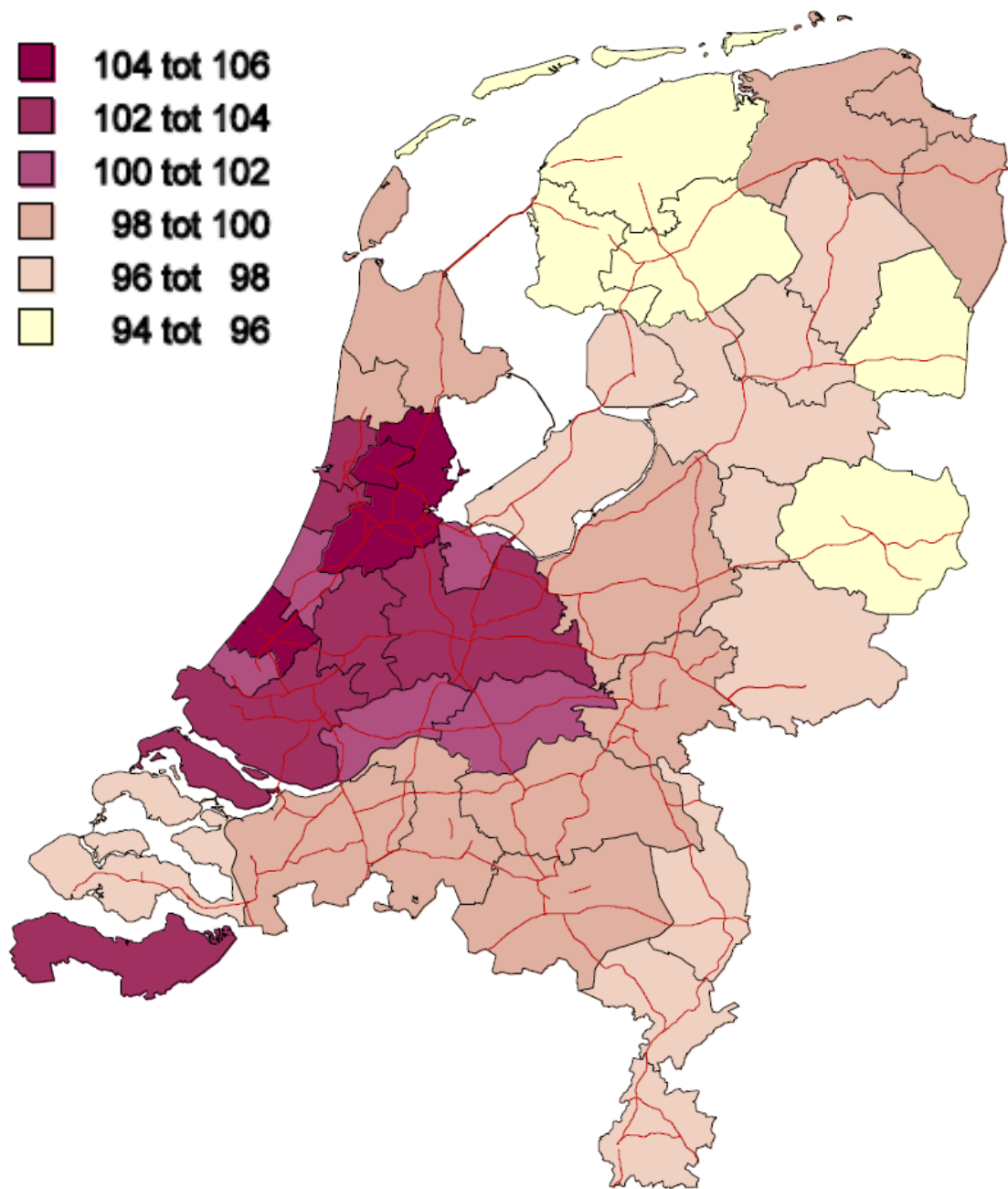
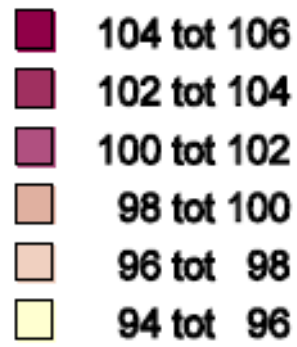


GSA	Highly educated (%)	Wage	Immigrants	Density
Amsterdam	45,3	21,7	13,1	1929
Rotterdam	35,2	19,7	13,0	1675
The Hague	45,9	21,6	13,6	2122
Utrecht	46,9	20,6	8,3	1981
Eindhoven	42,0	19,5	7,8	1075
Tilburg	34,6	18,0	6,5	790
's-Hertogenbosch	37,6	19,1	5,6	973
Breda	36,4	18,4	6,8	817
Leiden	43,0	19,6	8,4	1376
Haarlem	37,8	19,3	7,8	1242
Geleen/Sittard	30,1	18,7	5,9	631
Heerlen	30,6	17,9	5,3	859
Niet-GSA	31,7	17,9	5,4	143

Mincerian wage regression – step 1

- Dependent variable: log wage
- Independent variables: education, age, gender, immigrants, part-time, occupation
- The spatial residual is measured by a dummy for each region
- Coefficients are as expected

Spatial residual



What explains the spatial residual?

- Two stage method
 - Estimate spatial residuals for each industry–year combination using the Mincer equation (explains about 60% of variation)
 - Regress the residuals on
 - Log employment density
 - Log area
 - Log industry share
 - Diversity (Shannon's entropy)
 - Sector and year fixed effects
 - This explains about 30% of the variation

Results from second step

	NUTS-3 regions	Municipalities
Density	0.038 (13.6)	0.021 (14.9)
Specialisation (industry share)	0.024 (8.2)	0.023 (13.1)
Diversity (Shannon's entropy)	-0.078 (2.9)	-0.042 (5.2)
Competition (1-HHI)	-0.068 (4.5)	-0.012 (1.5)
Log(area)	0.013 (3.7)	0.011 (5.9)
Industry dummies	yes	yes
Year dummies	yes	yes
R^2	0.32	0.19
Number of observations	7,747	28,048

Assessing the economic significance

Agglomeration	Expected Wage	Actual wage	Decomposition of expected average wage in different components								
			Gender	Non-natives	Part-time	Age	Education	Density	Diversity	Competition	Specialization
Amsterdam	10.99	19.52	0.76	-0.72	0.81	0.41	4.75	4.41	0.04	-0.27	0.021
's-Gravenhage	11.08	19.22	0.47	-0.76	0.98	0.15	4.95	4.70	0.56	-0.25	0.302
Utrecht	9.95	14.10	0.53	-0.27	0.42	-0.09	5.30	4.23	-0.10	-0.14	-0.108
Nijmegen	9.39	12.99	-0.11	-0.16	-0.30	0.80	5.25	3.84	0.38	-0.35	0.225
Amersfoort	8.26	9.88	0.16	-0.11	0.30	0.56	3.91	2.69	0.10	0.65	0.026
Rotterdam	5.18	9.77	0.30	-0.70	0.63	0.02	1.21	3.63	-0.12	-0.22	-0.167
Leiden	5.70	9.04	-0.67	-0.28	-0.54	-0.51	3.94	3.87	0.48	0.56	0.363
Eindhoven	7.39	8.57	0.54	-0.23	0.70	0.12	3.59	3.17	-0.23	-0.21	-0.195
Haarlem	5.50	7.71	-0.37	-0.22	-0.09	0.83	2.15	4.05	0.17	-0.15	0.123
Groningen	8.03	7.02	0.13	0.08	-0.23	-0.42	3.88	3.16	0.24	0.77	0.189
Arnhem	7.47	6.61	0.14	-0.03	-0.04	1.46	2.21	2.66	0.27	0.21	0.098
's-Hertogenbosch	5.49	6.61	0.32	-0.02	0.39	0.44	2.05	2.54	-0.10	-0.25	-0.103
Apeldoorn	2.00	5.61	0.50	0.11	0.39	-0.03	0.05	-0.05	-0.40	-0.28	-0.215
Maastricht	4.73	4.60	-0.11	-0.01	0.02	-0.47	2.45	3.22	-0.15	-0.04	-0.070
Geleen/Sittard	4.70	4.52	0.94	-0.05	0.55	2.18	-0.54	1.72	-0.59	0.71	-0.288
Breda	3.38	2.90	-0.17	-0.13	0.29	-0.10	1.65	2.03	-0.40	-0.37	-0.207
Tilburg	2.21	0.81	0.08	-0.10	-0.10	-1.13	1.01	2.29	-0.03	-0.29	-0.147
Zwolle	3.50	0.63	-0.02	0.09	-0.31	0.16	0.95	1.95	0.05	-0.23	0.186
Dordrecht	1.11	0.63	0.14	-0.13	0.18	0.15	-0.78	2.22	-0.18	0.24	-0.161
Heerlen	3.75	0.17	0.48	0.00	0.56	1.24	-0.37	2.42	0.01	0.18	-0.109
Enschede	2.94	0.15	-0.02	-0.24	0.03	-0.10	1.71	1.28	-0.38	-0.16	-0.113
Leeuwarden	3.55	0.11	-0.04	0.19	-0.35	-0.17	1.79	2.39	-0.20	-0.27	-0.070

Summary

- Density-wage elasticity is about 3.8%
 - Smaller than the 5% that is generally found (Melo et al., 2009)
 - Consistent with Combes et al. (2009)
- Specialisation results in higher productivity
 - Doubling share of an industry results in a 2.4% wage increase
- Negative diversity and competition effect

Next step

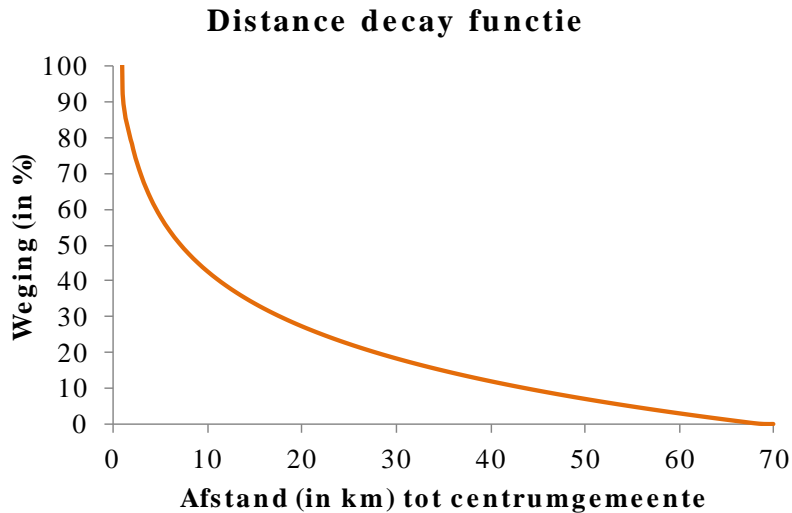
- Bias according to education level?
- Social returns to clustering of high skilled?
- Better education data
- Longer time span
- Expanding on Moretti (2004); Canton (2009)

Data

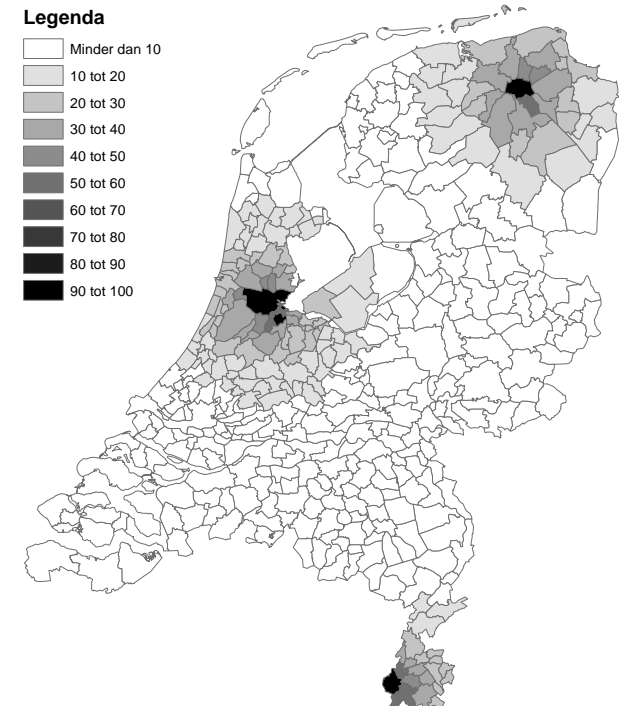
- CBS Microdata, 2000–2010
 - 11.5 million observations, 2.12 million employees
 - Fiscal data: wage slips (wage and hours worked)
 - GBA: age, gender, place of residence
 - ABR: sector and location of firms
 - Gemeente standplaats: place of work
- Selection
 - Per year and employee job with highest income
 - Job duration at least one month, and at least 12 hrs/week
 - At least minimum wage
 - Age18–65

Local labour market

- No administrative units
- Distance decay estimated on basis of commutes

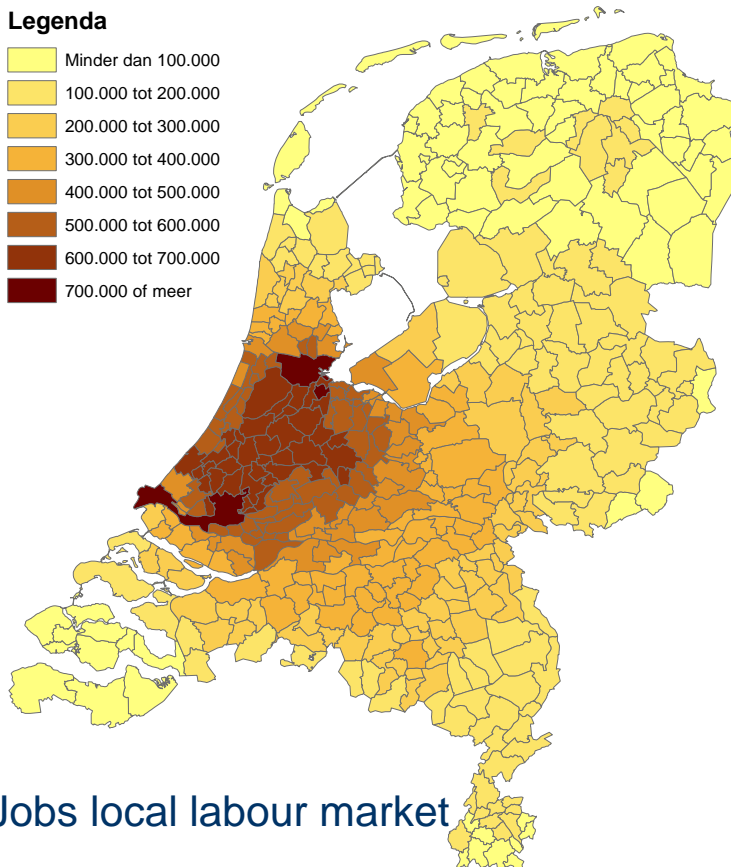
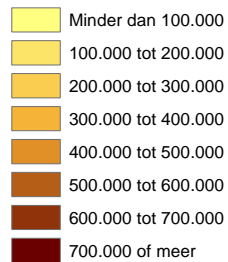


Weight (in %) in three examples



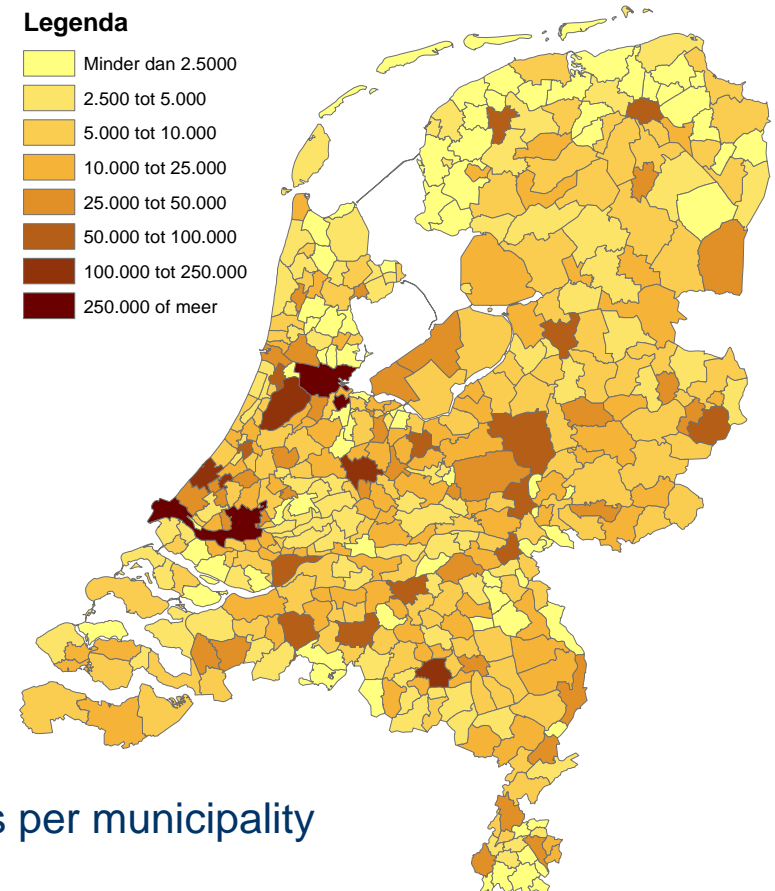
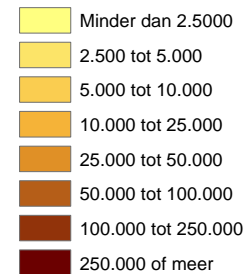
Agglomeration

Legenda



Jobs local labour market

Legenda

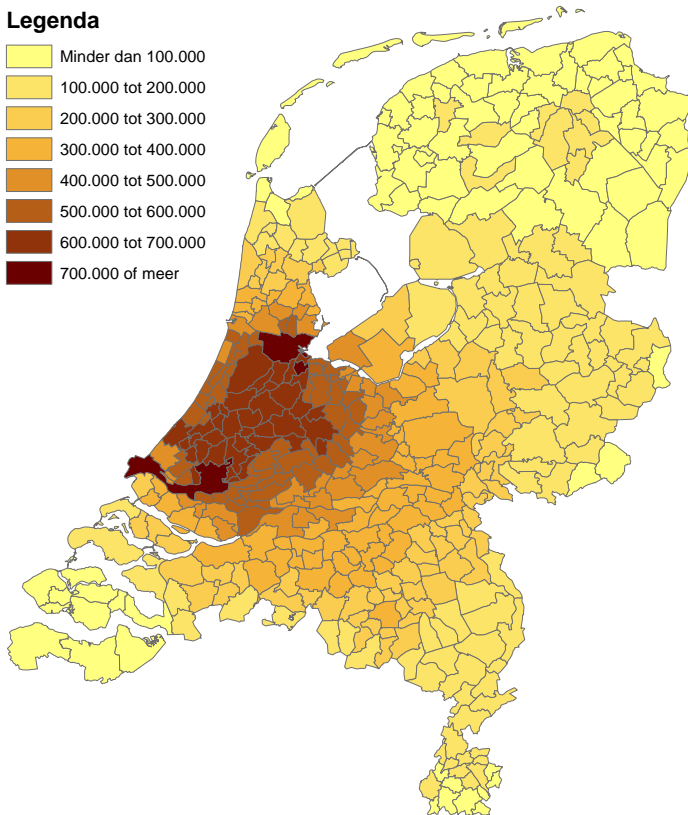
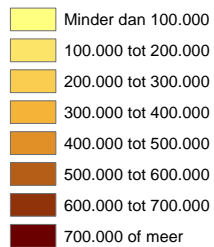


Jobs per municipality

Agglomeration and wages

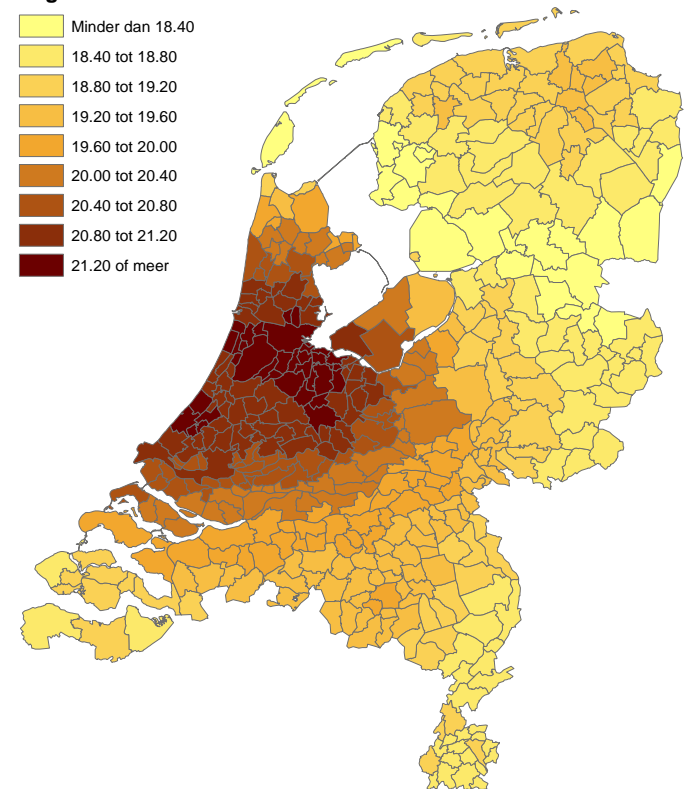
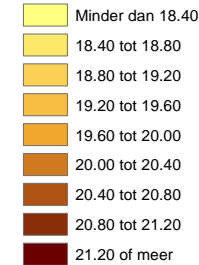
jobs local labour market

Legenda



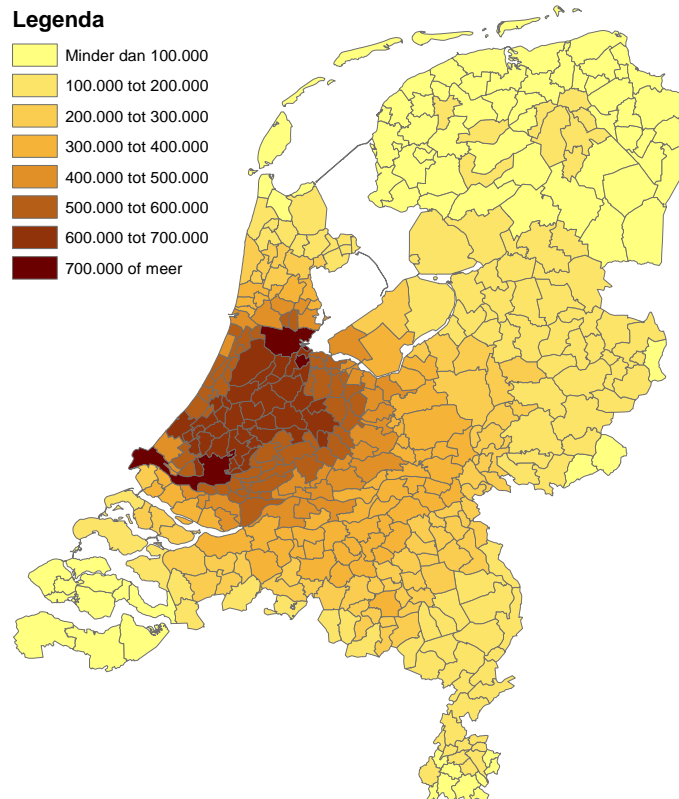
Average hourly wage

Legenda

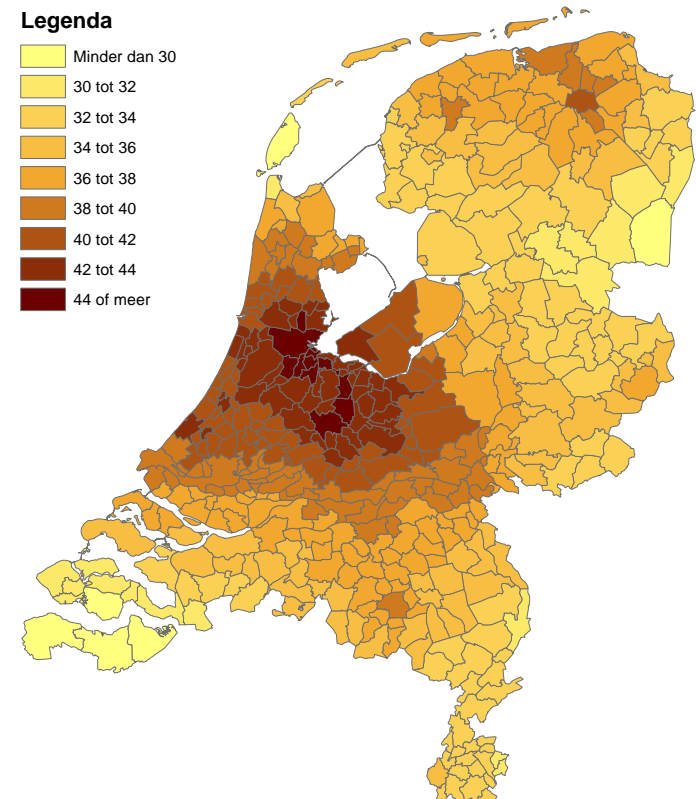


Agglomeration and highly educated

jobs local labour market

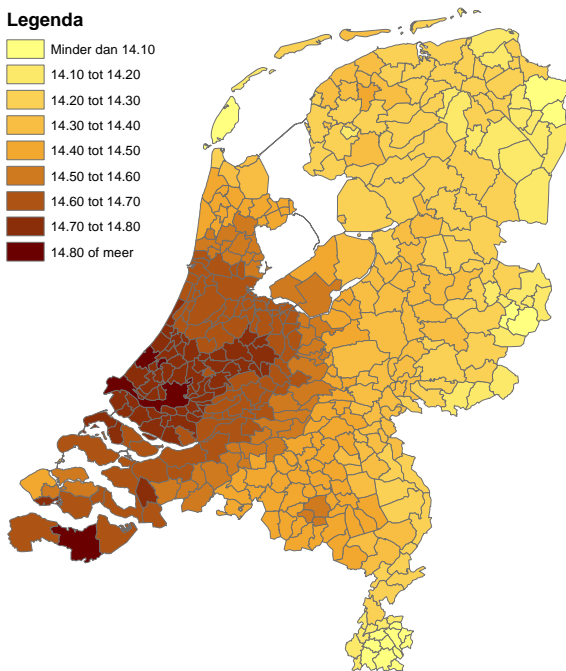
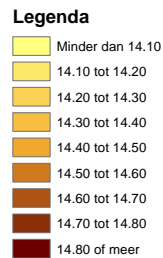


% highly educated local labour market

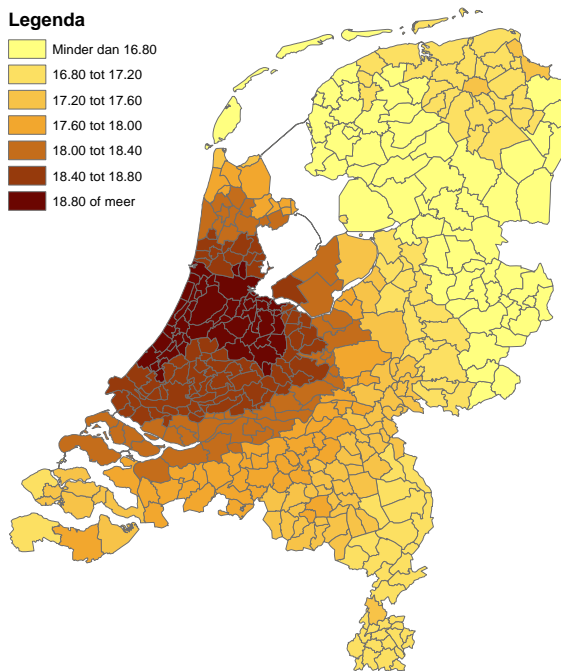
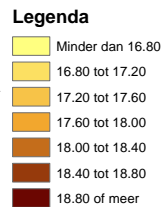


Hourly wage according to skill

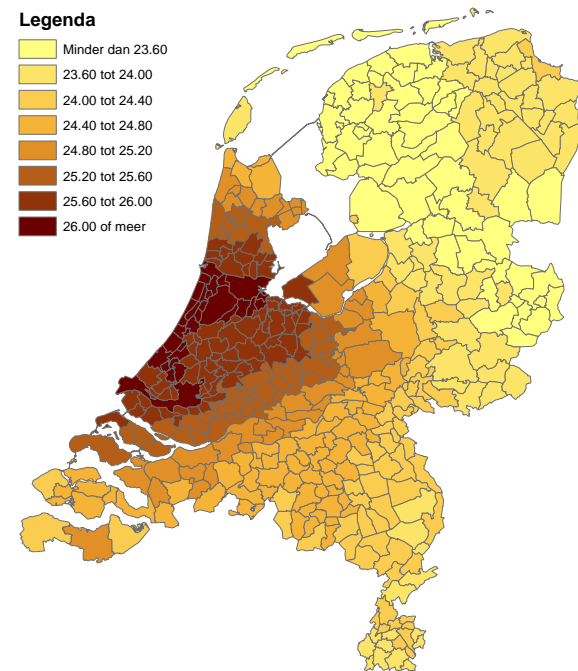
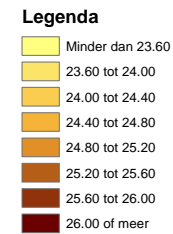
Low



Medium



High



Methodology

- Wage regression per skill level
- No agriculture and public sector
- Dependent: log hourly wage
- Controls: education (3 levels), age, age², origin, part-time, year, sector, plus
 - (Log) Employment Density (density 1830 as instrument)
 - (Log) Share high skilled (# graduates HBO and university as instrument)
 - (Log) Share people with SAME education level

Results – OLS

	Low	Medium	High
# Observations	3.750.960	3.219.920	4.507.189
# Employees	736.573	584.981	799.423
Female	-0,180 (573)	-0,172 (426)	-0,111 (321)
Age	0,037 (463)	0,070 (573)	0,113 (858)
Age ²	-0,0004 (362)	-0,0007 (439)	-0,0011 (674)
Part-time	-0,035 (108)	-0,084 (190)	-0,117 (290)
Foreign (OECD)	-0,023 (25,4)	-0,030 (23,6)	-0,075 (72,8)
Foreign (non-OECD)	-0,081 (181)	-0,111 (126)	-0,196 (236)
Ln(employment density)	0,040 (106)	0,065 (190)	0,073 (145)
Ln(share highly educated)	-0,058 (22,4)	0,065 (17,8)	-0,027 (8,0)
Year- and sector dummies	Ja	Ja	Ja
Goodness of fit	0,38	0,44	0,49

Results – OLS

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Goodness of fit	0,38	0,44	0,49

Results – IV

	Low	Medium	High
# Observations	3.750.960	3.219.920	4.507.189
# Employees	736.573	584.981	799.423
Female	-0,180 (569)	-0,172 (425)	-0,111 (318)
Age	0,037 (463)	0,070 (572)	0,113 (856)
Age ²	-0,0004 (362)	-0,0007 (439)	-0,0011 (674)
Part-time	-0,035 (108)	-0,083 (187)	-0,117 (288)
Foreign (OECD)	-0,024 (25,5)	-0,032 (24,5)	-0,076 (72,7)
Foreign (non-OECD)	-0,082 (182)	-0,112 (127)	-0,195 (235)
Ln(employment density)	0,029 (14,7)	0,090 (37,5)	0,097 (49,4)
Ln(share highly educated)	0,051 (3,5)	-0,083 (4,7)	-0,208 (14,4)
Year- and sector dummies	Ja	Ja	Ja
Goodness of fit	0,38	0,44	0,49

Methodology – III (worker FE)

- Unobserved heterogeneity may lead to upward bias if high-density areas attract people according to unobserved (good) characteristics
- ‘Solution’: Worker FE
 - Identification exclusively on workers that change region
 - Workers that do not change excluded
 - But: sensitive for selection bias: People that gain are more likely to accept job

Results – FE per worker

	Laag	Middelbaar	Hoog
# Observations	1.584.236	1.874.901	2.553.011
# Employees	193.380	268.999	304.792
Age	0,046 (164)	0,087 (327)	0,150 (605)
Age ²	-0,0004 (220)	-0,0008 (340)	-0,0014 (559)
Part-time	-0,035 (93)	0,003 (6,8)	-0,018 (53,6)
Ln(employment density)	0,027 (11,4)	0,047 (22,5)	0,049 (28,5)
Ln(share highly educated)	-0,098 (5,7)	-0,207 (13,8)	-0,207 (16,7)
Year- and sector dummies	Ja	Ja	Ja
Goodness of fit	0,11	0,29	0,51

Conclusion

- Illustration of usefulness of micro-data
- Return to agglomeration higher for medium and high skilled
 - Agglomeration elasticity low: 2.7 – 2.9 %
 - Agglomeration elasticity medium: 4.7 – 9.0 %
 - Agglomeration elasticity high: 4.9 – 9.7 %
- More need for research into spatial scope of several externalities, link with housing market / land rents, role of commuting

From wages to land rents

- Ongoing effort building on Ricardo's capitalization result
 - Outgrowth of project at CPB Netherlands Bureau for Economic Policy Analysis
 - Joint with Gerard Marlet, Coen Teulings and Wouter Vermeulen
- Attempt to derive land rents
 - Empirically the big unknown
- And subsequently explain variation

Basic idea

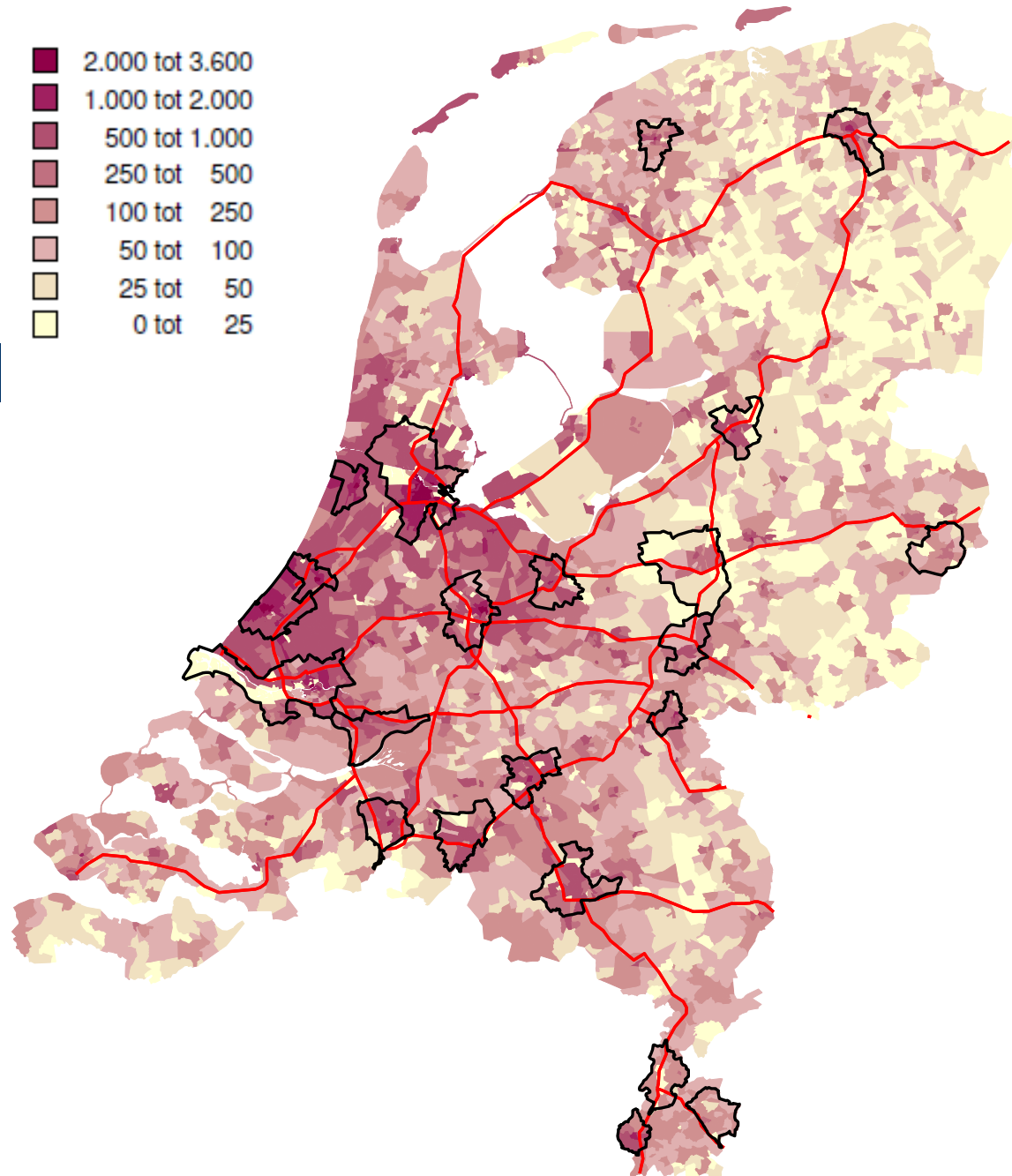
- Step 1 – Use hedonic pricing techniques to derive land rent based on information on lot sizes
- Step 2 – Explain variation in land rents as a function of labour market variables, urban amenities and urban disamenities
- Natural starting point for evidence based policy evaluation (ex ante and ex post)

Data

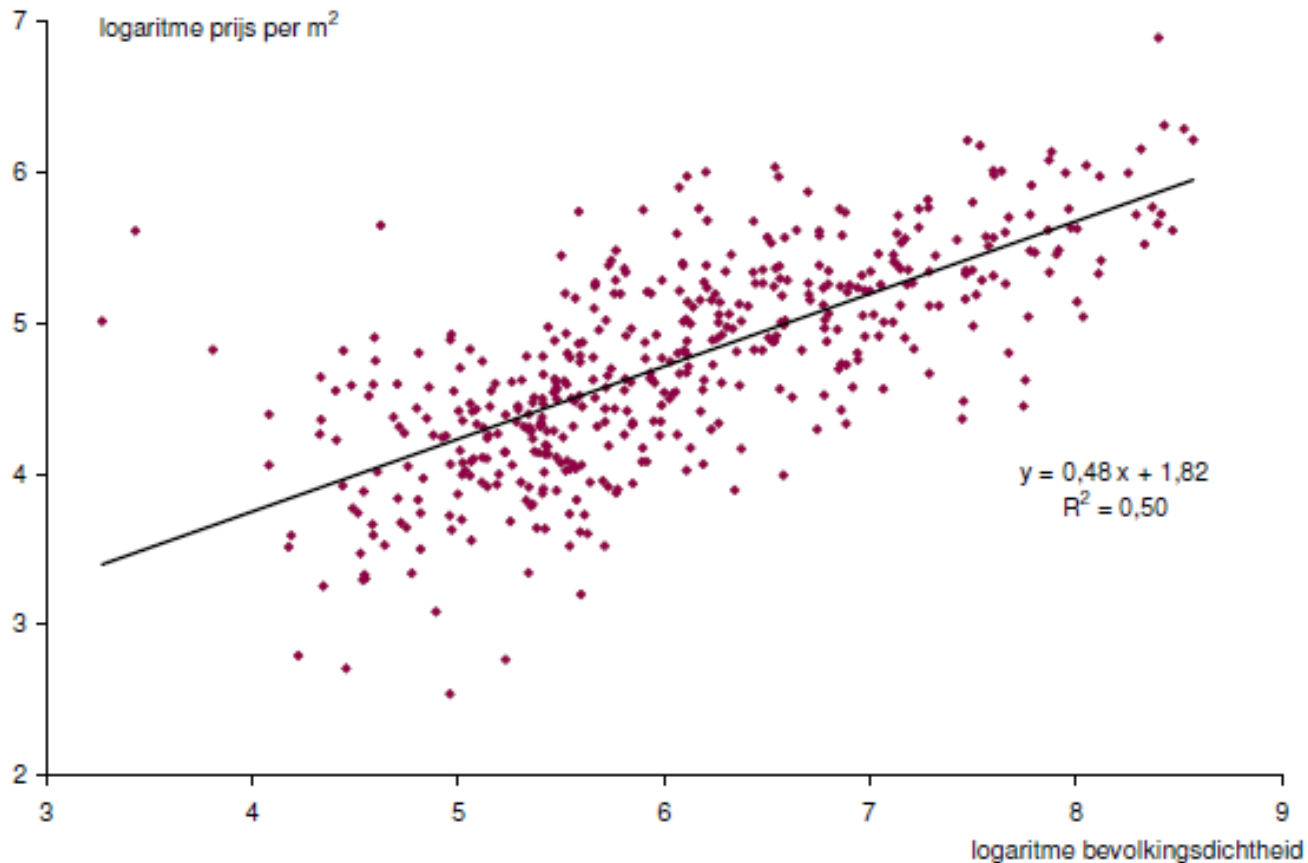
- Unique data from Dutch Association of Brokers
 - 1985-2007
 - 1.1 million transactions (excluding apartments, etc.)
 - Detailed information on houses (# rooms, year of construction, garage, lot size, etc.)
- Analysis done at 4-digit ZIP-code level
- Elasticities for lot size allowed to vary over space

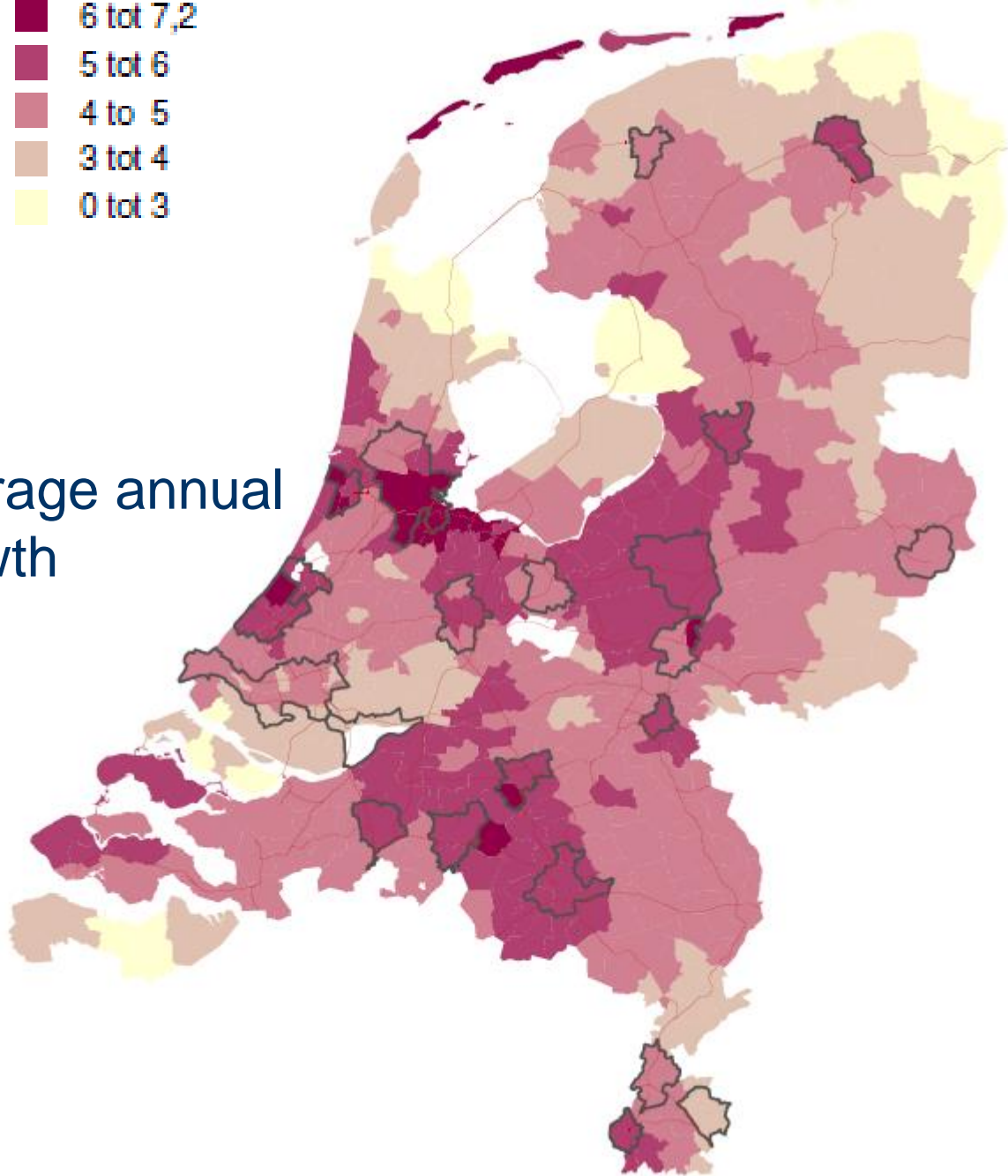
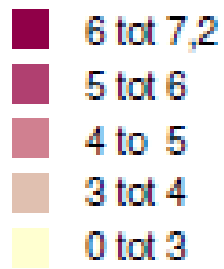
Land rents

- Hedonic pricing exercise
- Huge variation
- Focus on 21 'Metropolitan Areas' in NL



Land rents and population density





- Average annual growth

Wages and land rents confronted

GSA	Wage surplus	Differential land rent	Ratio
Amsterdam	16,7	45,4	2,7
The Hagues	8,0	17,7	2,2
Utrecht	6,6	7,5	1,1
Nijmegen	1,7	1,5	0,9
Amersfoort	1,2	2,2	1,8
Rotterdam	11,0	11,9	1,1
Leiden	1,2	7,8	6,2
Eindhoven	3,3	3,7	1,1
Haarlem	1,2	7,8	6,5

Next steps

- Explain variation in land rents
 - Labour market – wages and accessibility (35%)
 - Urban amenities (27%)
 - Natural amenities (10%)
 - Disamenities (5%)

Wages and land rents

- Higher wages partly reflected in land rents
- But also clear role for other factors (old city centre, cultural activities, accessibility)
- Which are patterns that we also saw back in the dynamics of land rents
- Evidence for the consumer city

Policy dimensions

- Place / history / context matter: policy versus luck
- Specialization versus diversity (people and sectors)
- Scale versus density (borrowed size debate / transport)
- Equity versus efficiency

The big policy debates

- People vs place based policies
- Decentralization / increasing role of regions
- Top-sector policy vs smart specialization strategy
- An urban future for Europe(an Cohesion Policy)
- Concerns about segregation and gentrification vs sorting

Spatial equity-efficiency trade-offs

- Bear in mind (cf. Glaeser, 2011, p. 250): ‘... throwing resources at troubled cities is usually a terribly inefficient means of taking care of troubled people. Helping poor people is an appropriate task for government, but helping poor places is not.’
- Key question in many countries: which government are we talking about? A question of governance and organizing solidarity!

Knowing more?

- Contact me at h.l.f.de.groot@vu.nl
- Meta-analysis on externalities (Journal of Economic Surveys)
- Cities and the Urban Land Premium (Edward Elgar, 2015)
- Groei en Krimp (Growth and Decline: in Dutch)
- And much more...