



Combining Census and EPCs Data to Map Fuel Poverty in Italy. A Small Scale Experimentation

Work in progress

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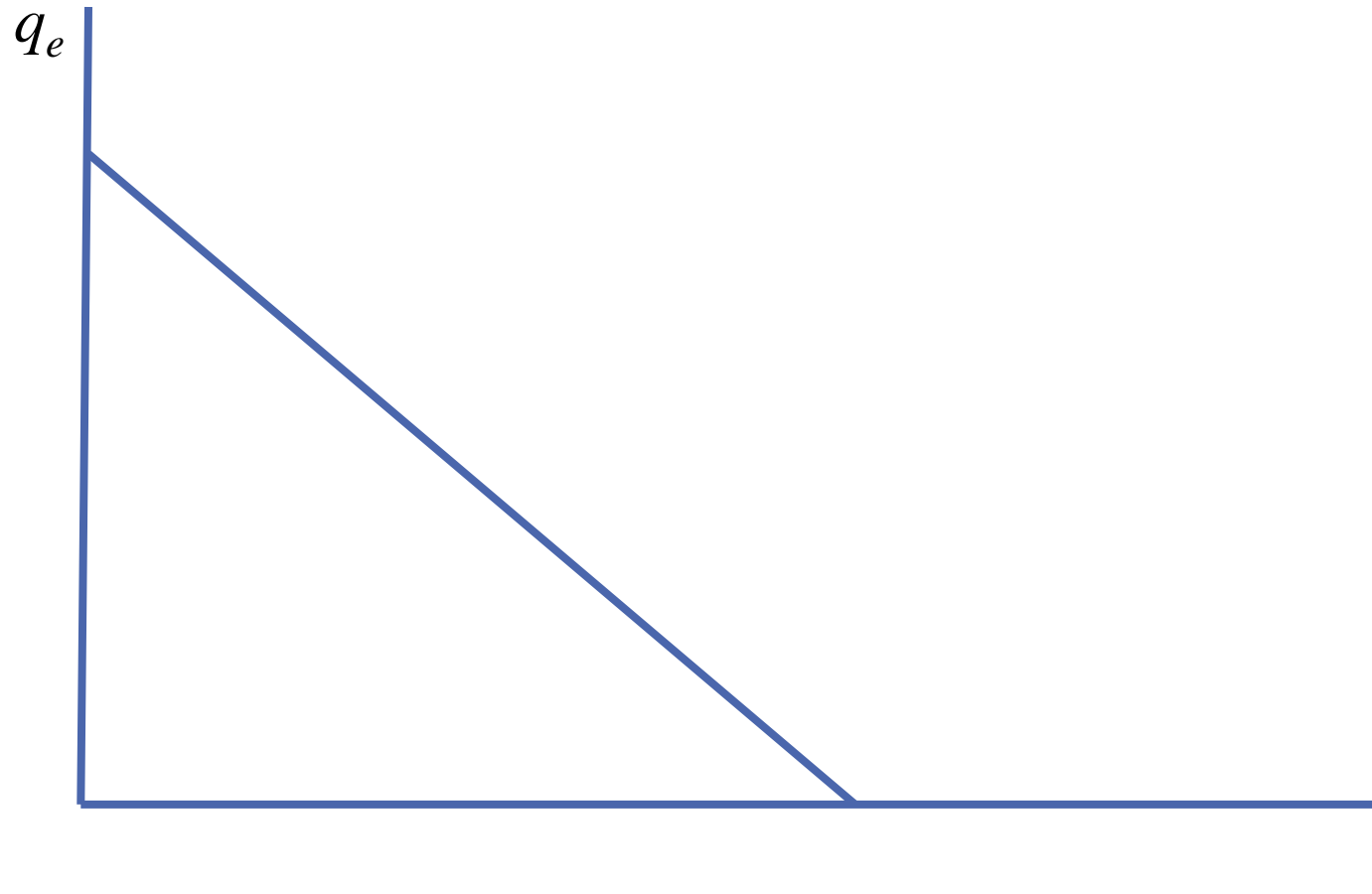
Motivation

- Alternative definitions of energy poverty
- Actual vs standard consumption
- Alternative definitions of standard consumption
- Consumers are locked-in
- Lack of survey/administrative unique data source with energy efficiency, socio/demographic, income and consumption data
- Combine census (survey) and EPC (administrative) data

Outline

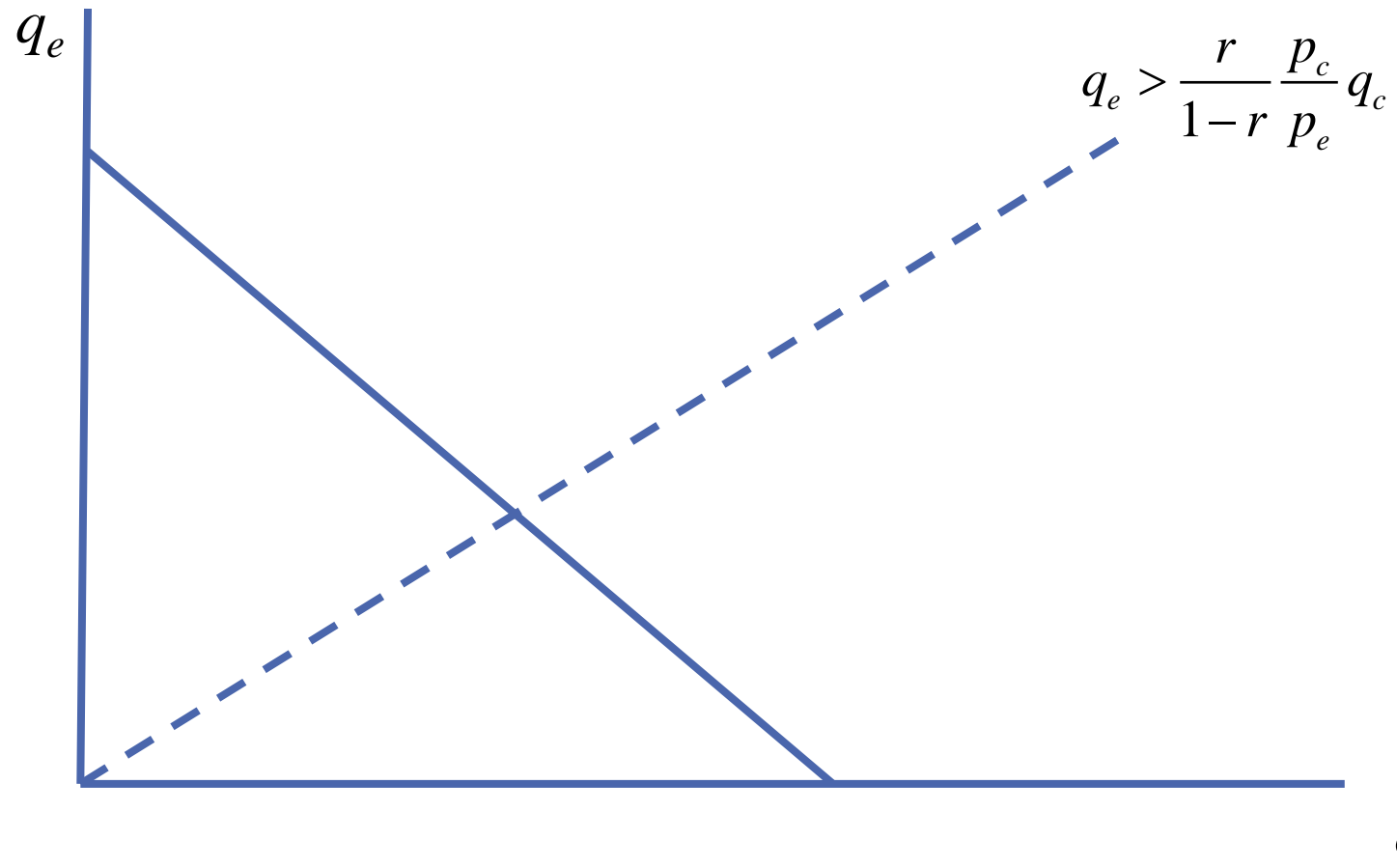
- Why should we prefer “standard” consumption to “actual” consumption?
- How can obtain “standard” consumption
- Combining data sources: exact vs probabilistic matching
- Very preliminary results

“Standard” vs “actual” consumption



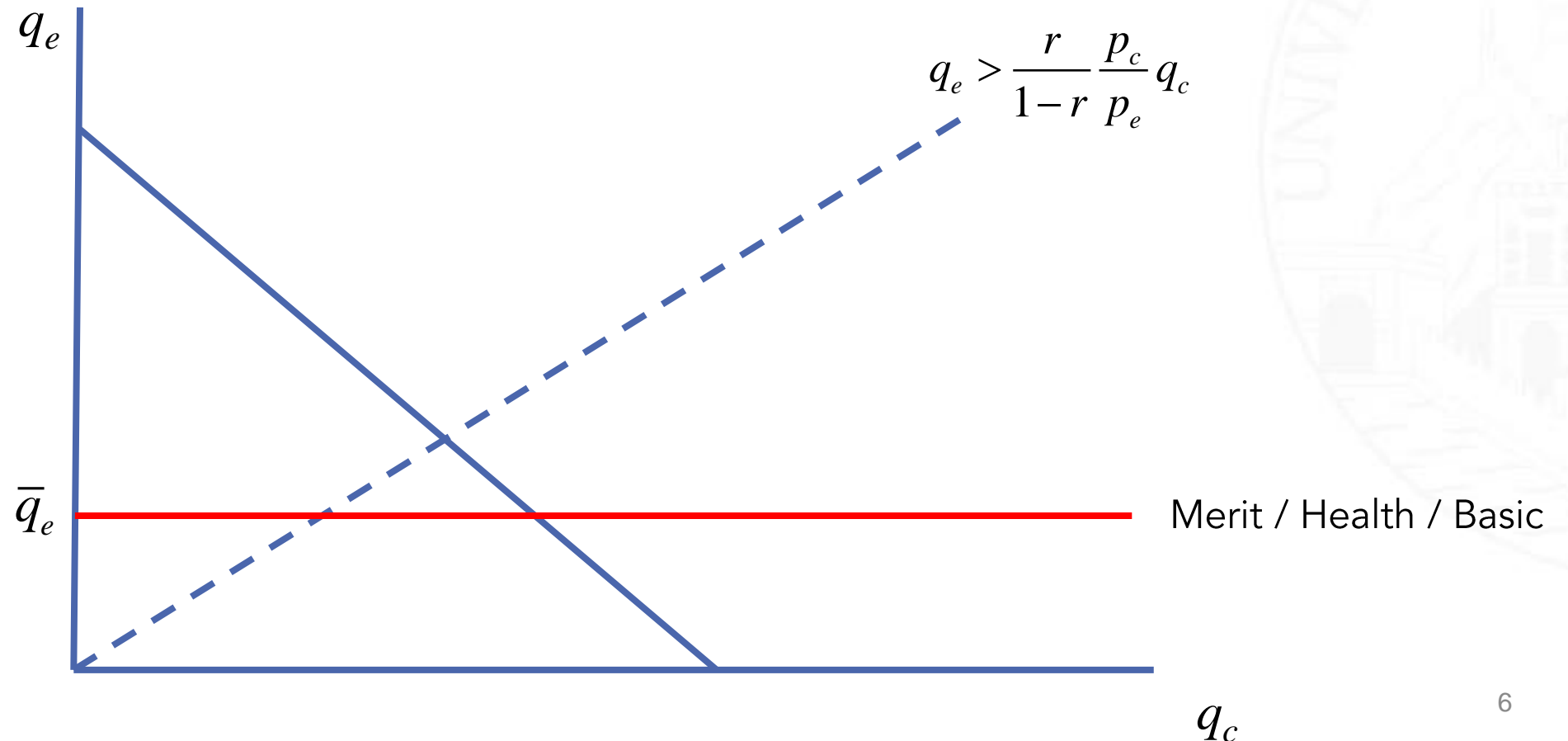
“Standard” vs “actual” consumption

$$\text{Poor if } \frac{p_e q_e}{Inc} = \frac{p_e q_e}{p_e q_e + p_c q_c} > r$$



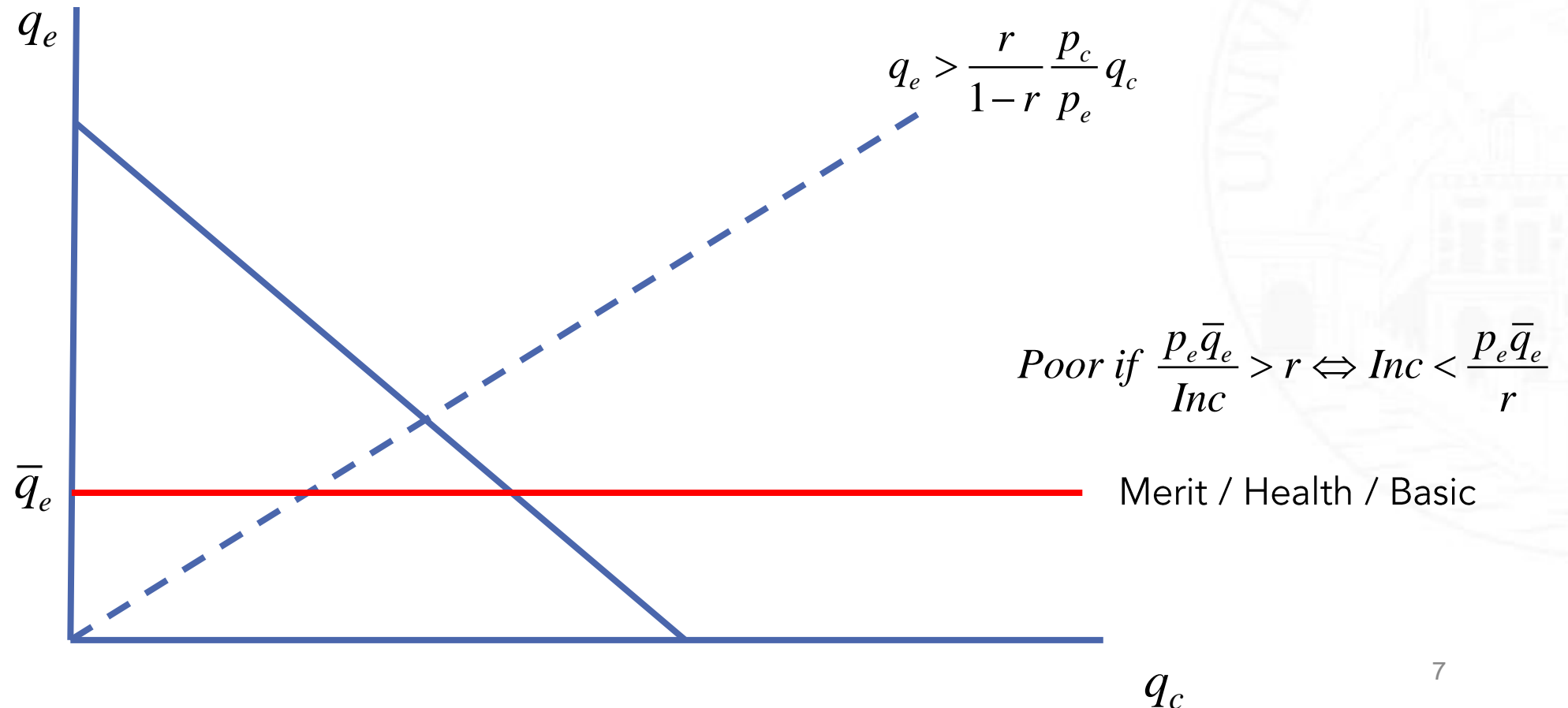
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“Standard” vs “actual” consumption

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Which “standard” consumption?

- Refer to
 - median/mean/... consumption of low income households (conditional on ...)
 - standard dwellings and standard heating needs
- Consumers cannot easily adjust
 - Accommodation size
 - Energy performance
 - Technology
- Survey data with energy performance assessors
- What if not available?

Combining data sources

Energy Performance Certificates (2015)

- Point geo reference
- General information on dwelling and building
- Energy source for heating, conditioning and hot water
- *Energy Efficiency Rating + Energy efficiency index (kwh/m²) + CO2 kg/m²*
- *Consumption, by energy source, to keep 20 C° 24h*
- *Potential efficiency gains and post intervention energy efficiency index*

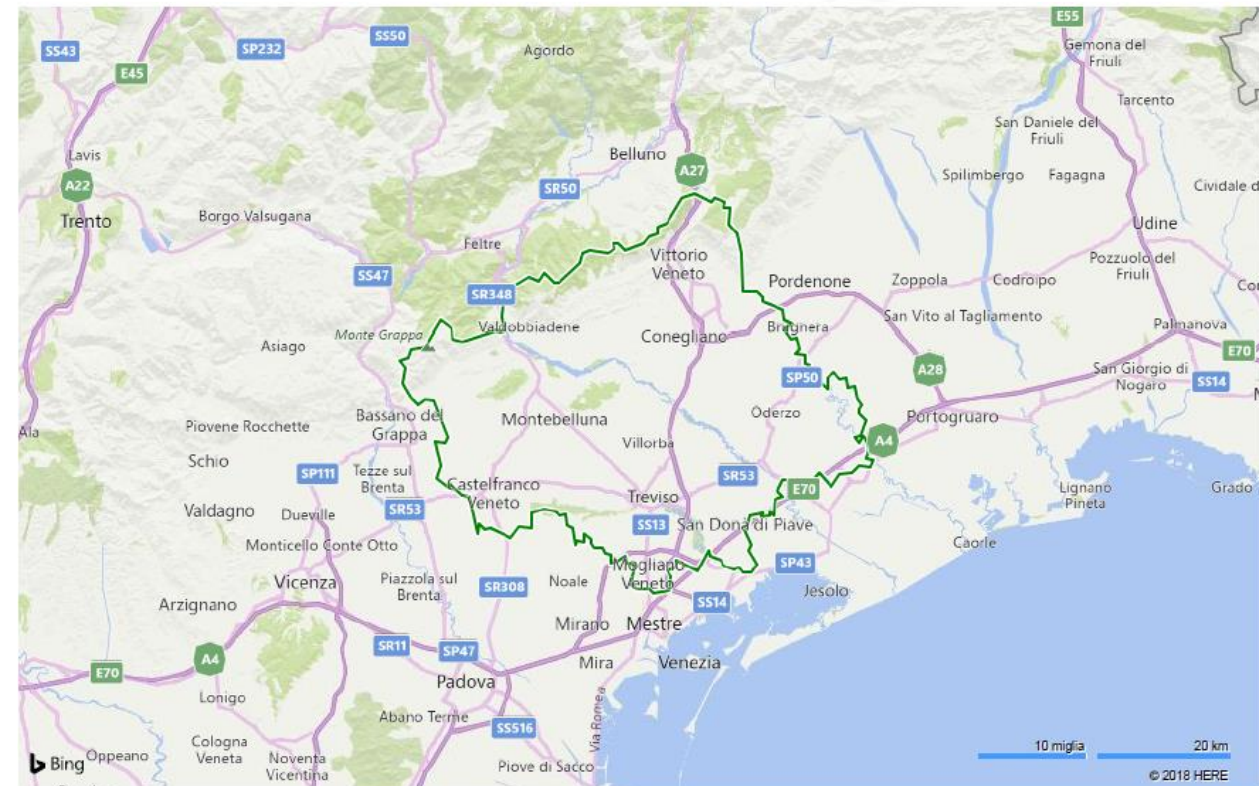
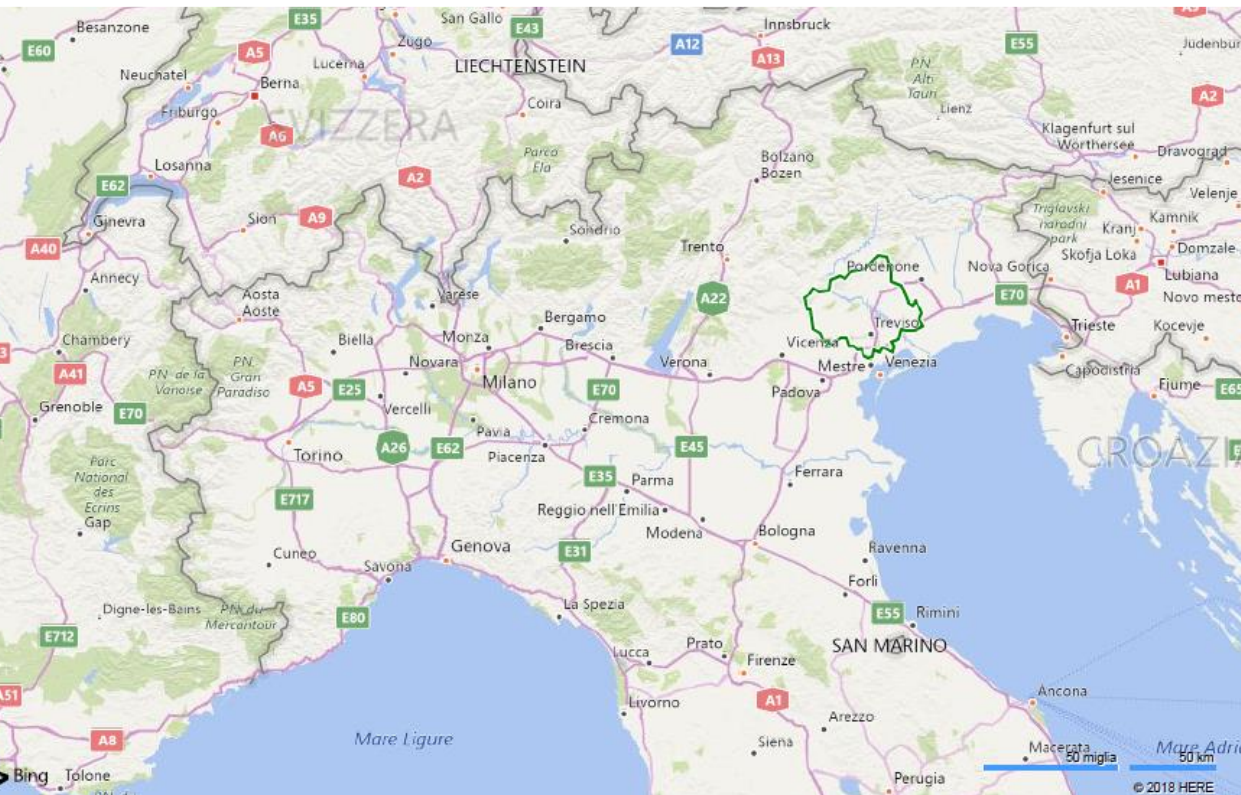
Population & Building Census (2011)

- Small area geo reference
- General information on dwelling and building
- Energy source for heating, conditioning and hot water
- *Household socio/economic characteristics*

Survey on Income & Living Conditions

- Regional geo reference
- General information on dwelling and building
- Energy source for heating, conditioning and hot water
- Household socio/economic characteristics
- Income

Small Area Experiment: Treviso Province



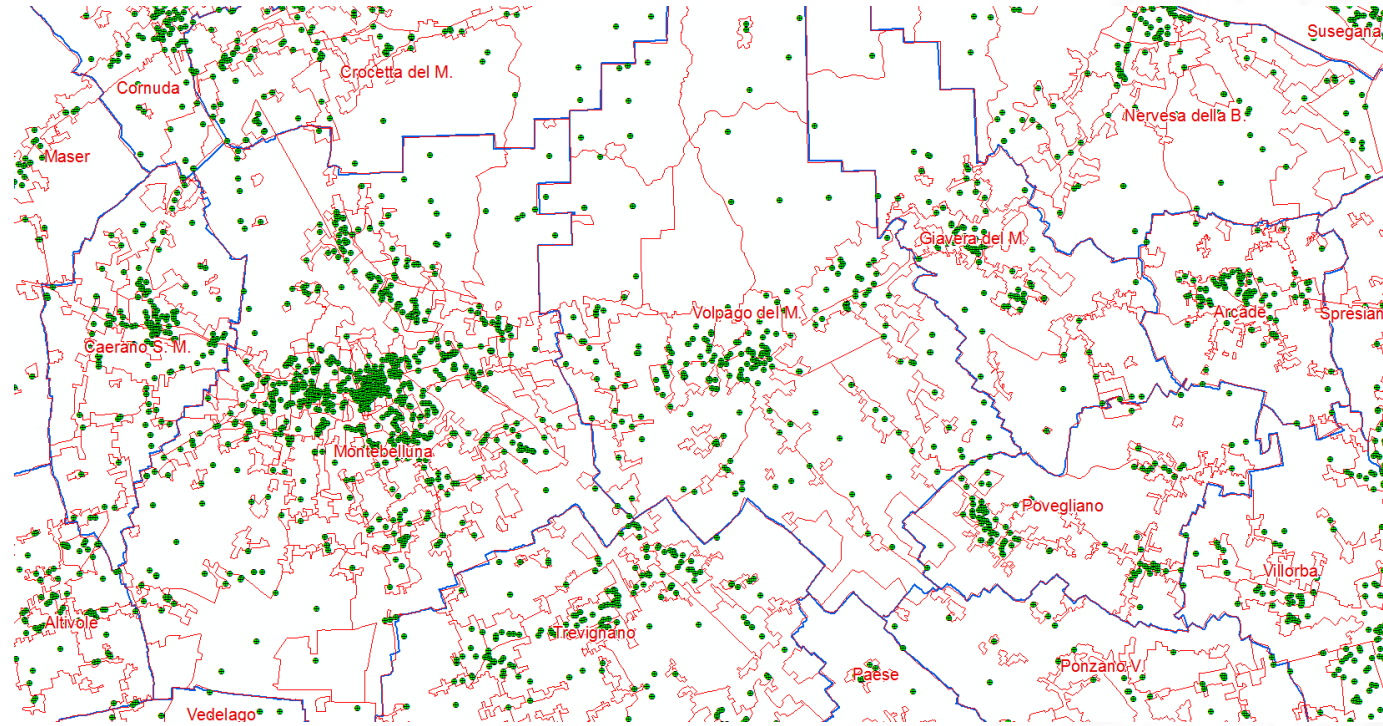
Combining data sources - Treviso

Energy Performance Certificates

- About 25,000 EPC for residential
- Data cleaning: about 20,000

Population & Building Census

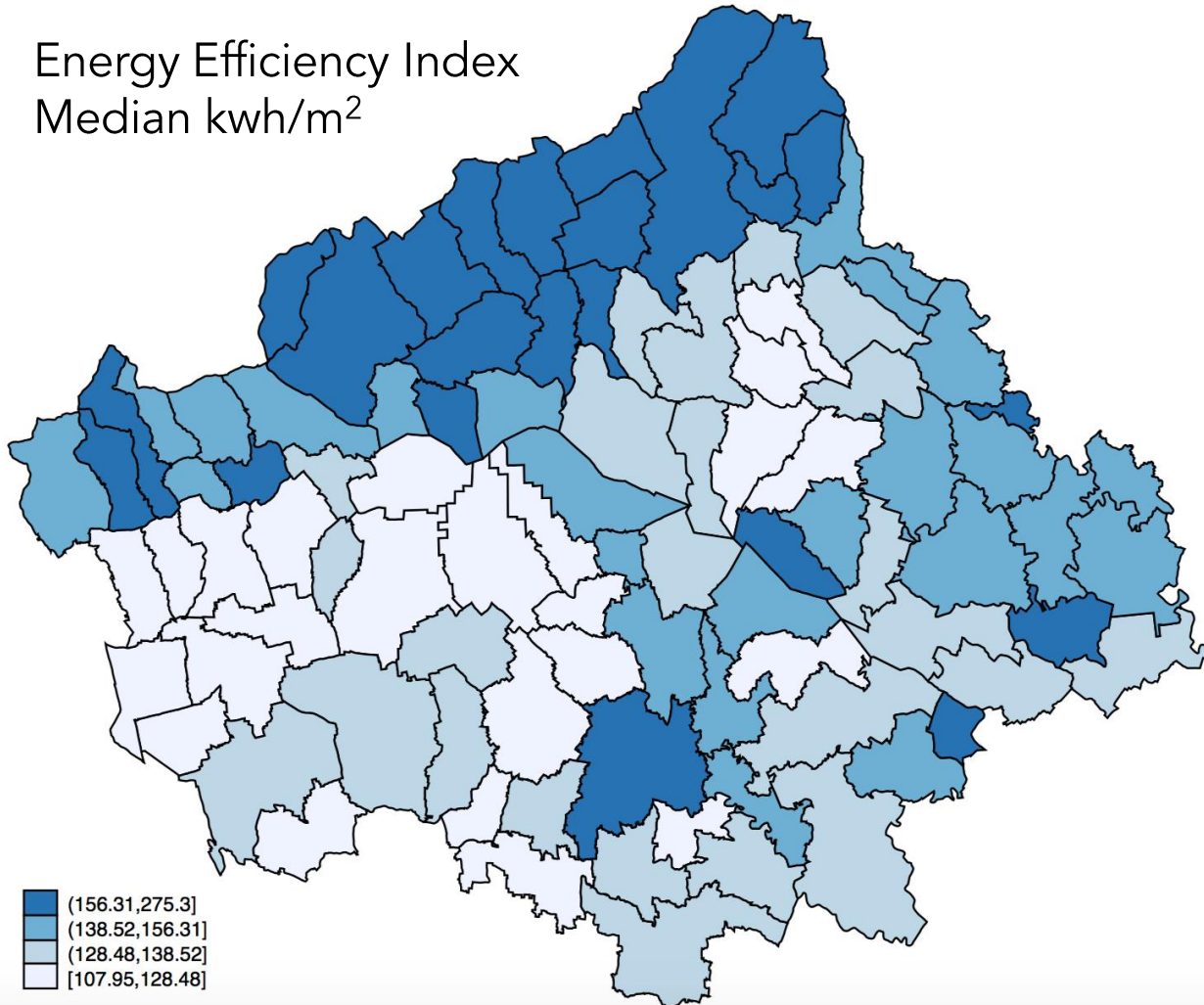
- About 400,000 dwellings
- About 340,000 not empty
- Data cleaning: about 280,000 (no heating)



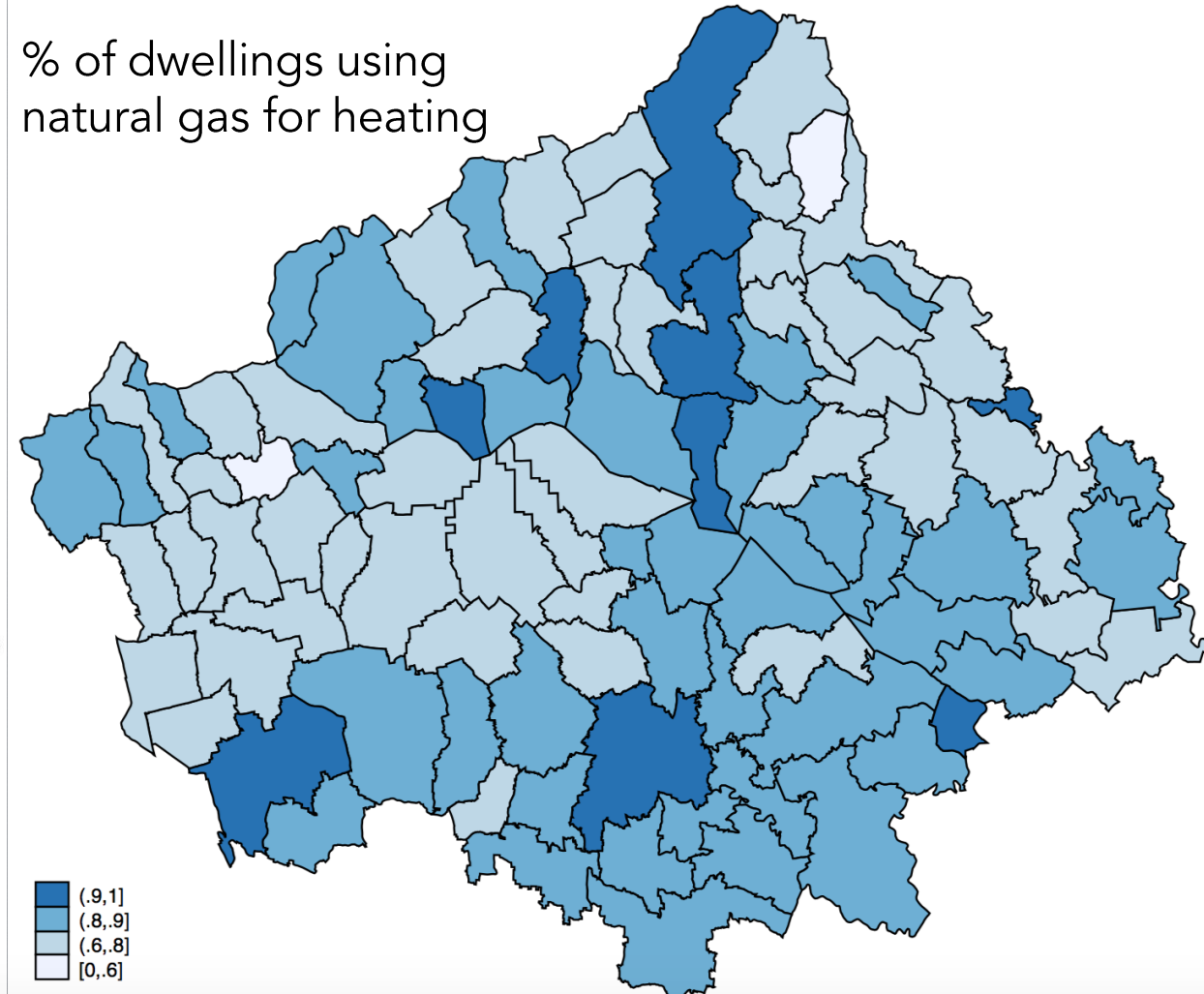
From point to small area geo reference

Energy Efficiency Index and energy source maps

Energy Efficiency Index
Median kwh/m²

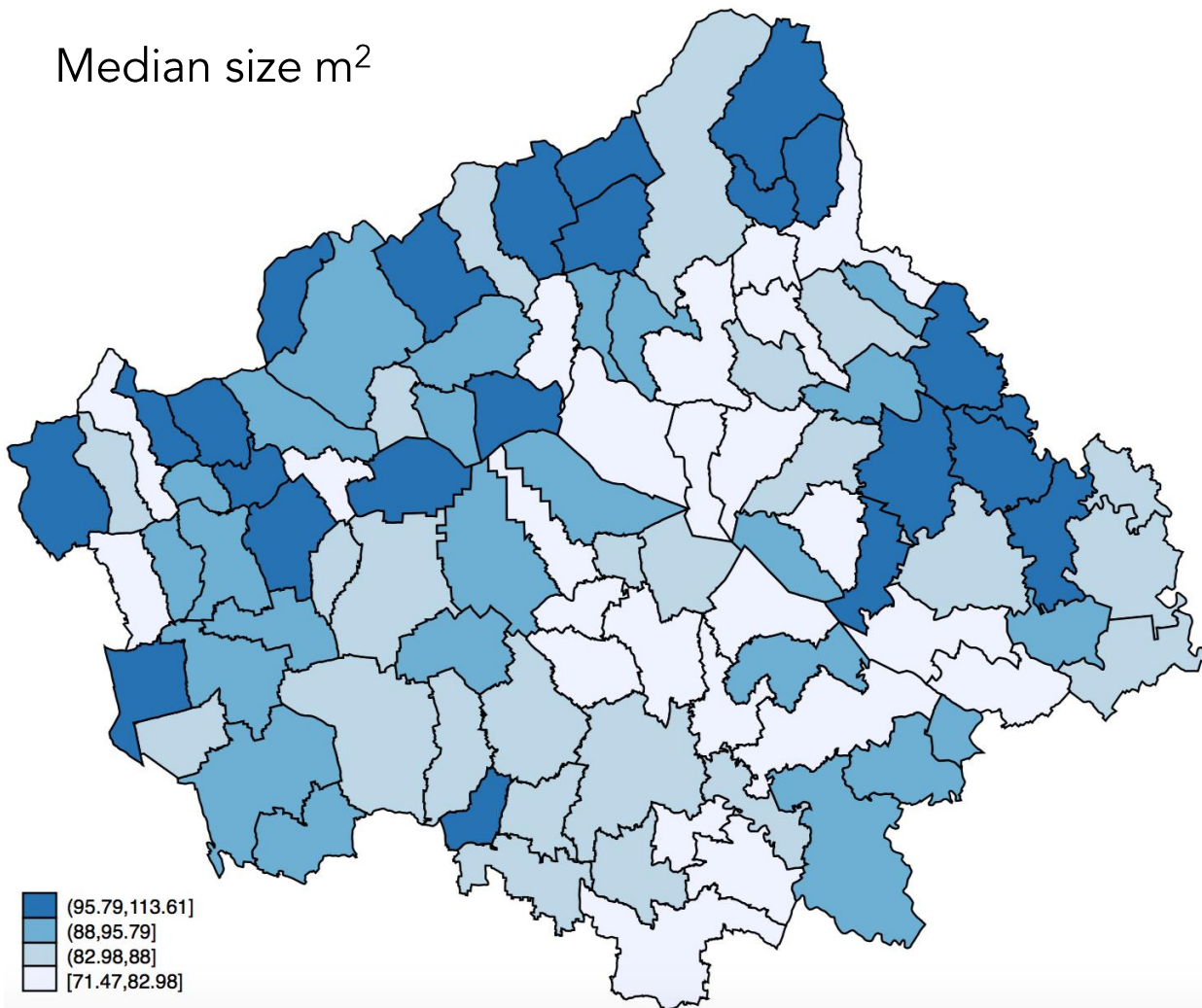


% of dwellings using
natural gas for heating

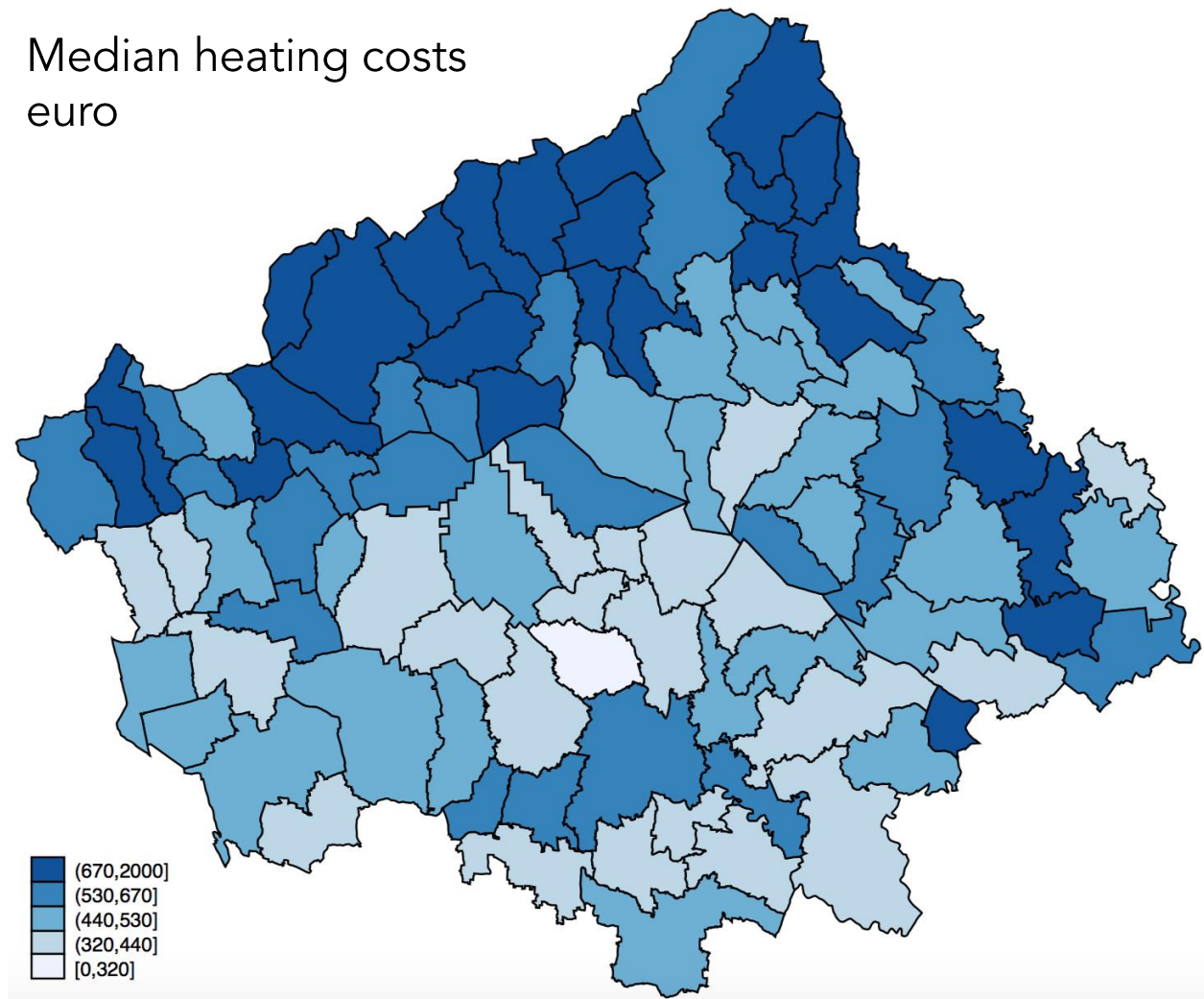


Dwelling size and heating costs maps

Median size m²

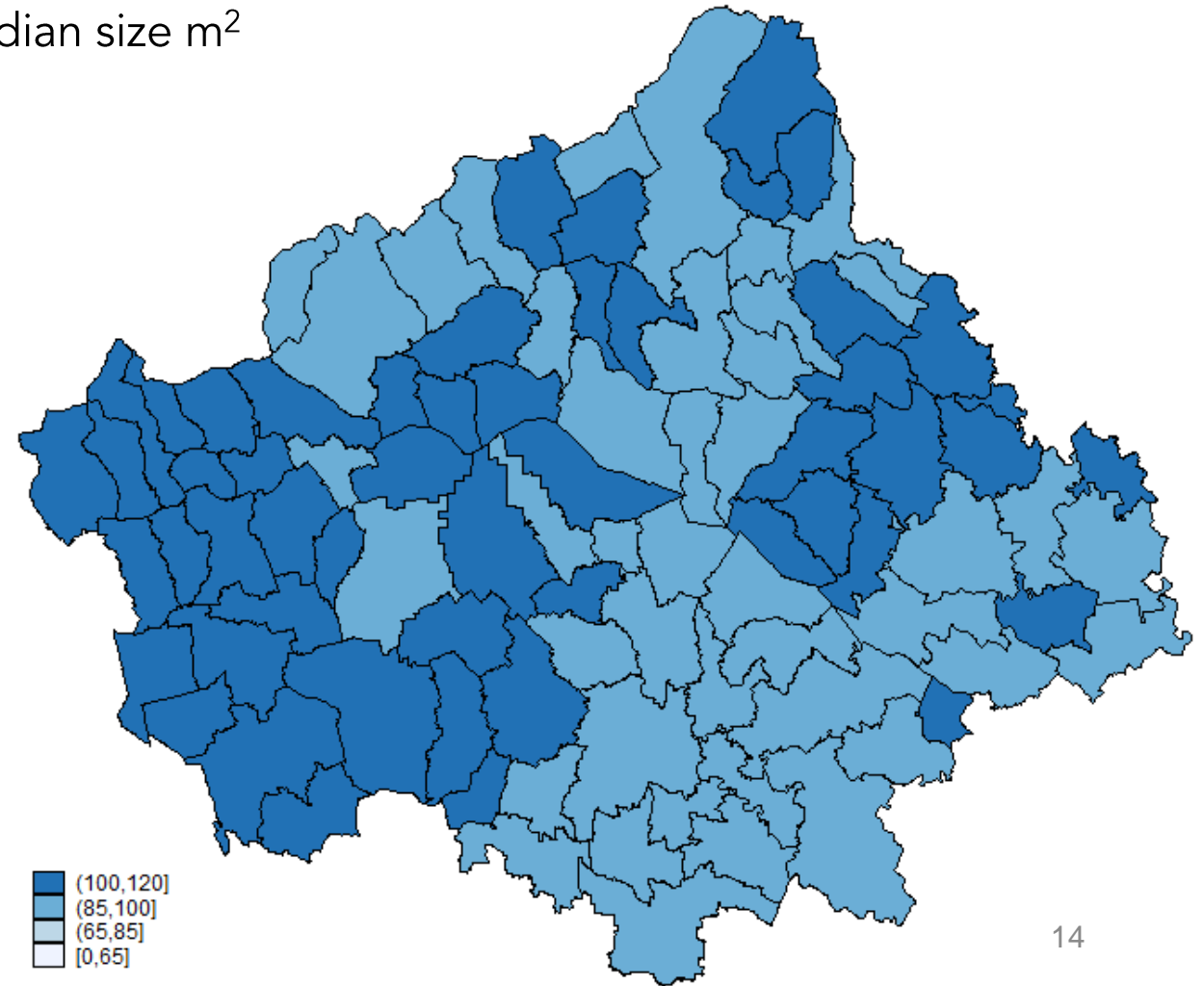
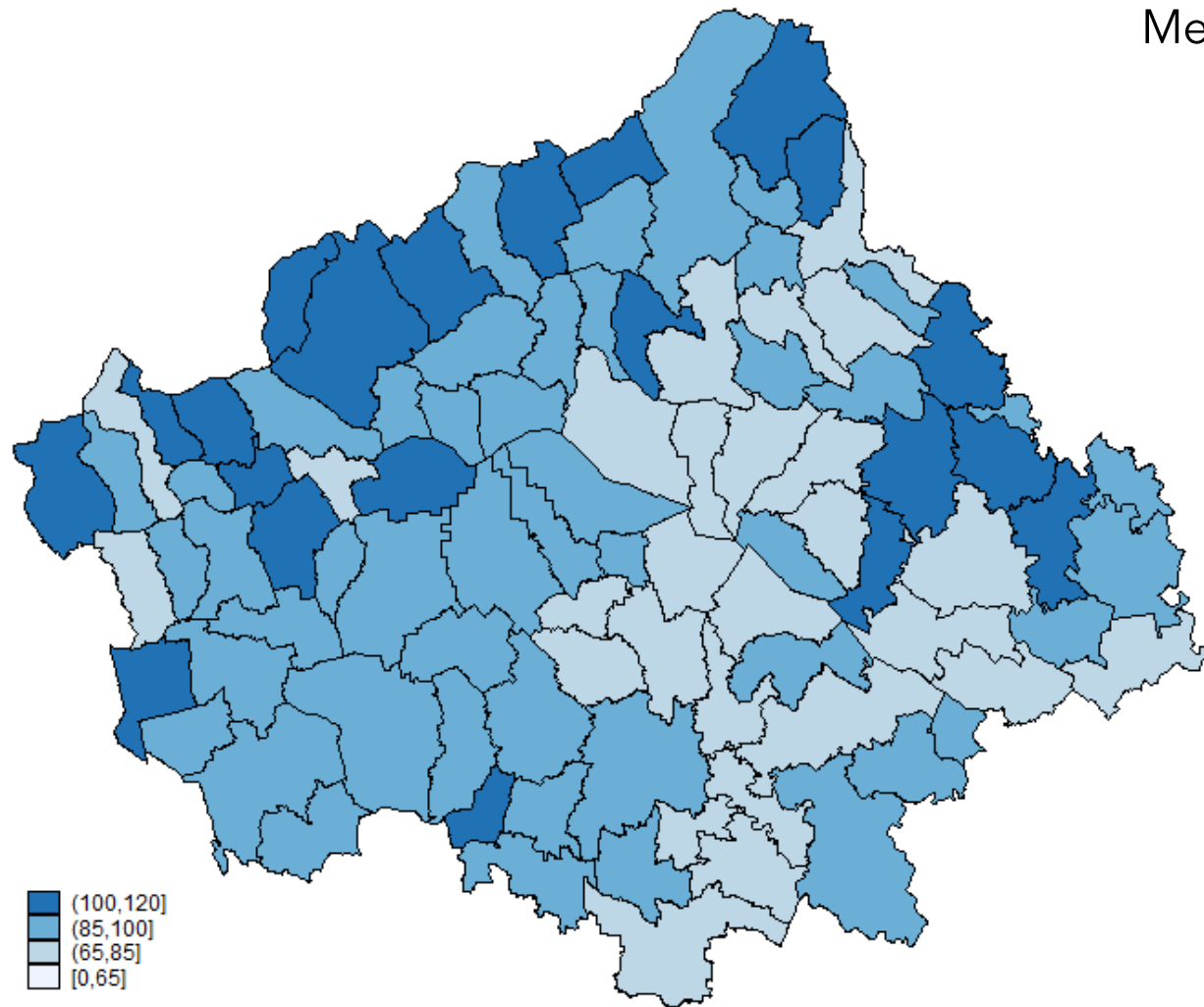


Median heating costs
euro



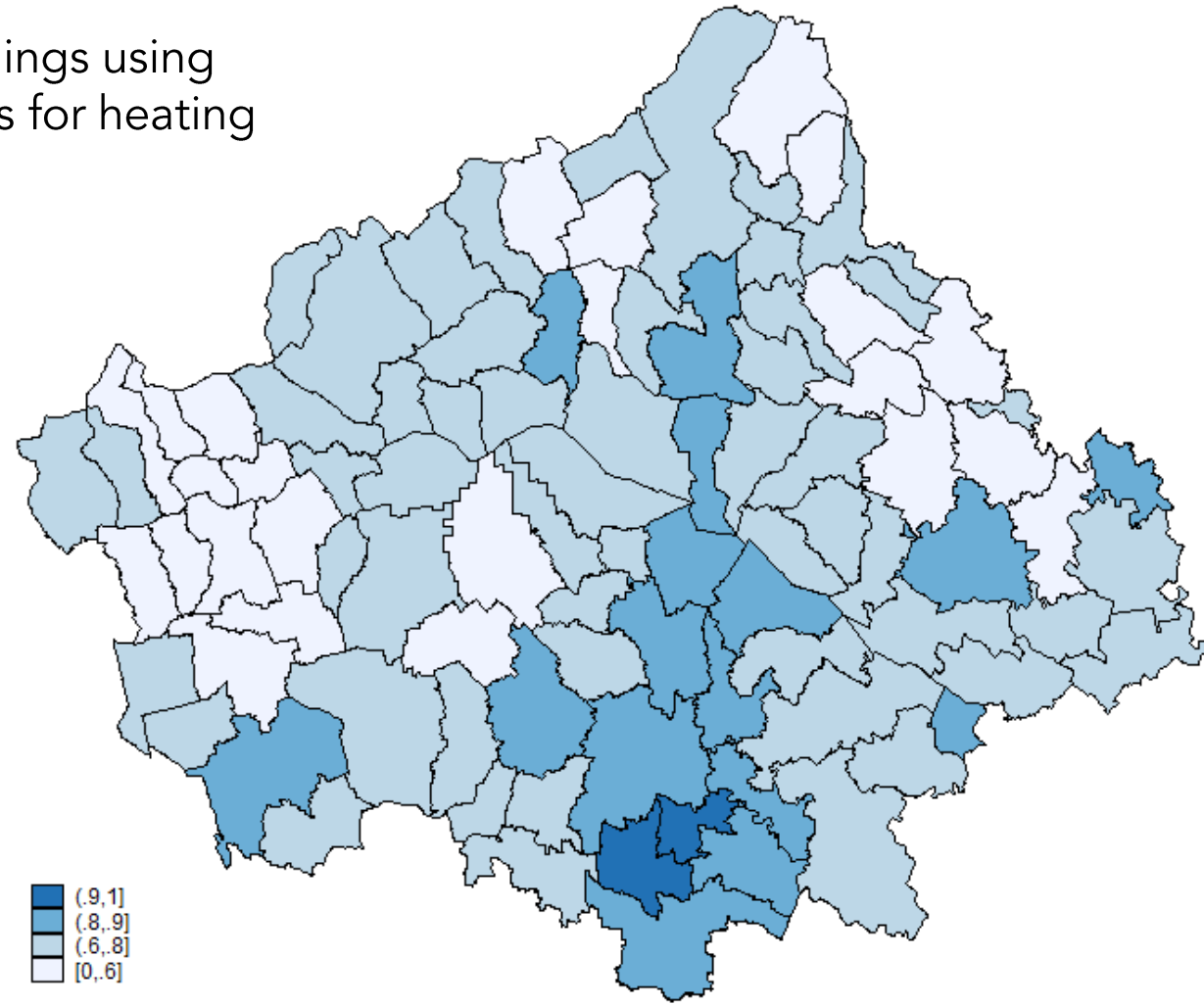
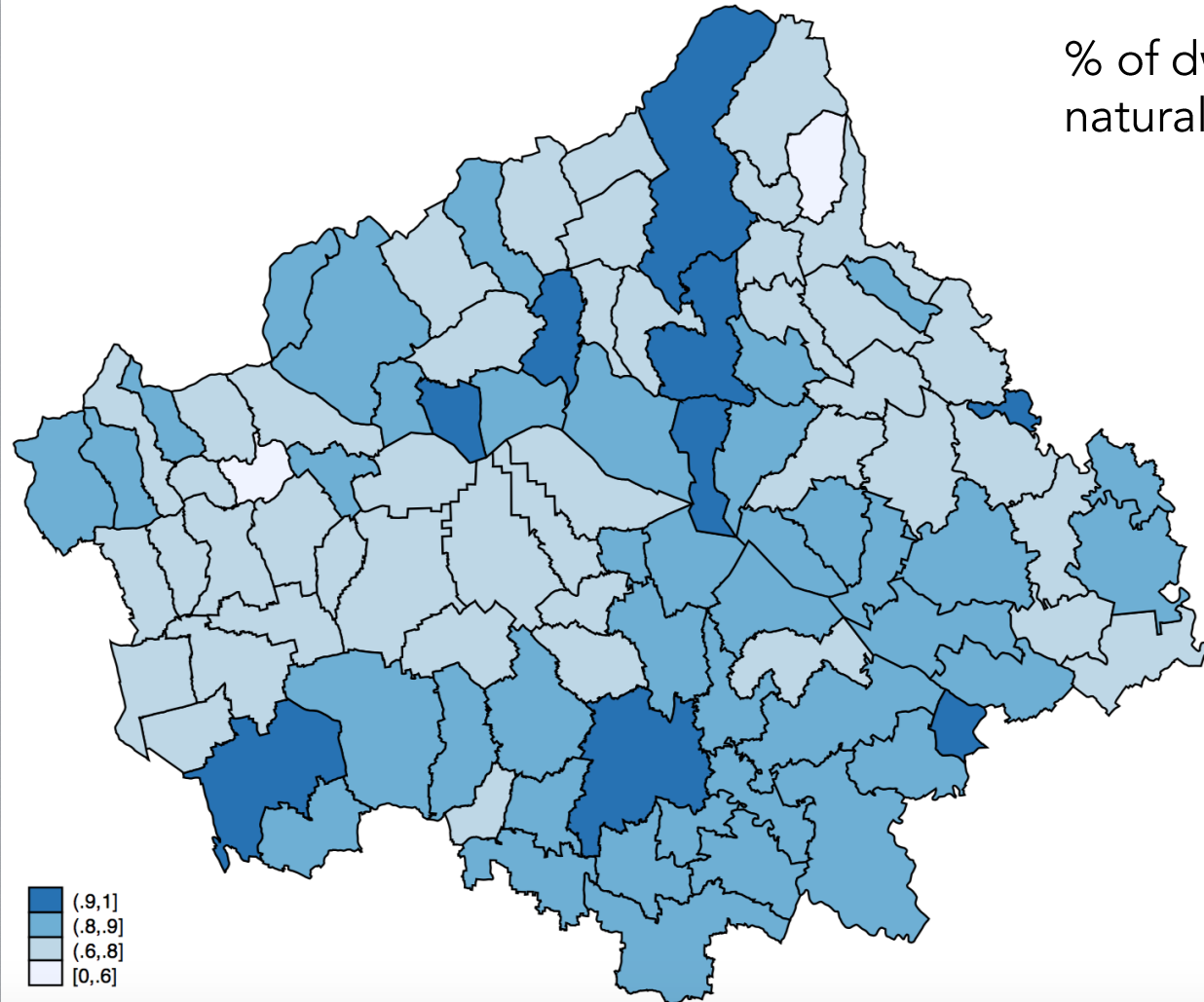
EPC vs Census data maps: size of the dwelling

Median size m²



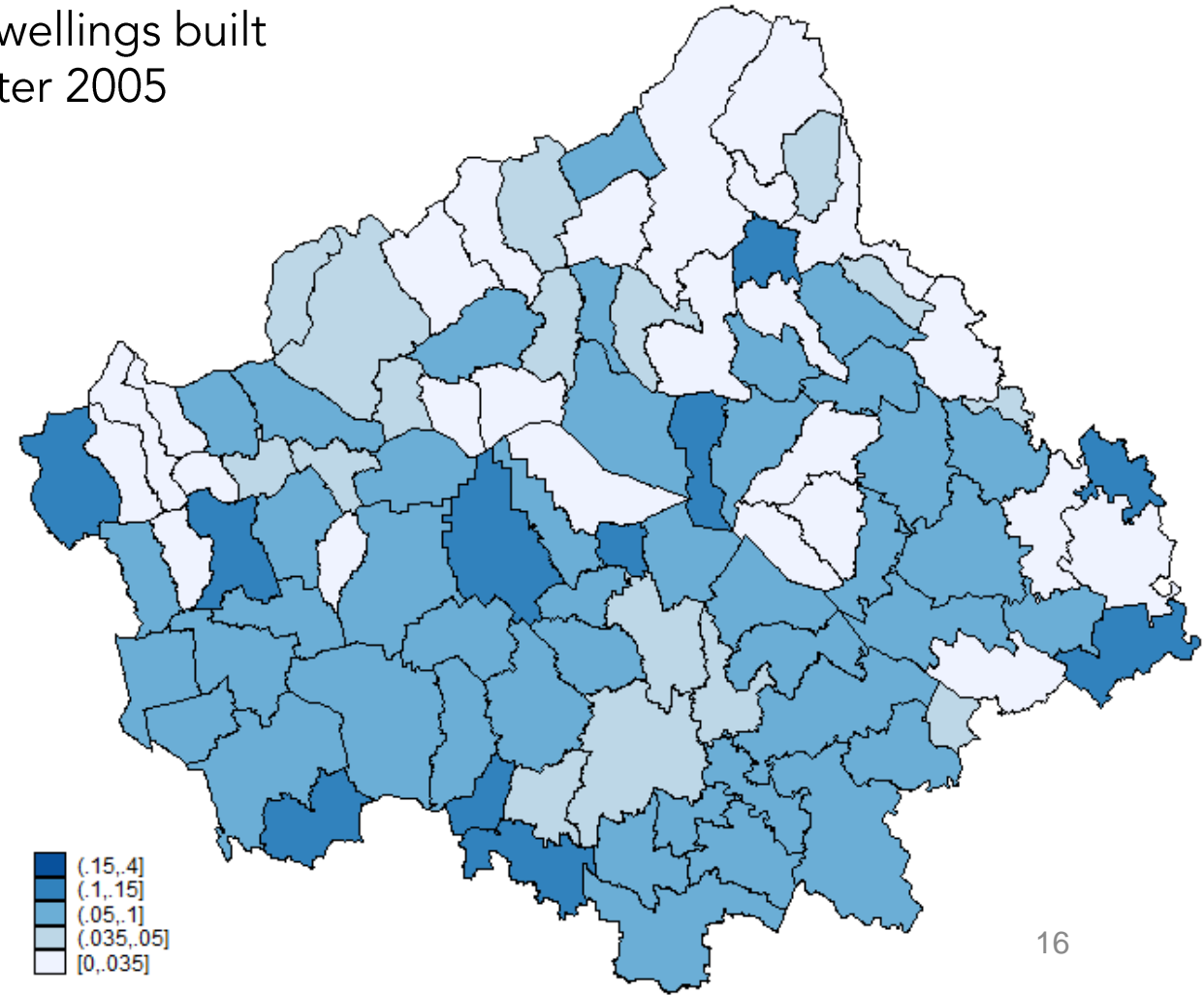
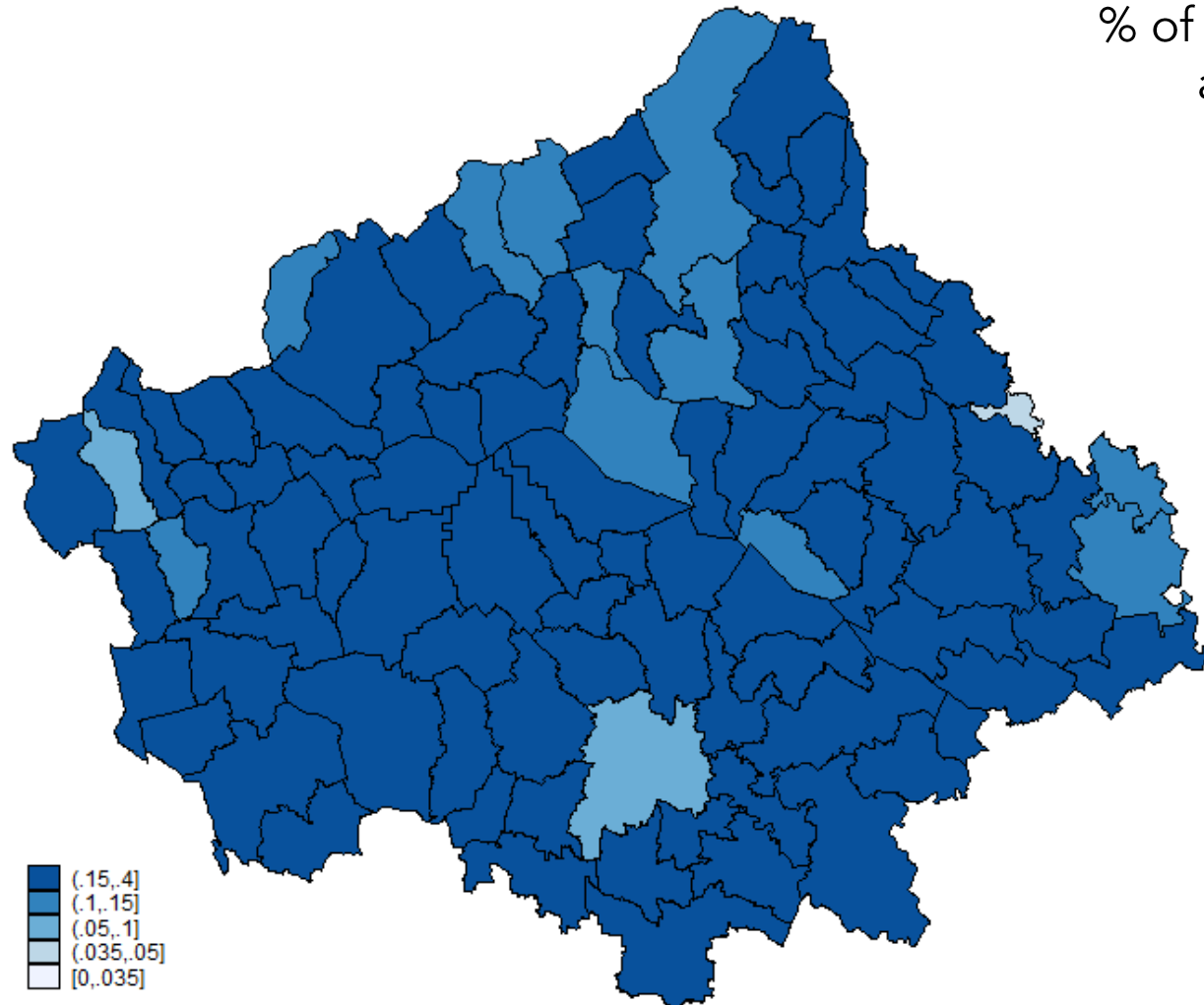
EPC vs Census data maps: natural gas

% of dwellings using
natural gas for heating



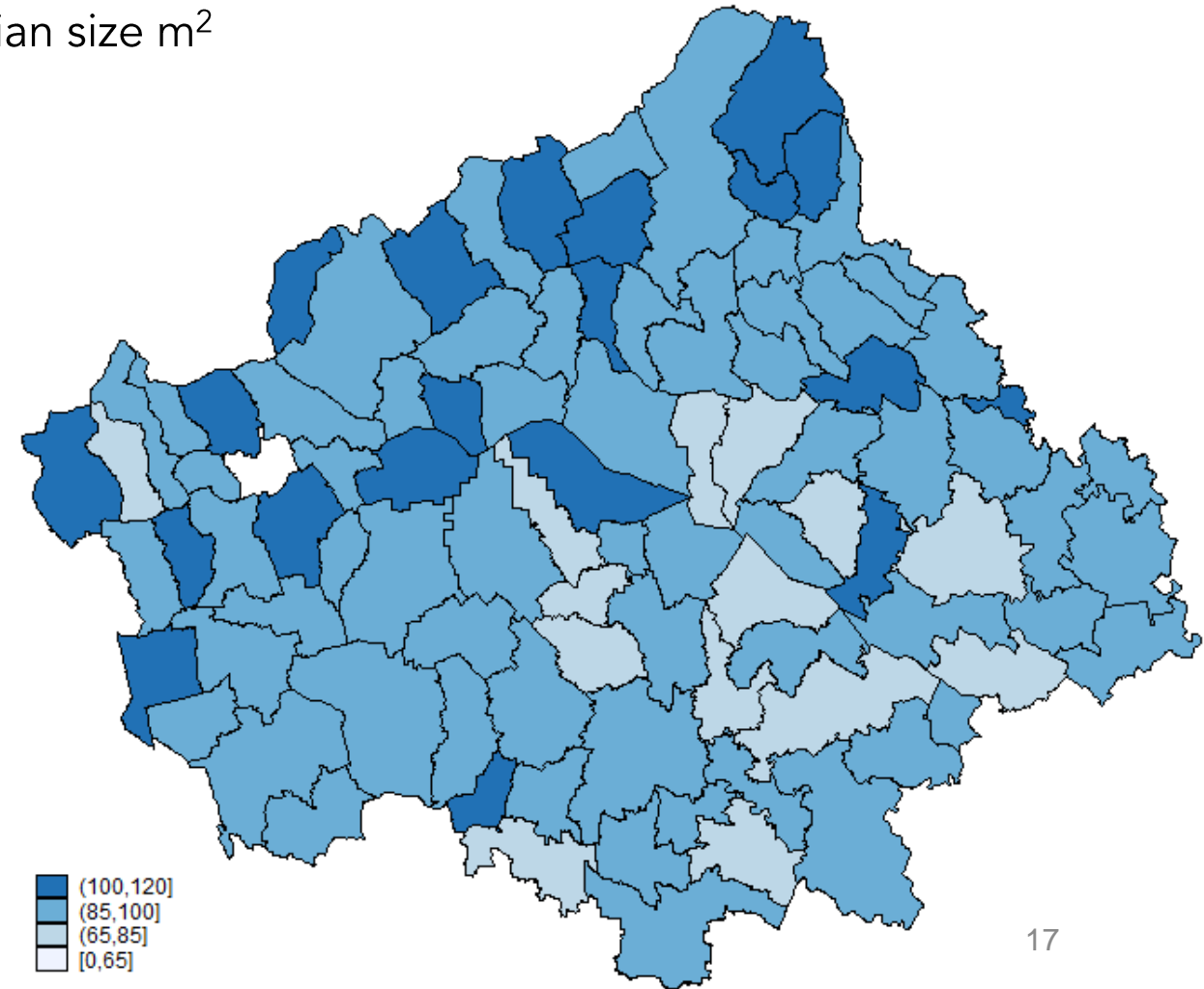
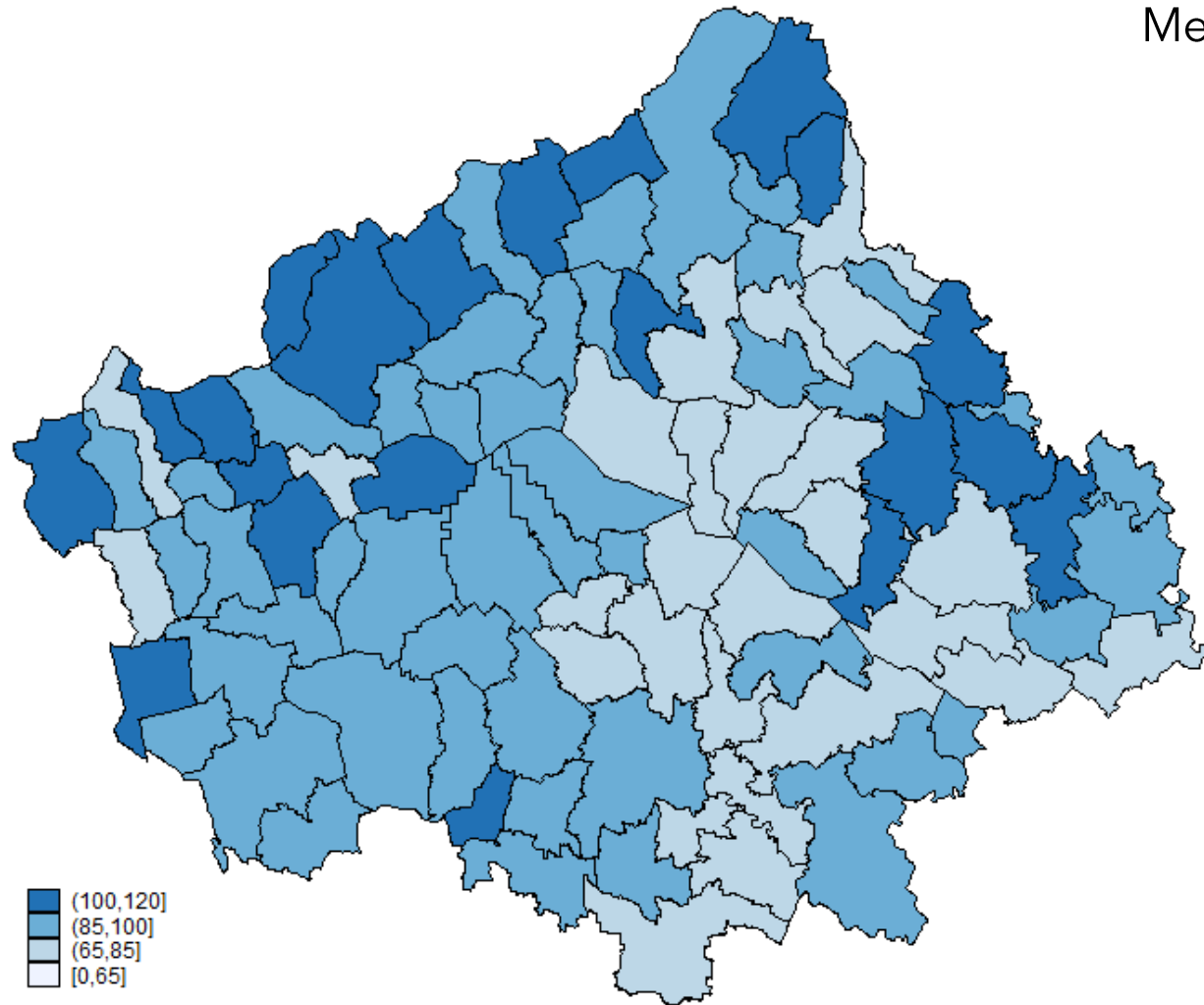
EPC vs Census data maps: age of the building

% of dwellings built
after 2005



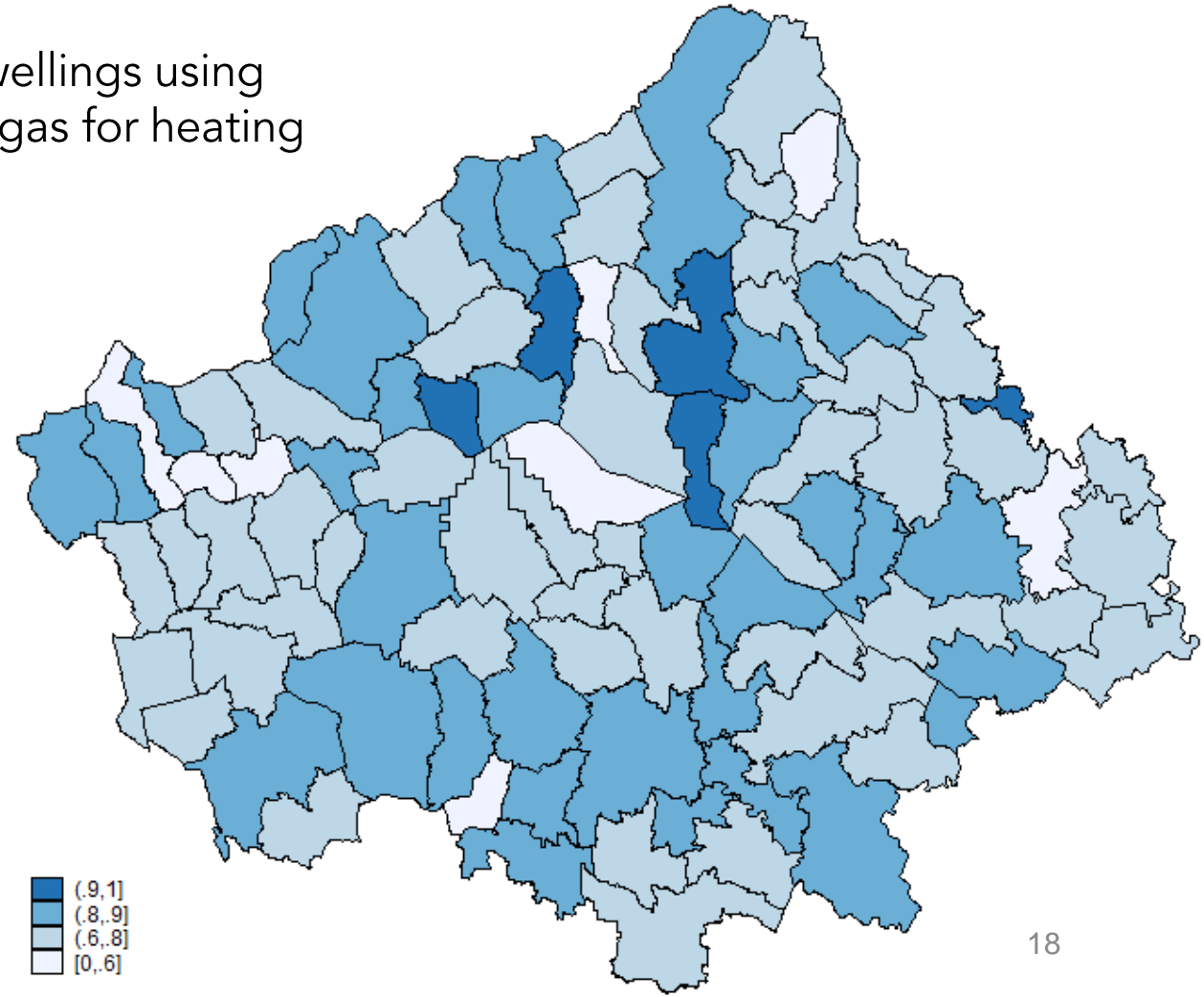
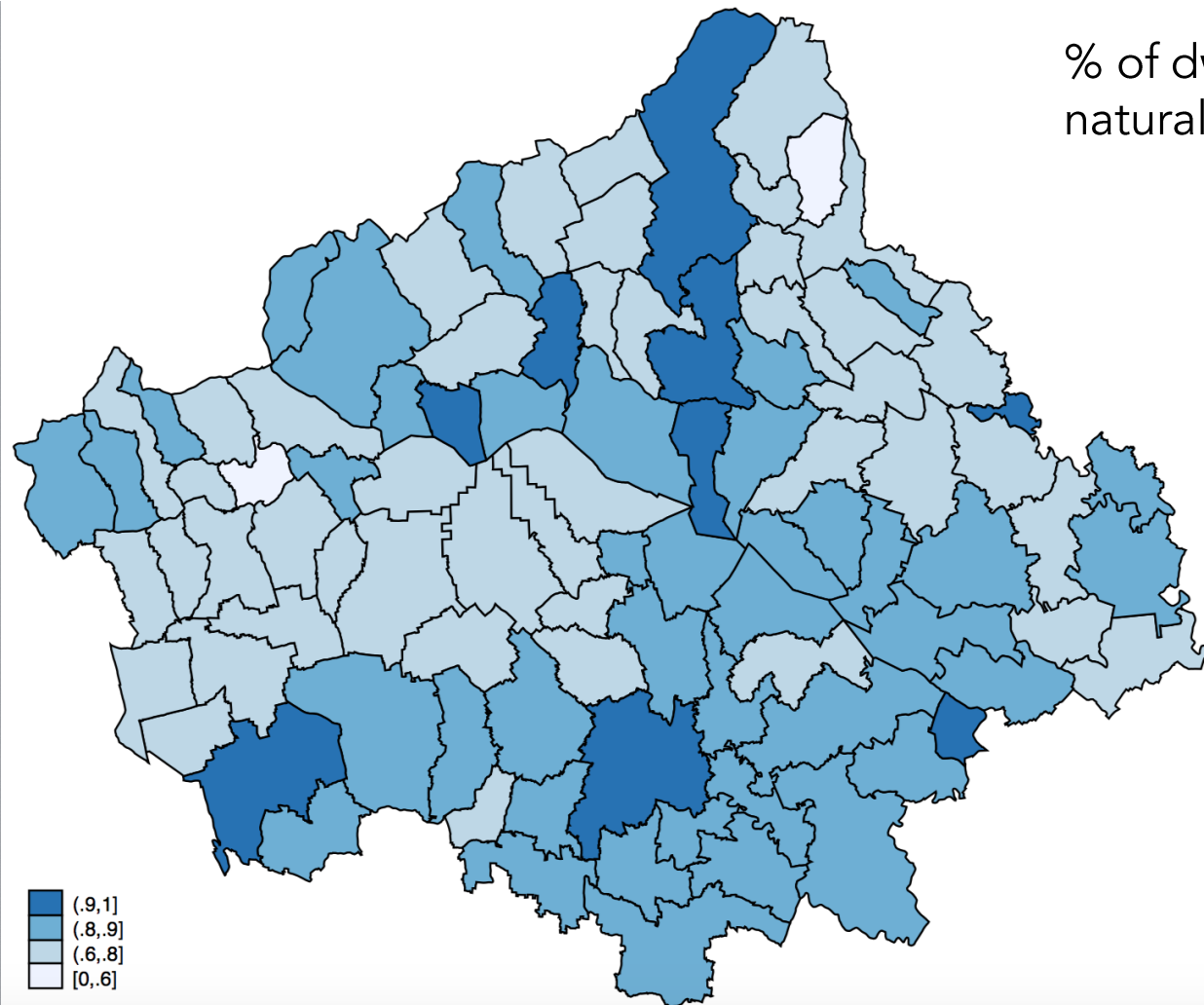
EPC vs matched Census data maps: size of the dwelling

Median size m²



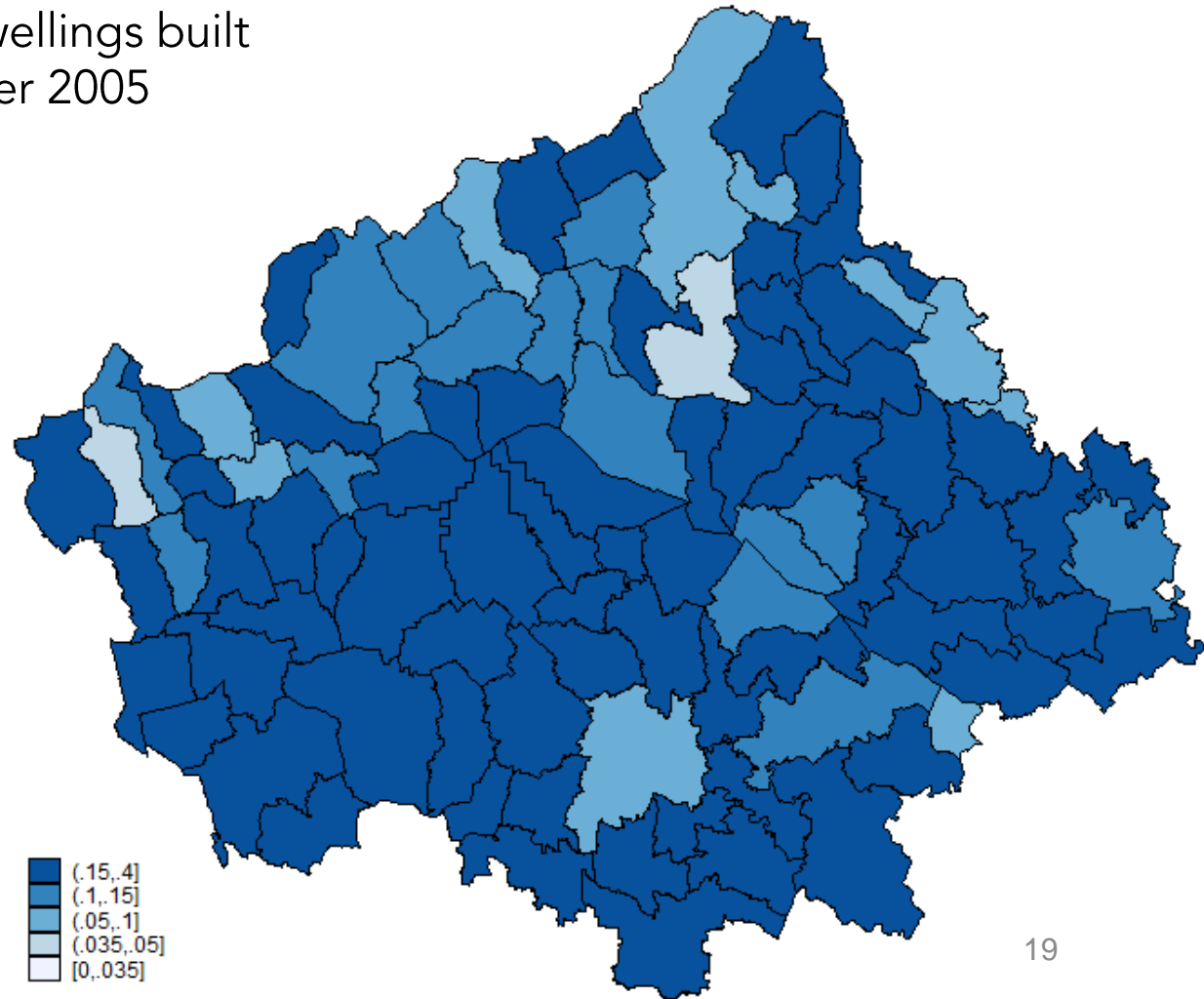
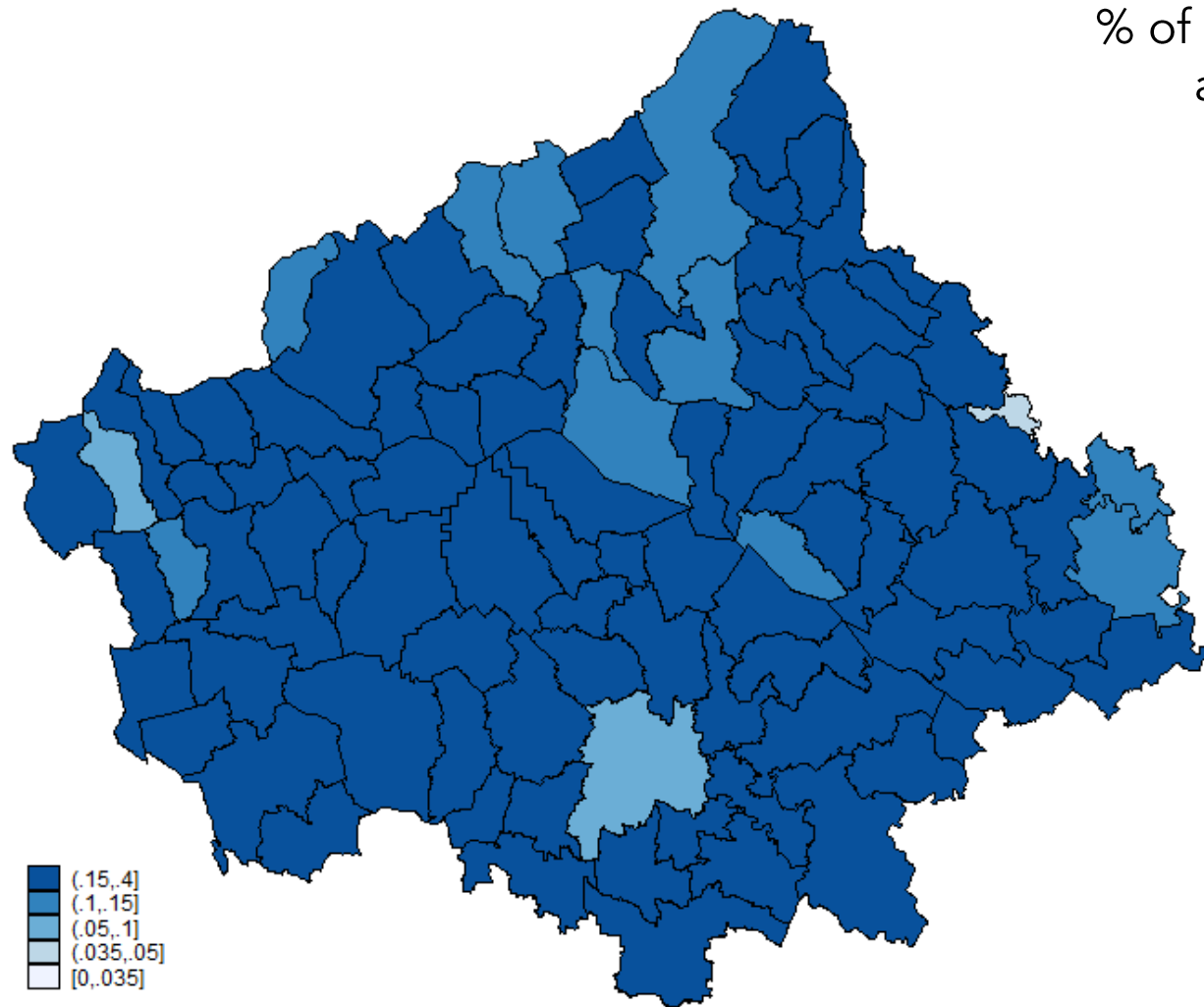
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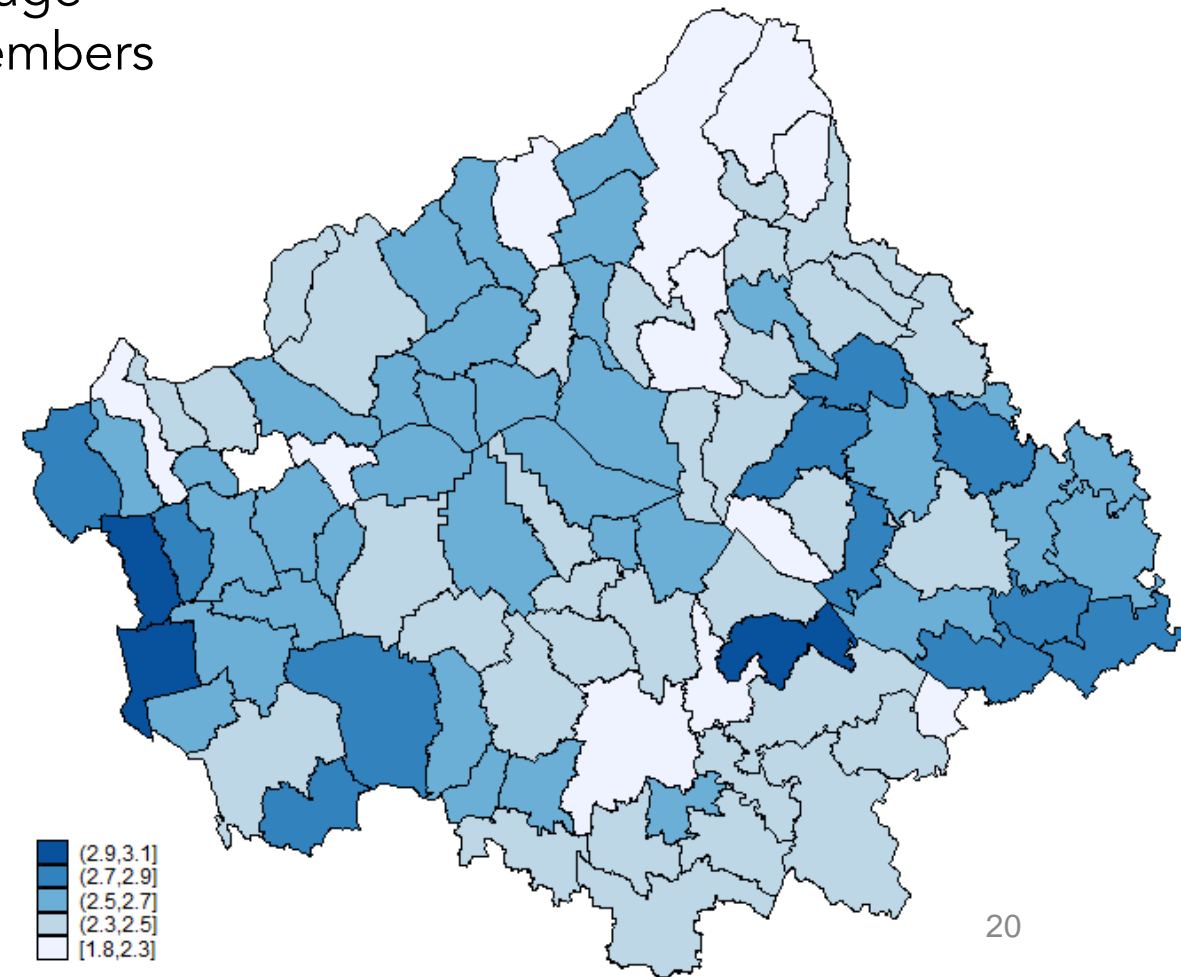
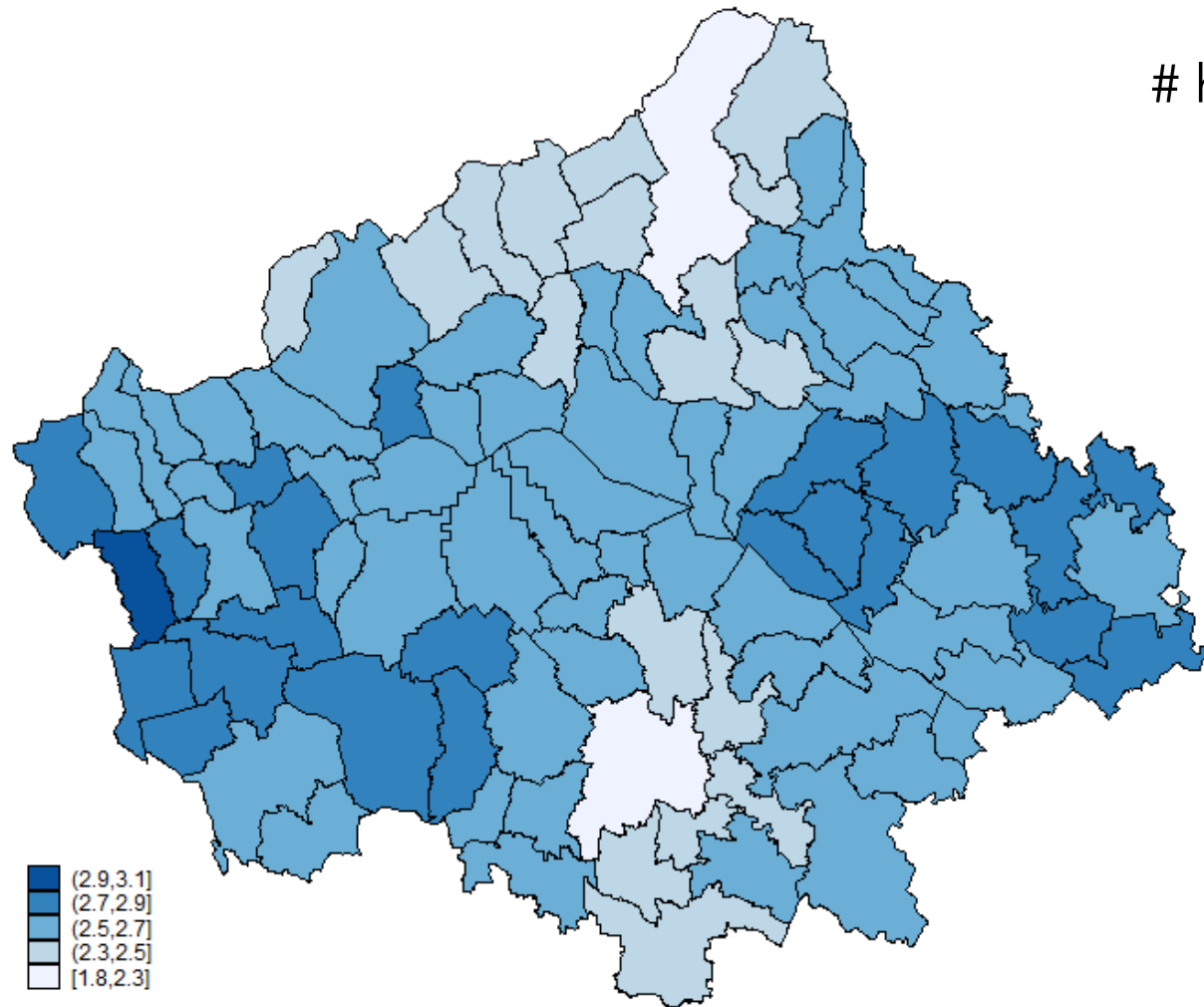
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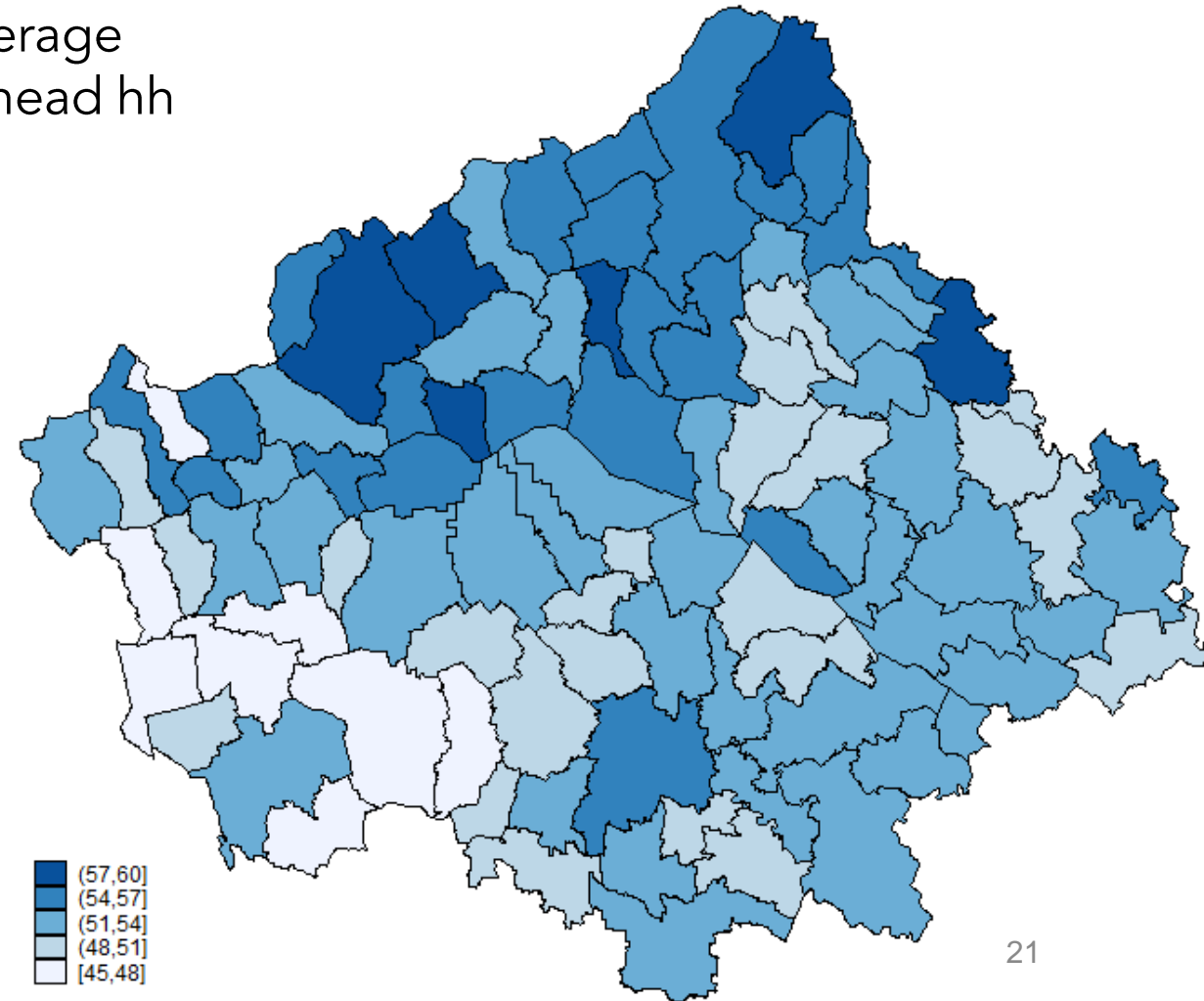
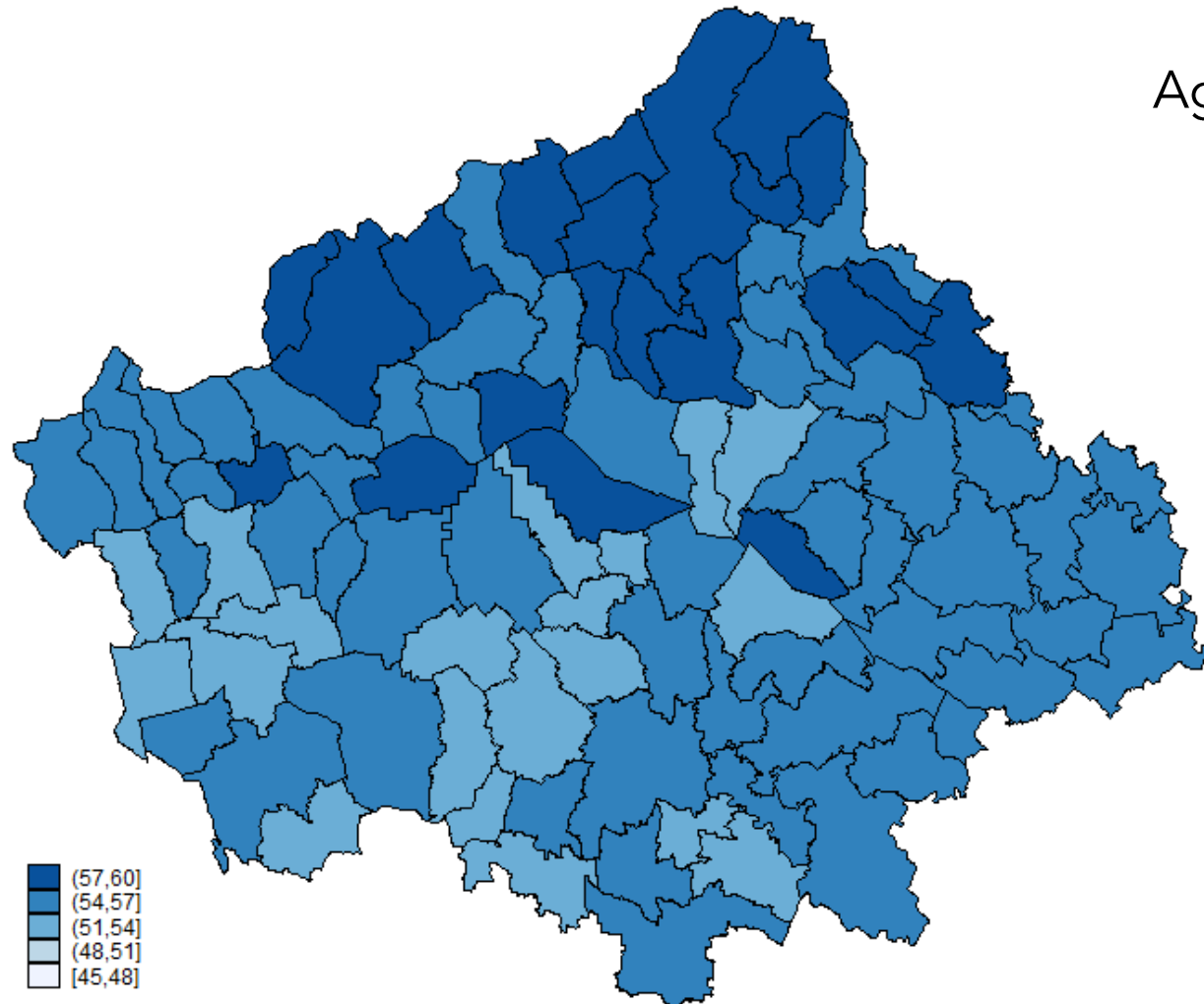
Census vs matched Census data maps: household size

Average
hh members



Census vs matched Census data maps: household age

Average
Age head hh



Conclusions

Use of complementary data sources:

- Doable
- Different stocks of dwellings
- Different population
- Caution necessary for policy

Next:

- Costs, affordability e poverty map