EUROMODspatial Italy: a new model to evaluate the fiscal and distributional impact of public policies at local level

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POST-COVID: POverty and vulnerability Scenarios in The era of COVID-19: how the pandemic is affecting the wellbeing of the Italians

Fondazione CARIPLO

Background

- Increasing relevance of social outcomes and policy impacts at local level
  - “The revenge of the places that don’t matter” (Rodrìguez-Pose 2018)
  - Socio-spatial effects and patterns of macro-economic shocks and tax-benefit policies with impact on inequality and social cohesion (Cassiers and Kesteloot, 2012)
  - Geographical outcomes of government actions and forecasts at the local level (Openshaw, 1995: 60)
  - Existing gap between geography and social policy (Whitworth, 2019) but increasing devolution of fiscal and social responsibilities at local levels

Motivations

- There is no dataset of individuals and households which can be used both

  (i) to explore spatial variations in living conditions and behaviour

  (ii) to monitor the effects of changes in taxation and social policies at local level

- Admin data not always accessible, limited coverage in terms of vulnerable population and income sources.
- EU-SILC mainly at NUTS-1 (or NUTS-2 but no more disaggregation)

Potential solutions

- Spatially disaggregated population microdata through
  - A massive new survey

- very costly

- confidentiality problems

  - Spatial microsimulation modelling

- synthetically reproduce households which look as similar as possible to the real ones

- construction of small area microdata from combining samples, surveys and small area data

- spatial microsimulation makes possible the analysis of public policies and their reforms at local level combining with fiscal microsimulation models

(Static) Spatial Microsimulation

- Two sources of data
  - High-quality aggregate data with a high degree of accuracy and reliability (i.e. census)
  - Survey, nonspatial microdata with relevant information on income and tax-benefit system (i.e EU-SILC in EUROMOD)
- Estimation of small-area microdata through reweight of survey data to fit in small-area descriptions based on census using demographic and socioeconomic characteristics as “small-area constraint variables”

Small Area Estimations

- Imputing into population census data an outcome variable (e.g. equivalised disposable income; poverty status) from household survey data—which has a sample to small for small area disaggregation
  - World Bank method based on regressions (Elbers et al. 2003)
  - M-quantile approach (Chambers and Tzavidis 2006; Giusti et al.)
  - Empirical Best Prediction approach (Molina and Rao, 2010)
- However, in order to adapt the multiple outcomes of a tax-benefit microsimulation model to small areas we need to retrieve the whole information set from surveys

Opportunities for EU countries

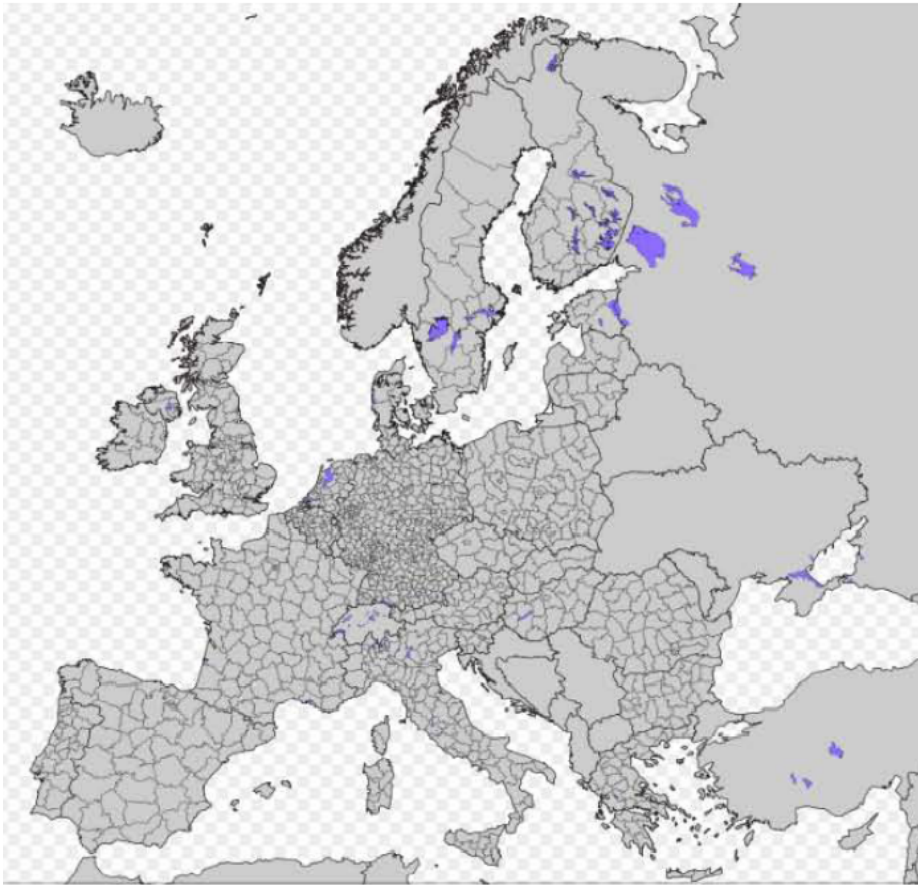
- Linking the existing spatial microsimulation approach (Ballas et al. 2007, 2017; Tanton et al. 2009) to tax-benefit microsimulation using EUROMOD
  - Apply in a cross-country perspective already existing open-source spatial microsimulation methodology (Lovelace and Ballas 2013)
  - Increase the scope of EUROMOD in terms of policy simulation (i.e. tax-benefit policies at local, sub-regional, level)
  - Enhance knowledge of distributional and policy effects at local level (e.g. municipality)

EUROMOD

- A static multi-country tax-benefit microsimulation for the EU (Sutherland and Figari, 2013)
- 27 countries [+ UK] (mainly) using the EU-SILC as input data
- Yearly update (policy and data, up to very recent policy system)
- Simulation of
  - ☐ Income taxes, employee and employer SICs, benefits that depend on current income and observed characteristics
  - ☐ Plus unemployment benefits, with assumptions
  - ☐ Remaining benefits (e.g. contributory pensions, disability benefits) taken from input data and updated to policy year where necessary
  - ☐ (non cash income and indirect taxes for selected countries)
- Free for research purposes subject to obtaining microdata access permission (European Commission JRC Seville and Eurostat)

What does "local level" refer to?

- Local level or small area as domain of interest, for which the sample size is not adequate to produce reliable direct estimates – in EU lower than NUTS2 level
- NUTS-3 level or lower
  - Italy: 107 Provinces
    - Municipalities
  - Germany: 429 Districts (Kreis)



(some) examples of Spatial Microsimulation applications linked to tax-benefit models

- Ballas et al., 2005, SimBritain BHPS
- Panori et al., 2017, SimAthens EU-SILC
- Chin et al. 2005; Harding et al., 2009; Tanton et al., 2009; Vu & Tanton, 2010, NATSEM/Australia Tax benefit model
- O'Donoghue et al. 2013, SMILE/Ireland

EUROMODspatial Italy

- Census of Italian population
- 100% coverage
- Fine geographical detail
- Small area data available only in tabular format with limited variables to preserve confidentiality
- (Micro data available for research purposes)

- IT-SILC
- Sample size: more than 40,000 individuals, representative of 21 regions
- Annual surveys (waves) since 2004

- EUROMOD
- Simulation of tax-benefit systems since 2001

- Fiscal data - MEF
- Tabular format from tax returns

EUROMODspatial Italy

- Census of Italian population at 2018
- IT-SILC 2019 (income 2018), representative at regional level
- EUROMOD Tax-benefit system: 2018 (external validation), 2021-2022 (to analyse tax reform)
- Fiscal data: 2018 (external validation)

- Geographical coverage for all Italy
  - Analysis at provincial level (NUTS-3 – 107 provinces / autonomous provinces)
  - Further information for the regional Administrative Centres (Capoluogo di Regione) at the municipal level.

EUROMODspatial Italy

- Main “small-area constraint variables” (correlated with the target variables of the micro-simulation) available in Census
  - Gender
  - Age
  - Marital status
  - Education
  - Main economic activity
  - Income (frequency)

EUROMODspatial Italy

- Reweighting approach
  - We start form the sample of a given region (NUTS2)
  - We assign to every record a new weight for every province (municipality) to make it 'representative' of that small area.
    - E.g. the 5000 observations of the IT-SILC sample for Lombardy (NUTS-2) are reweighted to create a small area microdata at provincial level – NUTS-3 (matching the aggregate SILC variables to the census variables)

(Static) Spatial Microsimulation

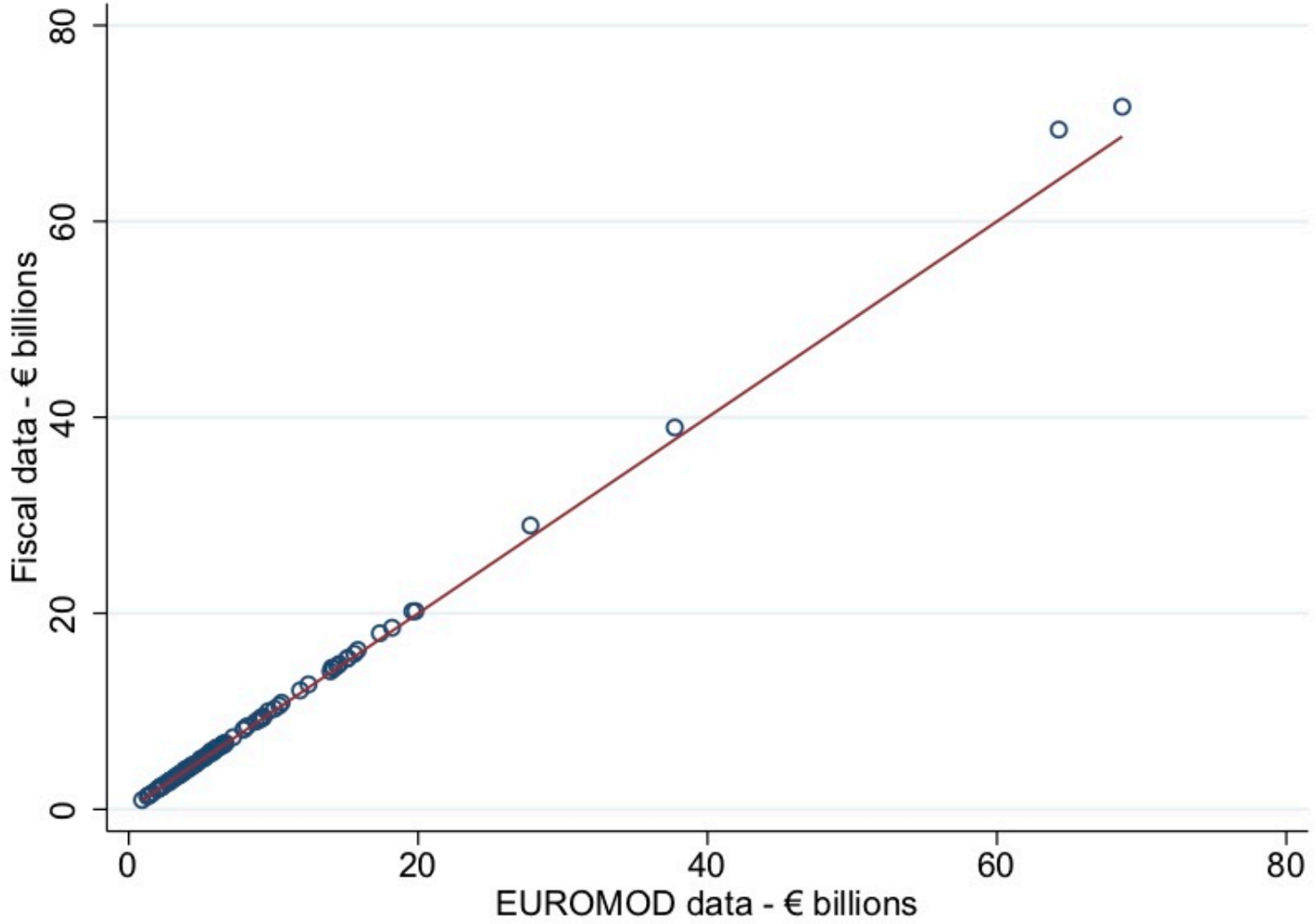
- Reweighting approaches
  - probabilistic, which typically reweight an existing national microdata set to fit a geographical area description on the basis of random sampling and optimisation techniques
  - deterministic, which reweight a non geographical population microdata set to fit small area descriptions, but without the use of random sampling procedures. Such approach uses the iterative proportional fitting (IPF) technique to give a weight to each individual, by adjusting for each constraint variable the initial weight through a reweighting algorithm

Model validation

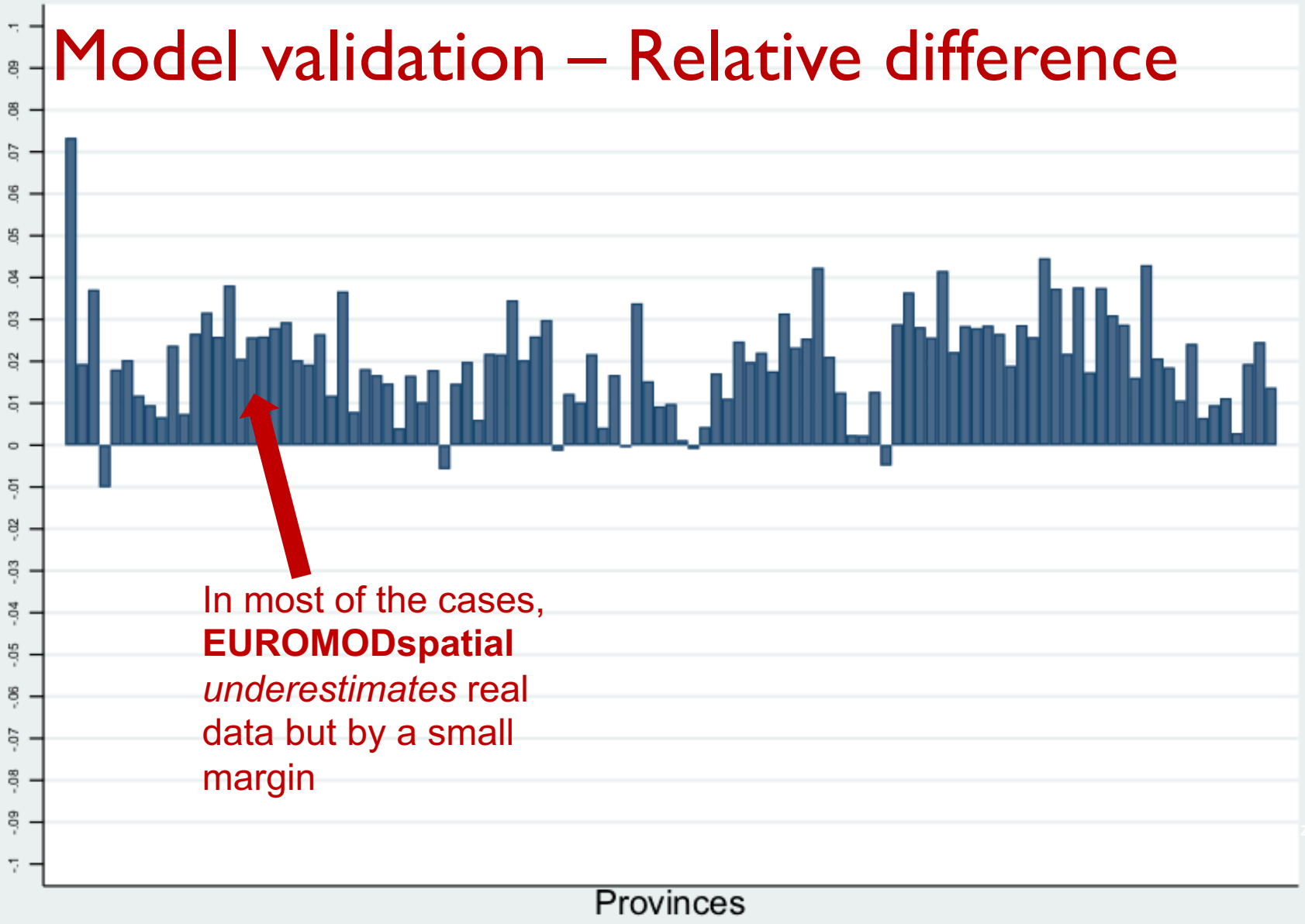
Two types of validation have been used:

- Internal: Uses the constraint variables in order to check for the model fitting. It is usually affected by the selected re-weighting method.
- External: Uses a set of external variables, not used as constraints when building the model, in order to check for the fitting.

Model validation – External
Total taxable income 2018



Model validation – Relative difference



In most of the cases, **EUROMODspatial** *underestimates* real data but by a small margin

Provinces

107 Provinces (NUTS-3)
20 Regions

Fiscal reform - 2022
IRPEF and AUU

- PIT (IRPEF) reform
  - From 5 to 4 tax brackets
  - Reduction of tax rates
  - Increased generosity of tax credits related to income sources
  - Abolition of tax credits reted to dependent children up to 21 years old

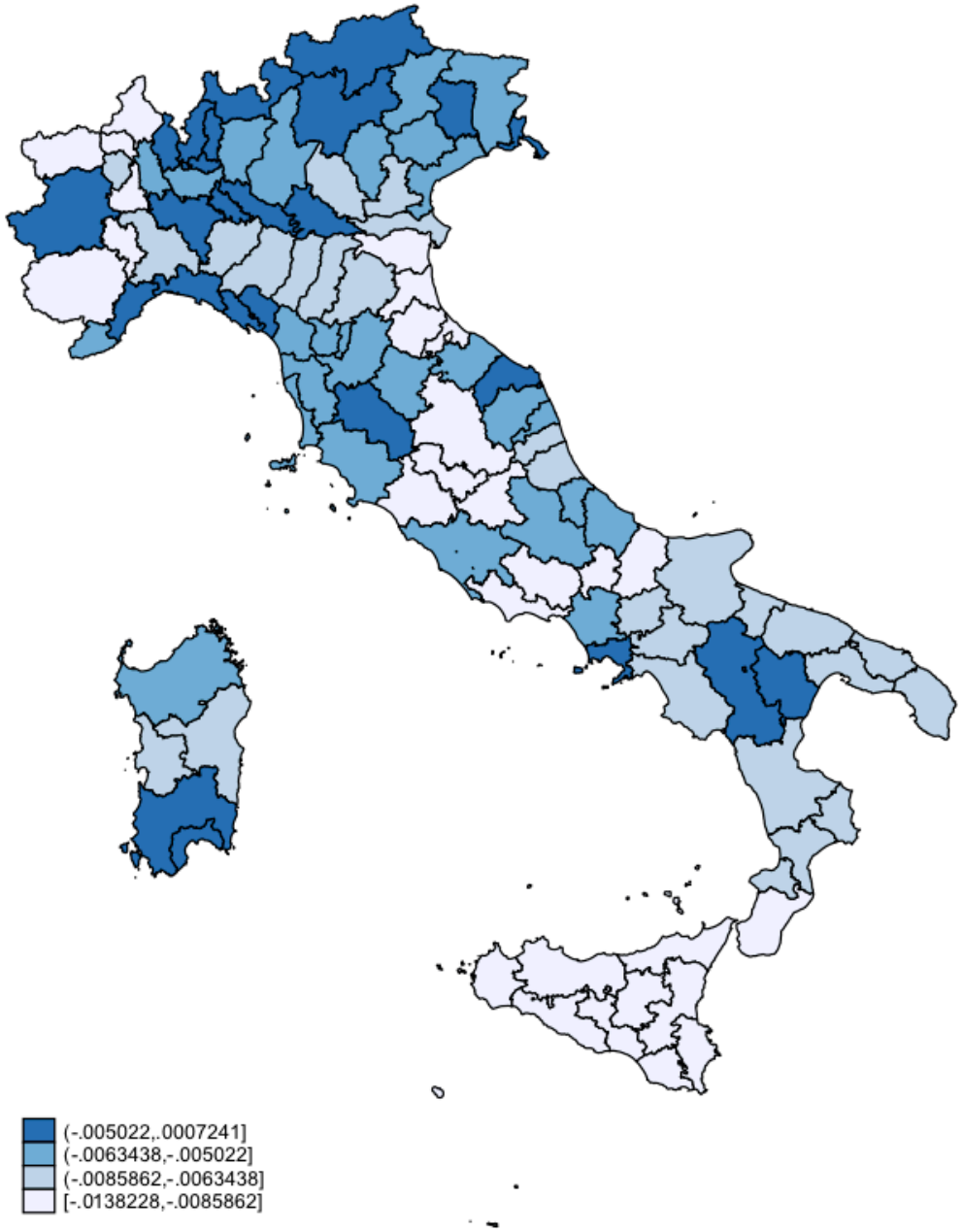
- Universal Unique Allowance (AUU) for children up to 21 years old
  - Universal; decreasing in the amount based on ISEE (income and assets)
  - Replaces existing tax credits, Family allowances and bonus

Fiscal reform - 2022
IRPEF and AUU

- Effects at national level in a nutshell
  - Net PIT revenue: -2.5 billion euro
  - SIC revenue: - 2.3 billion euro
  - Net AUU cost: 9.8 billion euro
  - Inequality of disposable income: GINI from 0.326 to 0.319
  - Poverty rate (anchored poverty line)
    - Overall: from 20.8 to 19.7

- What about effects at local level ?

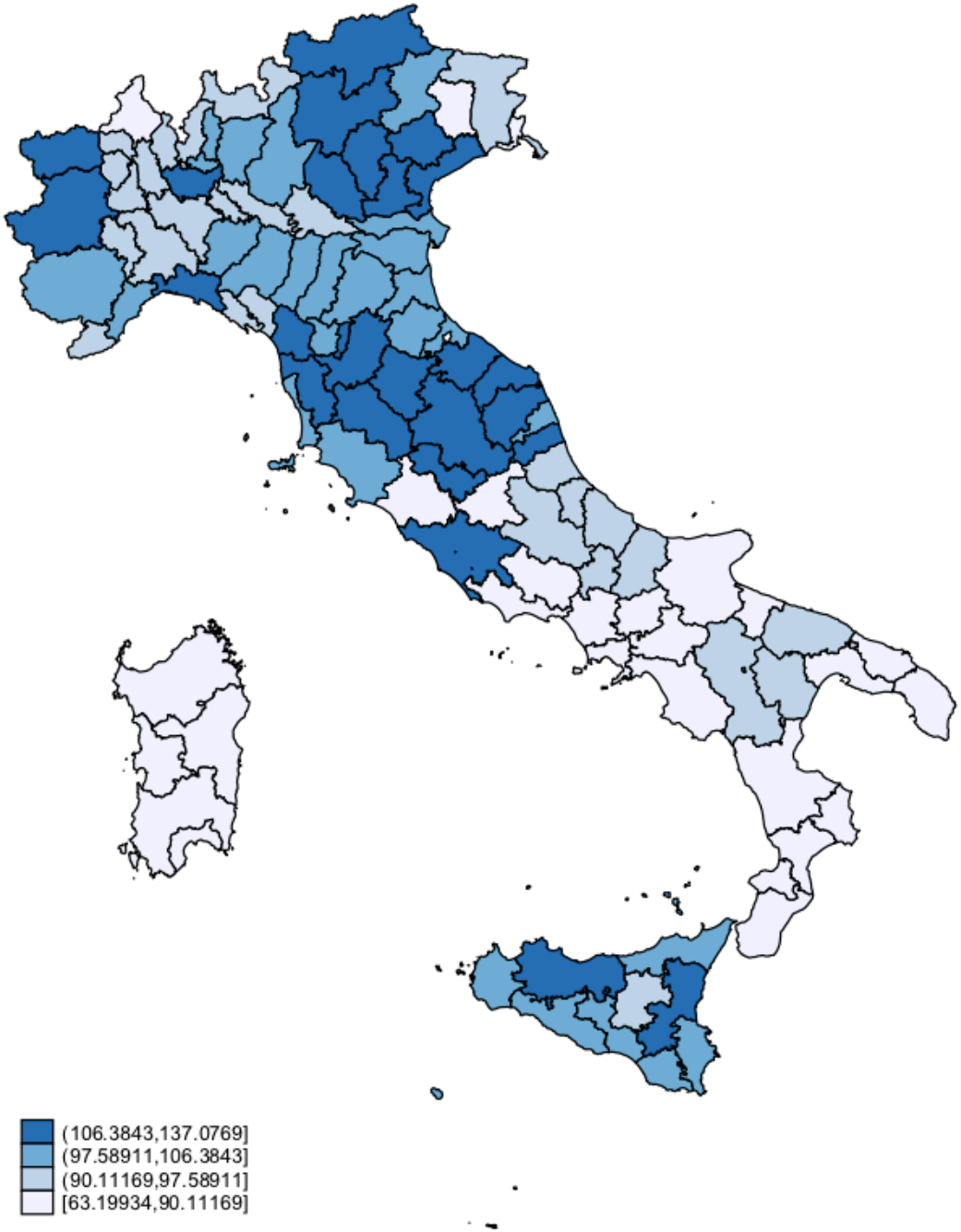
Income inequality, Gini index, 2021-2022



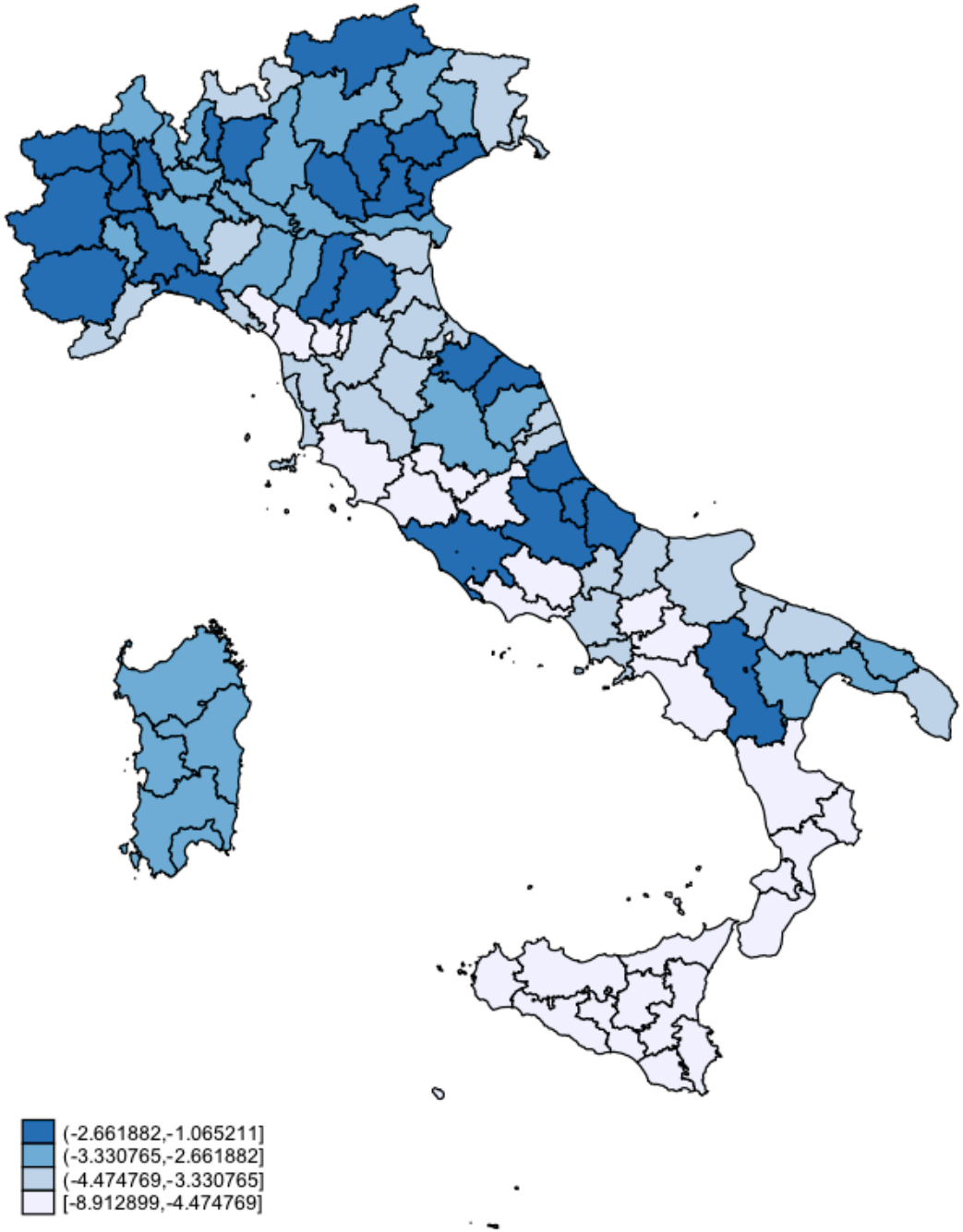
Note on the GINI Index levels

- Compared to pre-MSM calculations – done with the available IT-SILC sample, GINI appears to rise of around one percentage point.
- We did an ulterior validation using national income levels taken from the MEF (Italian Ministry of Economics and Finance).
- EUROMOD almost perfectly matches the frequences in the original SILC, with the exception of the upper tail
- Comparing it to the MEF data, it appears that SILC underestimated the number of high-income individuals and EUROMOD can improve the dataset's approximation to reality.

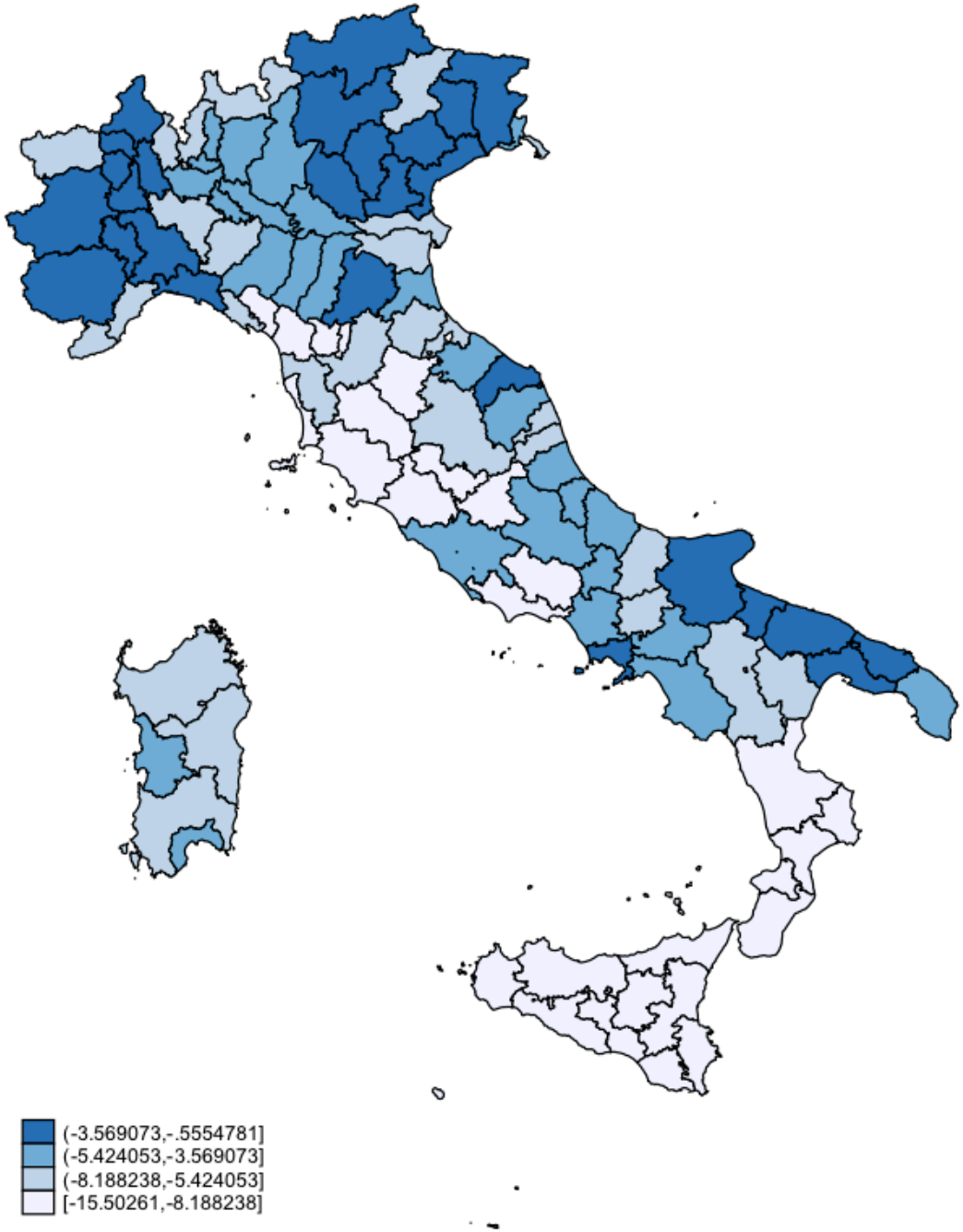
Reform effect 2021 - 2022 change on mean Equivalised Disposable Income



Reform effect 2021 - 2022 change on poverty



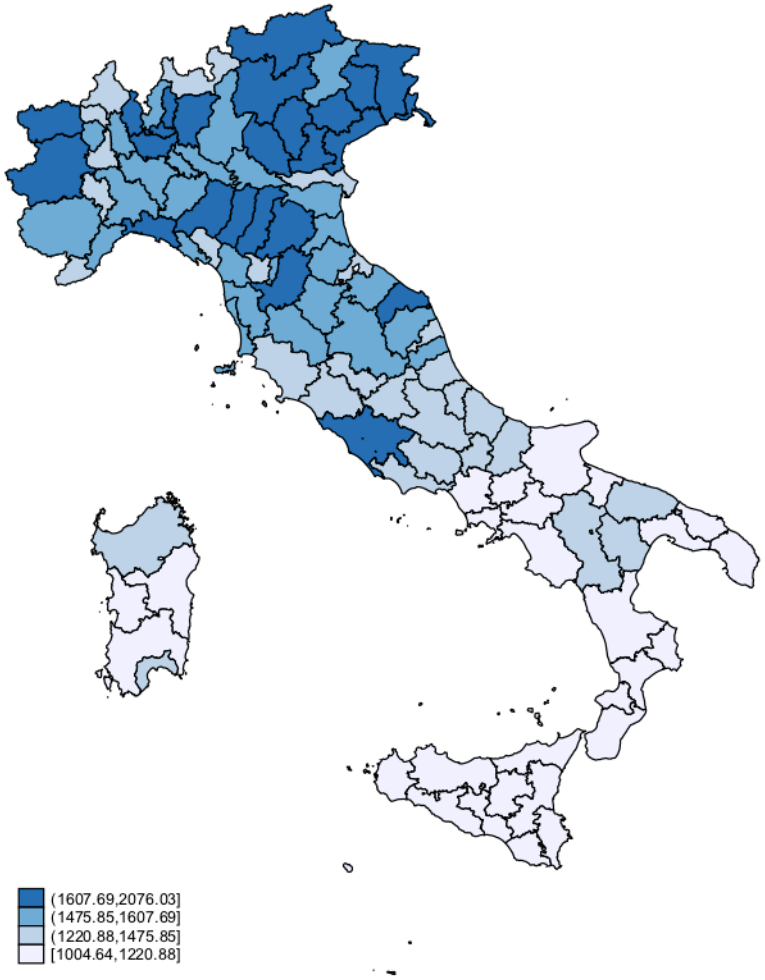
Reform effect on child poverty ppt change between 2021 and 2022

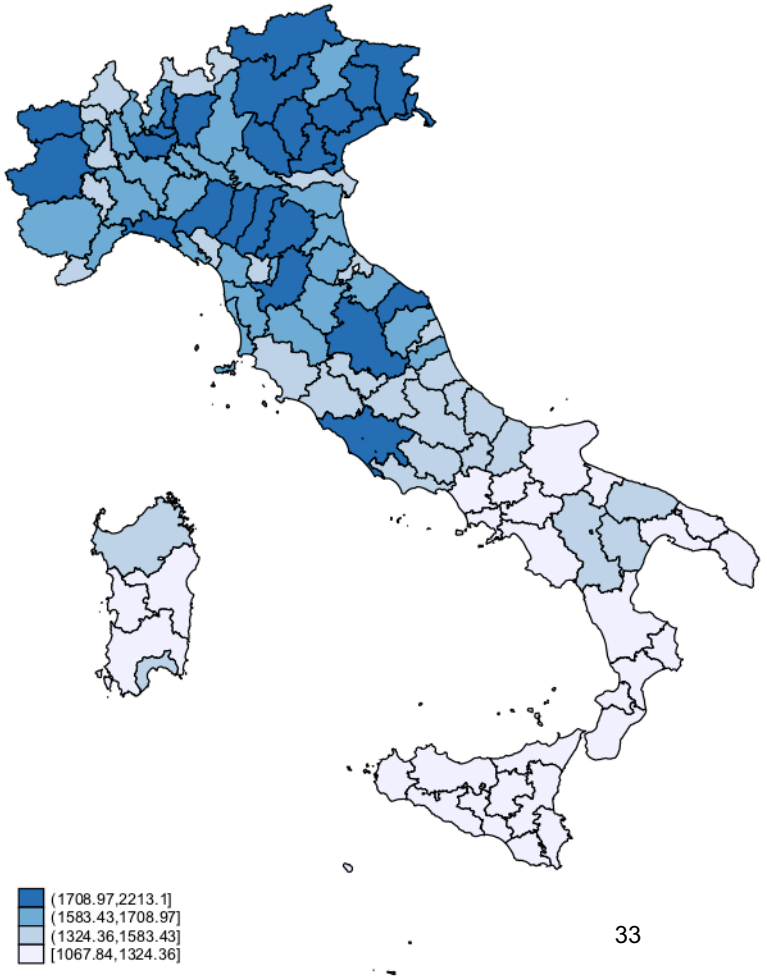


A forward looking approach

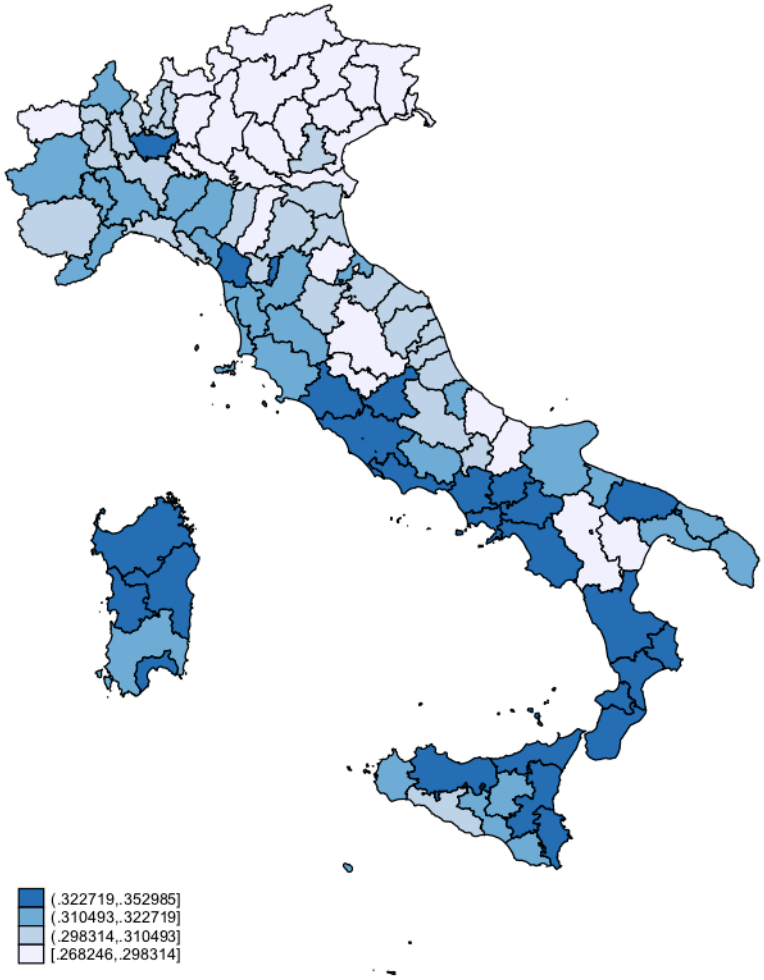
- Challenge to give EUROMOD a spatial dimension building on existing literature and models (e.g. Tanton et al. 2009)
  - It is more relevant in some EU countries than others
    - Spatial disaggregated socio-economic inequalities
    - Devolution of tax-benefit policies
  - It is more relevant in some policy areas than others
    - Housing
    - In-kind benefits (childcare services)
  - Are census data easily accessible ?

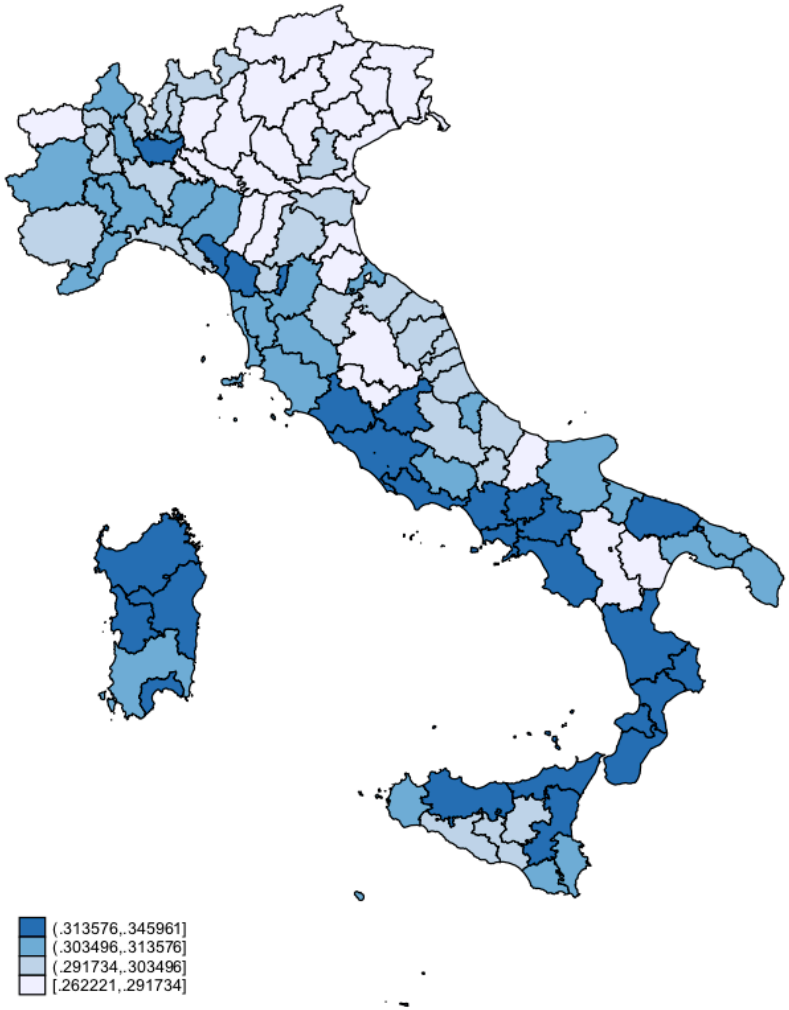
Mean EQDPI 2021 & 2022



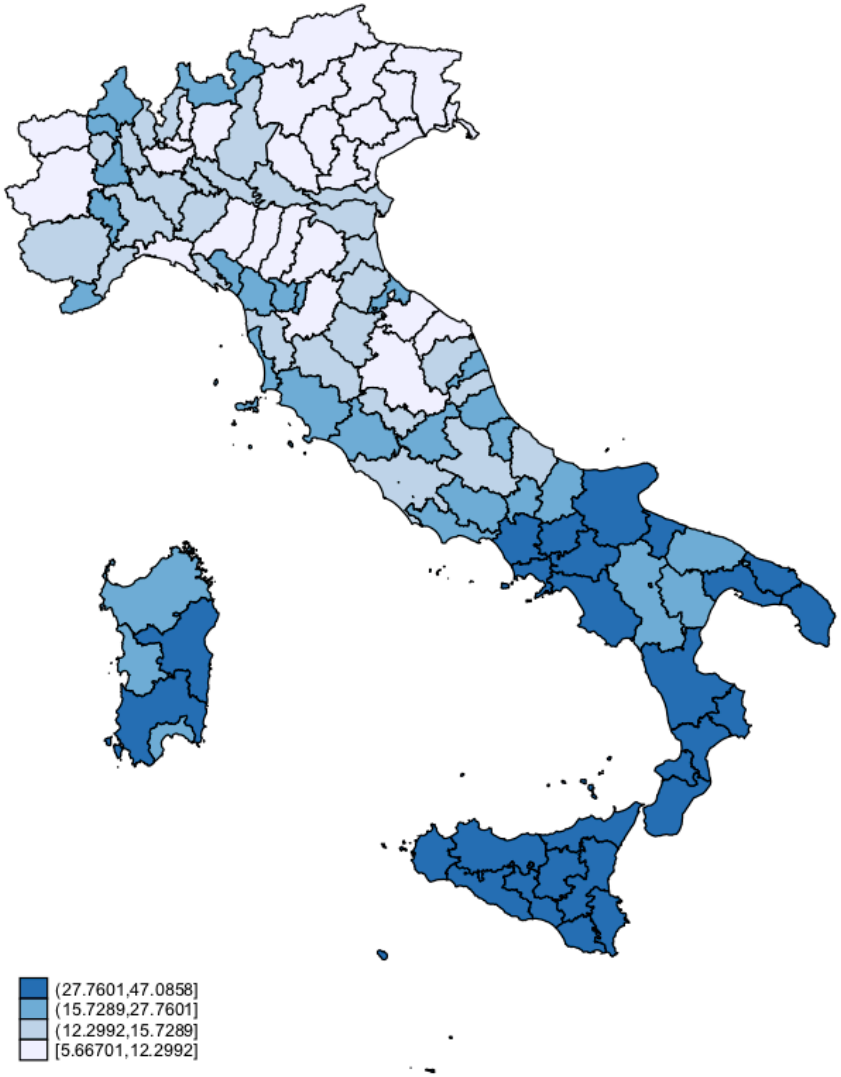


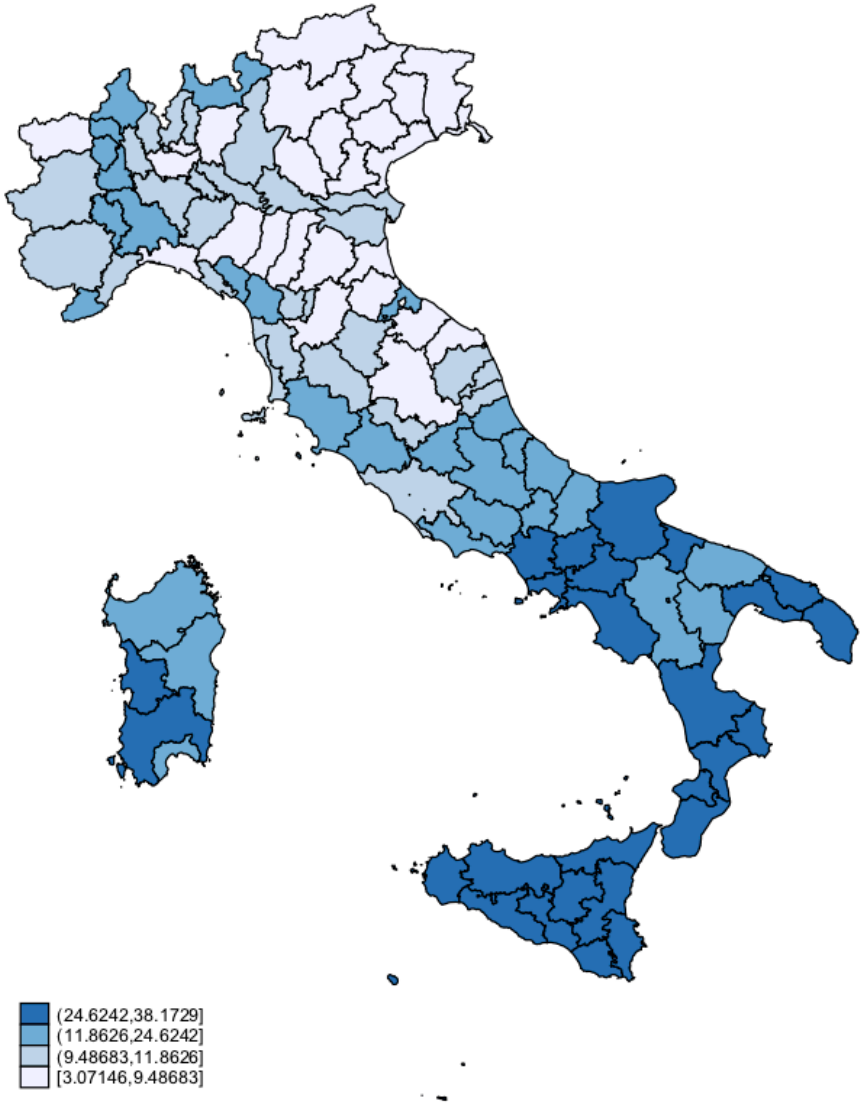
GINI 2021 & 2022





Poverty 2021 & 2022





Child Poverty 2021 & 2022