Small area poverty indicators adjusted using local price indexes

S. Marchetti [1,2] C. Giusti [1,2] G. Bertarelli [1,2] M. Pratesi [1,2]
F. Schirripa Spagnolo [1,2]

[1]Dept of Economics and Management, University of Pisa, Italy

[2]Tuscany Universities Research Centre 'Camilo Dagum' on Advanced Statistics for the Equitable and Sustainable Development

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Aims of the presentation

- The importance of estimating poverty indicators at sub-national level is nowadays worldwide recognized
- Poverty is a multidimensional concept: we focus here on relative monetary poverty indicators
- There are relevant issues when computing sub-national poverty indicators that may impact their value, namely:
  1. the choice between the use of income or consumption data;
  2. the use of national or local poverty lines;
  3. taking into account the local cost of living;
  4. the use of small area estimation techniques.

Aims of the presentation

- The aim is to estimate Italian households' At-Risk-of-Poverty-Rate (ARPR), a measure of poverty incidence
- We use consumption expenditures data from the Italian Household Budget Survey (HBS) 2012 to estimate the ARPR for the 20 regions (NUTS-2 level) and the 110 provinces (LAU-1 level) in Italy
- The issues we address are:
  1. The use of national or local Poverty Lines (PLs) to estimate the ARPR in Italy;
  2. The computation of local Purchasing Power Parities (PPPs) to take into account the local differences in price levels;
  3. The use of Small Area Estimation (SAE) techniques to estimate the ARPR for Italian provinces (LAU-1 level).

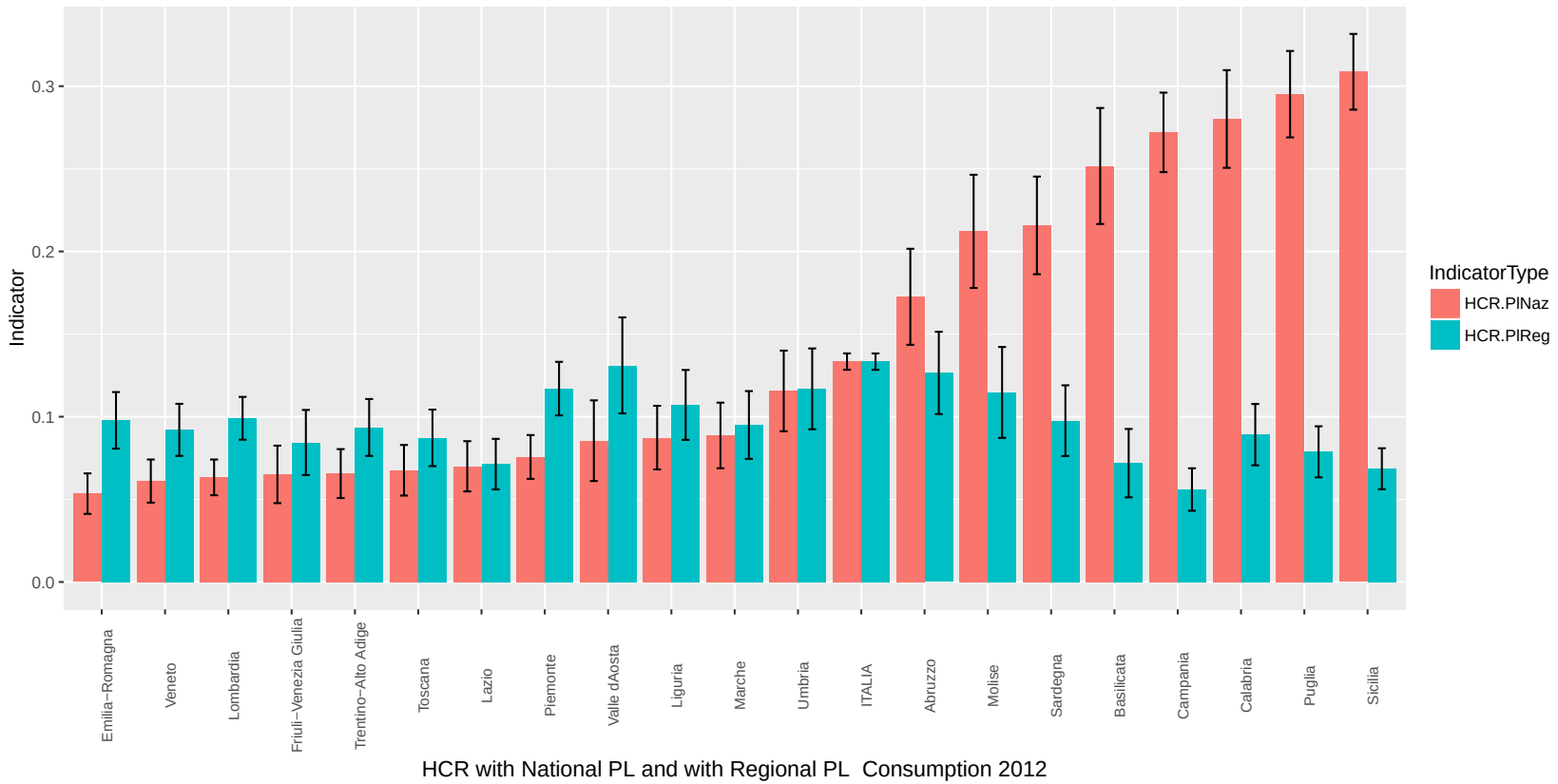
The use of consumption data to estimate the ARPR

- In Italy the relative and absolute poverty incidence is computed by Istat by using data from the Household Budget Survey
- To compute the ARPR, the poverty line is set, for households of two components, equal to the mean per-capita expenditure computed at national level (1015.2 Euros in 2012)
- The poverty line for households with a different number of components is then obtained by multiplying it with a specific coefficient (0.60 for households with one member, 1.33 for households with three members, etc.)

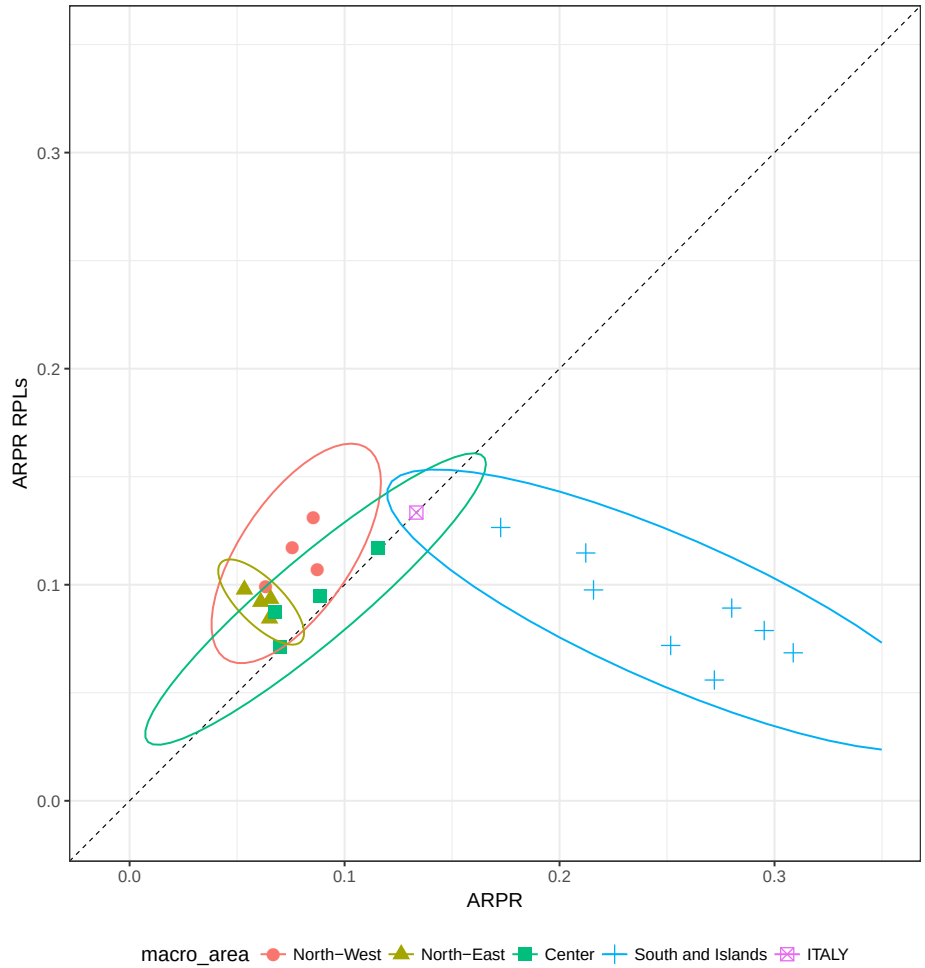
The use of consumption data to estimate the ARPR

- The national PL (NPL) used in the computation of the ARPR with expenditures data depends on the level of the mean per-capita consumption expenditures that in Italy varies strongly among regions
- The percentage difference reaches the 50% comparing northern with southern Italian regions
- Therefore, it is important to evaluate the impact of the use of sub-national poverty lines in measuring the ARPR, using regional PLs (RPLs) or provincial PLs (PPLs)
- At regional level (NUTS-2 level) direct survey estimates are statistically sound

Household ARPR at regional level with NPL and RPLs



Household ARPR at regional level with NPL and RPLs



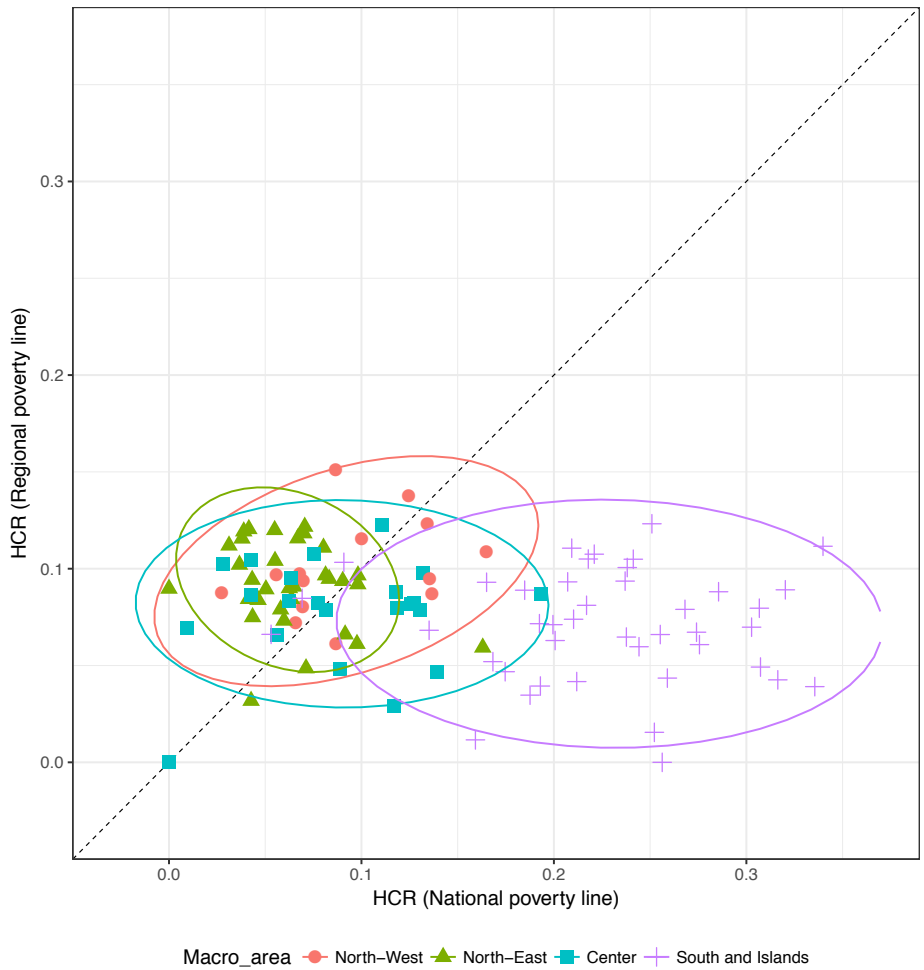
Household ARPR at regional level with NPL and RPLs

- The use of different PLs has strong geographical implications in the evaluation of Italian households' poverty
- The choice of the poverty definition and of the PL depends on the level of analysis and the kind of the policy to be implemented (Kangas and Ritakallio, 2007)
- For comparing relative monetary poverty at regional (local) level, it seems justified the use of region-specific PLs (Mogstad et al., 2007)

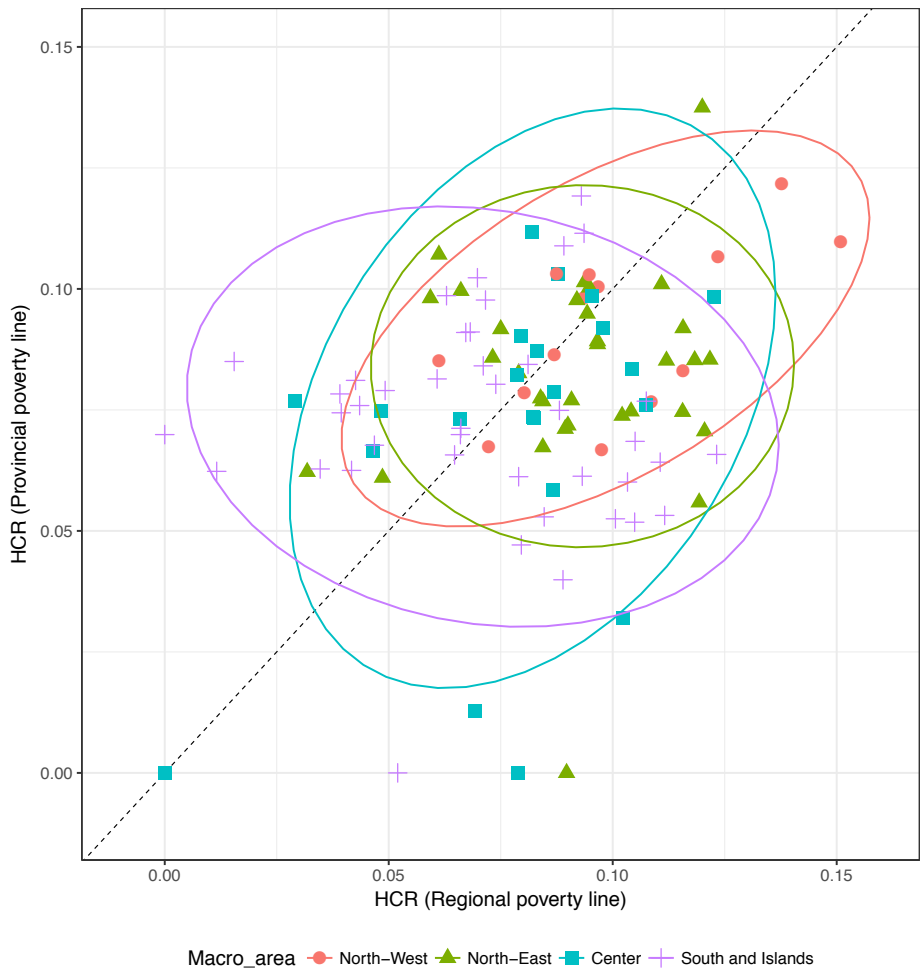
Household ARPR at provincial level with NPL, RPLs and PPLs

- Having observed a high impact of the regional PL definition on the regional ARPRs, we extend the analysis at the provincial level
- When computing the ARPR at provincial level, the PL can be defined not only at national or regional level, but also at provincial level
- The 2012 HBS sample size at provincial level, varying from zero to 1037, with a median value of 146, is for most of the provinces too small to obtain reliable estimates of the ARPRs.
- Therefore, we use a small area method to obtain more accurate estimates

Household ARPR at provincial level with NPL and RPLs



Household ARPR at provincial level with RPLs and PPLs



Taking into account local price levels

- As concerns the measurement of relative poverty indicators in real terms, a possible solution is to use Purchasing Power Parities (PPPs)
- To compute local poverty indicators in real terms, PPPs should be computed at sub-national level
- However, sub-national PPPs are usually not available
- PPPs for the Italian regional capital cities were estimated by Istat in 2009
- The PPPs for Italian regional capital cities are of course an approximation to measure the standard of living in Italian regions, and they assume that the level of the prices is constant inside each region
- As a starting point, following the approach by Marchetti and Secondi (2016), we extrapolated the Istat 2009 PPPs to 2012 by using Consumer Price Indexes (CPIs)

Taking into account price levels

- We then consider an alternative set of PPPs computed combining Istat regional PPPs with a housing cost (HC) index, based on rent costs
- The HC index is computed as the ratio of the mean monthly expense of the households to rent a house at provincial level (SAE) over the corresponding national mean value
- We define the new PPPs as

$$PPPHC = \alpha \cdot PPPs + (1 - \alpha) \cdot HC$$

- α is set equal to the share of house rent expenditure on the total consumption expenditure for the households living in a rented house ($\alpha = 0.26$ using HBS data)
- As an alternative, provincial specific αs could be used

Household ARPR at provincial level

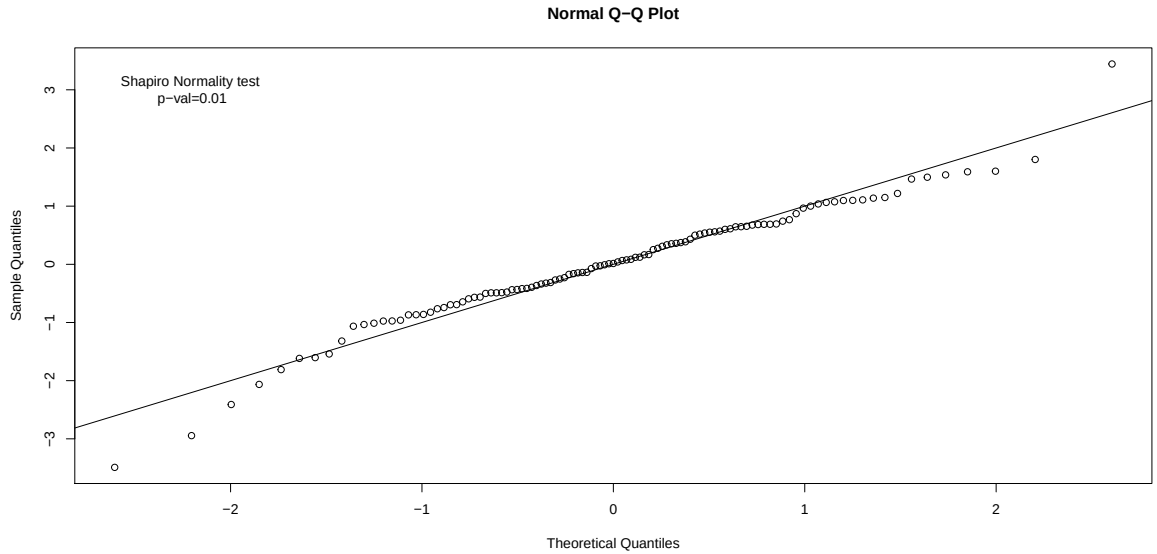
- The ARPR at provincial level has been estimated using five different poverty lines: NPL, RPL, PPL, NPL_{PPP}, NPL_{PPPHC}
- The ARPR estimates are obtained using an area-level Fay-Herriot model [**?**].
- Spatial models were tested, but spatial correlation was not significant
- The auxiliary variables have been selected from these data sources:
  - Tax agency archive
  - 8000 Census archive (Census 2011 data)
- Focus on ARPR estimates using NPL_{PPPHC}

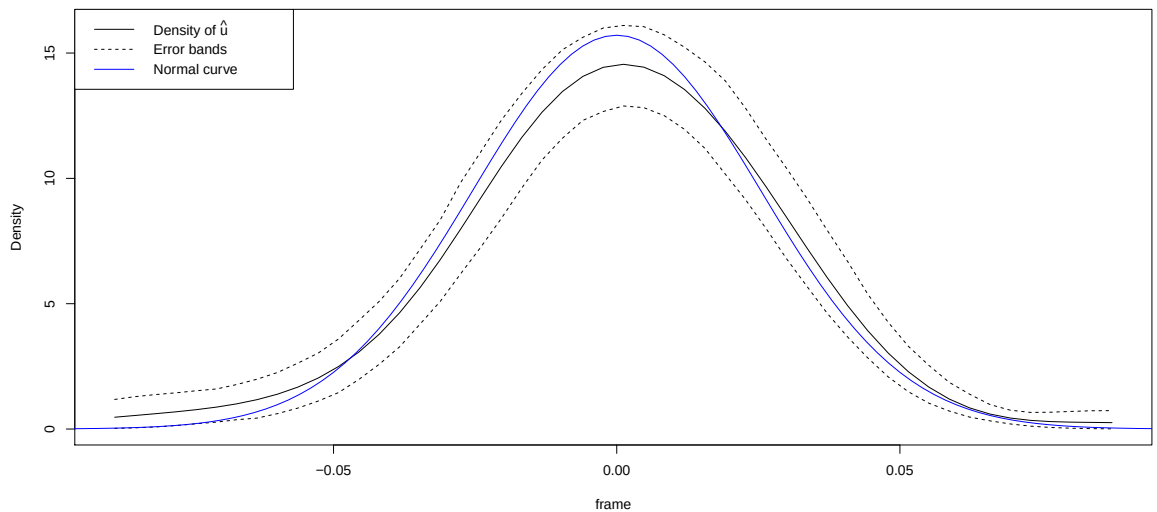
Household ARPR at provincial level, NPL_{PPPHC}

Fay-Herriot model coefficients estimates (REML)

Variable	Estimate	p-val.
Intercept	-0.3105	0.0023
Rate of unemployment (%)	0.0089	0.0000
Private mobility (%)	0.0033	0.0067
Slow mobility (%)	0.0052	0.0009
Variance of random area effects	0.0011	

Household ARPR at provincial level, NPL_{PPPHC}

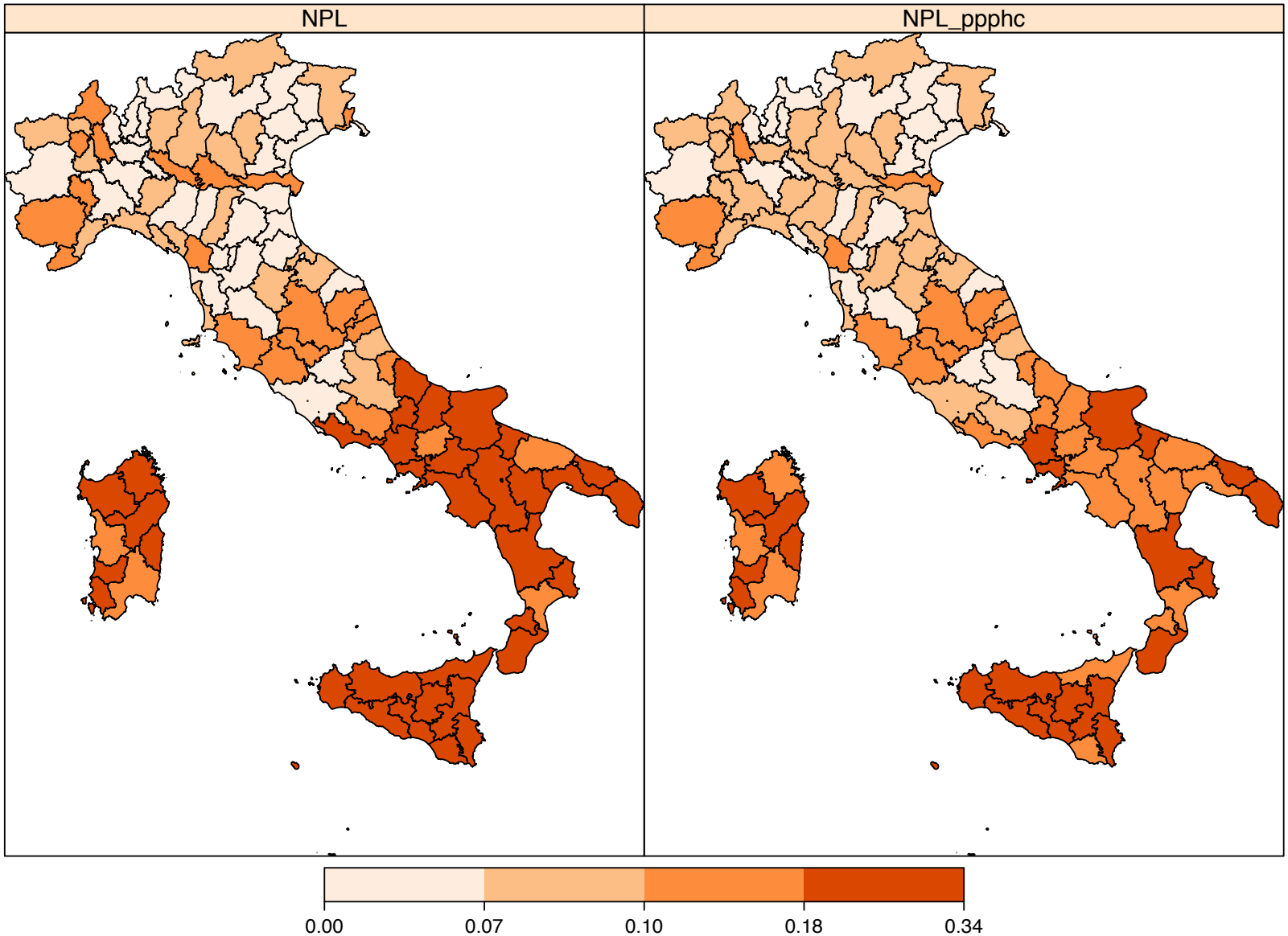




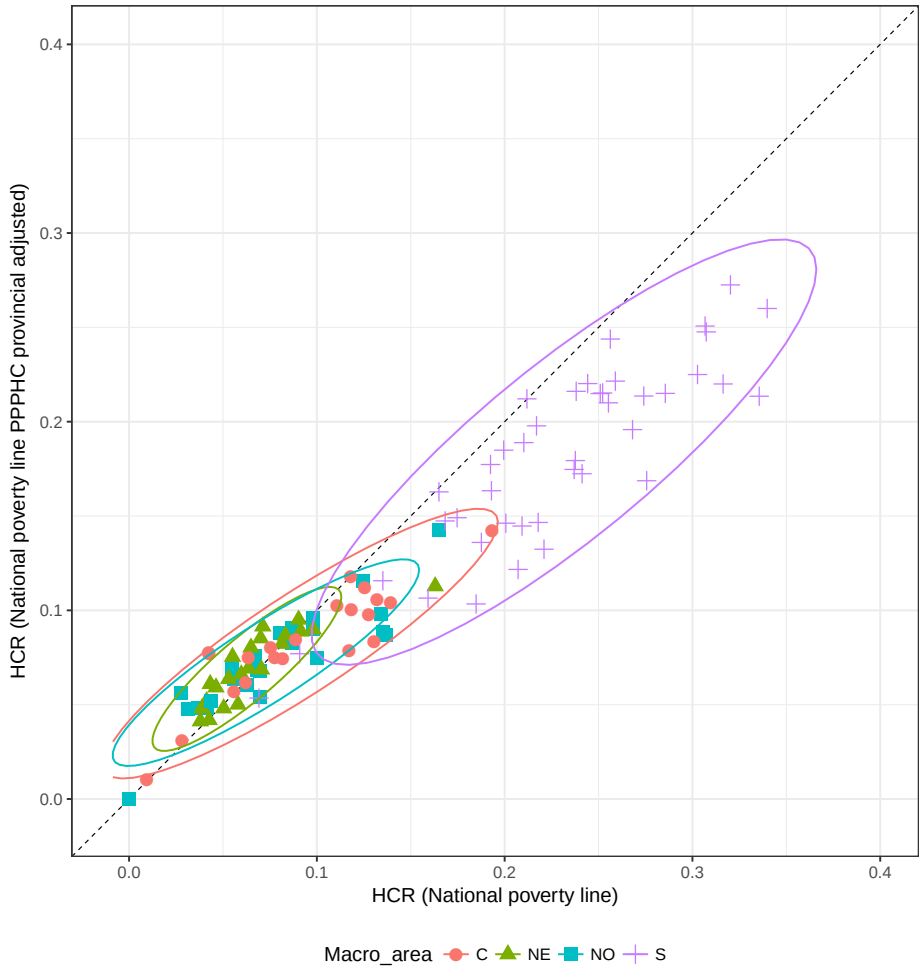
Household ARPR at provincial level, CVs (%)

	Direct			SAE		
	1st Q.	2nd Q.	3rd Q.	1st Q.	2nd Q.	3rd Q.
NPL	17.2	26.3	36.8	12.4	17.7	24.2
RPL	19.0	29.4	41.4	15.9	20.5	29.1
PPL	20.9	27.7	41.5	14.3	16.4	23.2
NPL_{PPP}	17.0	26.3	35.0	13.3	19.7	27.3
NPL_{PPPHC}	17.5	27.7	40.0	14.9	20.1	27.4

Household ARPR at provincial level, Map



Household ARPR at provincial level, NPL vs NPL_{PPPHC}



The use of archive/big data to estimate local PPPs

- In the MAKSWELL project we want to use different sources of data to compute local PPPs
- Scanner data are available to estimate spatial price indexes for grocery
- The tax agency house cost archive is available to compute the spatial price indexes for housing
- Area-specific weights for different purposes can be estimated using the HBS survey

Scanner data (big data)

- Outlets:
  - Universe of 9000 retailers belonging to the 16 most important retail chains (95% of modern retail chain distribution)
  - Data are available for a sample stratified by province, distribution chains and kind of outlets (888 strata)
  - Outlets are selected with probabilities proportional to the 2017 turnover
  - Total sample size is 1781 outlets (510 hypermarkets and 1271 supermarkets)
- Items in the data:
  - Grocery products: five divisions of the ECOICOP
  - Scanner data cover 55.4% of the total retail trade distribution for this category of products
- A first tentative to compute local PPPs has been done by Istat selecting items with probabilities proportional to the 2017 turnover for each product aggregate (at 60% cut-off line)

Concluding remarks

- In this work we have presented alternative estimates of the ARPR for Italian regions and provinces by using data on households' consumption expenditure
- The aim was to evaluate the impact of subnational PLs on the ARPRs
- We also tried to evaluate the impact of the local level of the prices on the computation of the ARPR
- Our results show that the choice of the PL and the use of local PPPs is very relevant when the aim is to compare local relative poverty indicators
- The aim is to extend the present work by using new data sources to compute new local PPPs
- Moreover, we would like to compute local poor-specific PPPs