

# Monetary poverty indicators at local level: evaluating the impact of different poverty thresholds

## *Indicatori monetari di povertà a livello locale: studio dell'effetto di diverse soglie di povertà*

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**Abstract** The importance of poverty measures at sub-national level is widely attested, both for a detailed planning of policy actions, and for the citizens to evaluate their effects. However, there are relevant issues when computing sub-national poverty indicators that may impact their value: the definition of the poverty line for monetary poverty indicators, and the use of small area estimation methods when the sample size is not enough to obtain accurate estimates at local level. In this work, we estimate the poverty incidence at provincial level in Italy by using small area estimation methods, and we analyze the impact on the poverty incidence of different poverty lines, defined at national, regional and provincial level. The key results underline a strong impact on the poverty incidence when using sub-national poverty lines.

**Abstract** *Disporre di indicatori di povertà a livello locale è uno strumento indispensabile per i decisori politici, per poter pianificare opportune politiche di intervento, e per i cittadini, per poter valutare l'effetto delle politiche sul proprio territorio. La stima di indicatori di povertà monetaria relativi a livello locale pone due principali problemi metodologici: la definizione della linea di povertà e l'utilizzo di modelli di stima per piccole aree quando la ridotta numerosità campionaria a livello locale non consente di ottenere stime dirette accurate. Obiettivo di questo lavoro è confrontare l'incidenza della povertà nelle province italiane utilizzando linee di povertà alternative, definite a livello nazionale, regionale e provinciale, utilizzando modelli per piccole aree per le stime a livello provinciale.*

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**Key words:** local poverty indicators; poverty lines; small area estimation.

## 1 Introduction

The important role played by poverty measures at sub-national and local level in setting policy actions against poverty and social exclusion is widely attested. Local poverty indicators are relevant both for a detailed planning of the policies actions and for the citizens to evaluate their effect.

As it is well known, a common method used to measure the monetary poverty is based on income or consumption levels. Individuals or families are considered as poor if their income or consumption level falls below a minimum level (called poverty line, PL). The PL is usually defined at the national level. However, it is well known that in Italy there is a strong geographical heterogeneity in income and consumption levels (ISTAT 2013a, ISTAT 2013b). Then, we propose an analysis where the geographical heterogeneity is reduced by defining the PL at regional and provincial level. Moreover, it is important to underline that also the different price levels within the country can play a role in the definition of alternative PLs, as observed among others by Ayala et al. (2014) and Giusti et al. (2017). However, we do not treat this last issue in this work.

Here we refer to the household poverty incidence or Head Count Ratio (HCR), the simplest monetary poverty indicator usually elaborated by most of the National Statistical Offices. More in detail, we use consumption expenditures data from the Italian Household Budget Survey (HBS) 2012 to estimate the HCR for the 20 regions and the 110 provinces in Italy.

We first estimate the regional HCRs using two alternative PLs: the PL defined at national level and the PLs defined at regional level. The national PL for households of two components is defined by ISTAT as the mean per-capita consumption expenditure at national level. Then, this PL is adjusted for households with a different number of components by using the Carbonaro equivalence scale, which takes the following values: 0.6 for households with one component, 1.33 with three, 1.63 with four, 1.90 with five, 2.16 with six and 2.40 for households with seven or more components. We define the PLs at regional level in the same way but computing the mean per-capita consumption expenditure separately for each region.

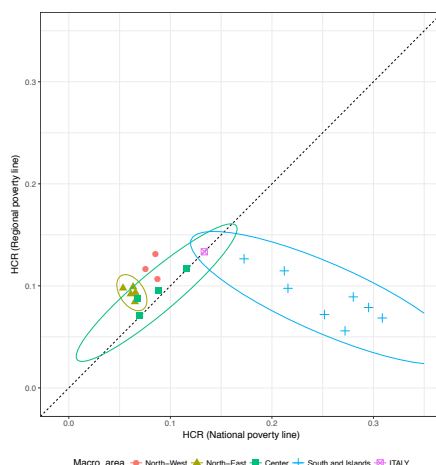
Since we observe a high impact of the regional PL definition on the regional HCRs, we then extend the analysis at the provincial level. When computing the HCR at provincial level, the PL can be defined not only at national or regional level, but also at provincial level. The 2012 HBS sample size at provincial level, varying from zero to 1037, with a median value of 146, is for most of the provinces too small to obtain reliable estimates both of the HCRs and of the PLs at provincial level.

Therefore, we use a small area model to obtain more accurate estimates, as better explain in the next sections.

## 2 Estimating regional HCRs with different poverty lines

The PL used in the computation of the HCR with expenditures data depends on the level of the mean per-capita consumption expenditures that in Italy varies strongly among regions, with a percentage difference that 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 poverty incidence.

Fig. 1 shows the estimates of the household HCRs for the 20 Italian regions by using the national PL and the regional PLs. The results clearly show that the variability of the spatial distribution of the HCRs is quite smaller when using the regional PLs rather than the national one. Moreover, the HCRs of north-east and north-west regions increase when using regional PLs, the HCRs of the central regions remain more or less the same, while the HCRs of the Southern regions strongly decrease. Thus, the use of different PLs has strong geographical implications in the evaluation of Italian households' poverty. On the other hand, 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). However, for comparing relative monetary poverty at regional (local) level, it seems justified the use of region-specific PL (Mogstad et al., 2007).

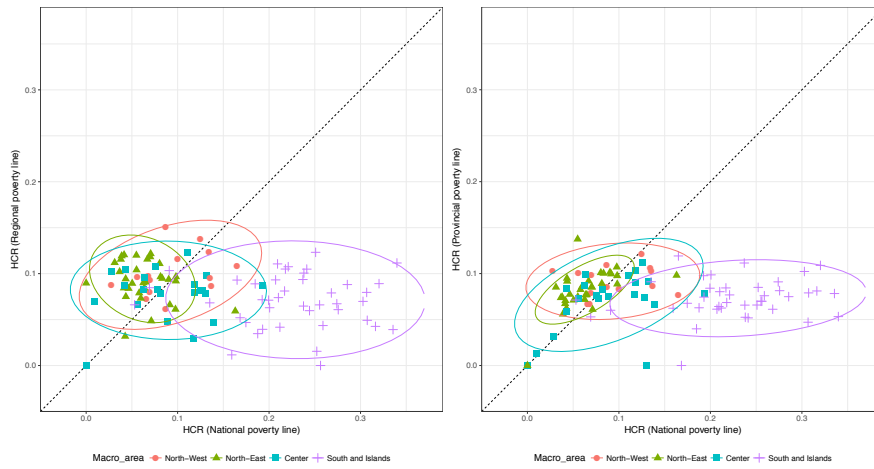


**Figure 1:** Estimates of the Head Count Ratio (HCR) for the 20 Italian regions with national versus regional poverty lines

### 3 Estimating the provincial HCR with different poverty lines

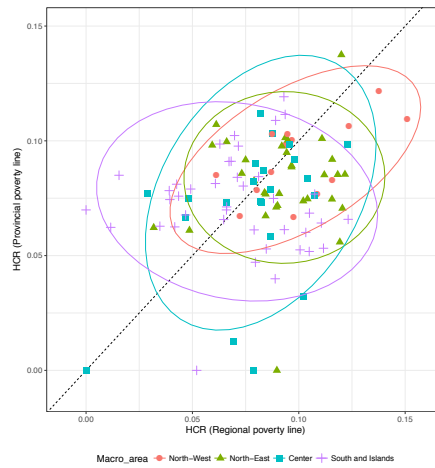
In this section we analyse the impact of three different thresholds on HCR estimates at provincial level in Italy. The HCR estimates at the province level are estimated using an area-level Fay-Herriot model (Fay and Herriot, 1979). This method uses aggregated auxiliary data to model direct estimates of the HCR to reduce their variability. As auxiliary variables at the province level we use the per-capita taxable income (information available from the “Agenzia delle entrate” database 2012) and the share of households who own their house (from the Population Census 2011). To save space we do not report here the model parameters, the model diagnostics and other details related to the estimation procedure. As a general result, the average decrease in variability of the HCR estimates is about 23.7% compared to the direct estimates.

We also estimate the provincial PLs by using a small area model, equal to the one used for provincial HCR estimates. Fig. 2 shows two plots: on the left the HCRs for the 110 Italian provinces based on the national PL versus the HCRs based on regional PLs, on the right the HCRs based on the national PL versus the HCRs based on provincial PLs. The two plots are similar: they show that when the PLs are estimated at more detailed geographical level we observe a strong decrease of the HCRs in the southern provinces, an increase for most of the north-east provinces, while the HCRs in central and north-west provinces increase in some provinces and decrease in others. Switching from regional to provincial PLs affect the HCRs more or less in the same way.



**Figure 2:** Estimates of the Head Count Ratio (HCR) for the 110 Italian provinces with national versus regional poverty lines (left) and with national versus provincial poverty lines (right).

Finally, Fig. 3 shows the HCRs based on regional vs. HCR based on provincial PLs. In this case it seems that the HCRs increase or decrease independently on the geographical level of estimation of the PLs. Moreover, the change in the values of the HCRs is very small compared to that observed when comparing results obtained using the national PL (Fig. 2).



**Figure 3:** Estimates of the Head Count Ratio (HCR) for the 110 Italian provinces with regional versus provincial poverty lines

The main results presented in this section suggest that measuring the monetary poverty incidence at provincial level using national or local (regional or provincial) thresholds strongly change the picture of the phenomena. On the contrary, using provincial rather than regional PLs seems to not affect HCR estimates at the province level.

#### 4 Concluding remarks

In this work we have presented alternative estimates of the HCR for Italian regions and provinces by using data on households' consumption expenditure. The aim was to evaluate the impact of subnational PLs on the HCRs. To estimate the HCRs and the PLs at provincial level we suggested the use of a small area model defined at the area level. Our results show that the choice of the PL is very relevant when the aim is to compare local relative poverty indicators.

The results can be extended in several directions, for example by also taking into consideration the different level of the prices in the regions and provinces, since also this aspect can highly impact the value of the HCRs. Moreover, to get a more complete picture of the poverty and living condition in the areas of interest, it would be important to complement the estimation of the HCRs with other monetary and non-monetary poverty indicators.

#### References

1. Ayala, L., Jurado, A., Perez-Mayo, J.: Drawing the Poverty Line: Do Regional Thresholds and Prices Make a Difference? *Appl. Econ. Persp. Pol.* (2014) doi:10.1093/aep/ppt053
2. ISTAT (2013a) La povertà in Italia, Anno 2012. Statistiche report.
3. ISTAT (2013b) Reddito e condizioni di vita, Anno 2012. Statistiche report.
4. Giusti, C., Masserini L., Pratesi, M.: Local Comparisons of Small Area Estimates of Poverty: An Application Within the Tuscany Region in Italy. *Social Indicators Research* (2017), 131 (1): 235-254.
5. Kangas, O., Ritakallio, V.: Relative to What? Cross National Pictures of European Poverty Measured by Regional, National and European Standards. *European Societies* (2007), 9 (2): 119-145.
6. Mogstad, M., Langørgen, A., Aaberge, R.: Region-specific versus Country-specific Poverty Lines in Analysis of Poverty. *Journal of Economic Inequality* (2007), 5 (1): 115-122.