# ESTIMATION OF POVERTY INDICATORS AT THE SUB-NATIONAL LEVEL USING UNIVARIATE AND MULTIVARIATE SMALL AREA MODELS

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The assessment and reduction of the large inequalities in the distribution of income and wealth among member countries and regions represents, for the EU, a priority in order to stimulate an equal participation of all regions and members states to the economic life of the Union. Thus availability of reliable estimates of income distribution parameters at a sub-national level is essential for the study of poverty and regional disparities.

The aim of this work is to estimate some of the income inequality parameters suggested in the Laeken European Council (Eurostat, 2003) for the Italian admimistrative regions. In particular we consider the *Per-Capita Income*, the *Poverty Threshold*, the *At-risk-of-poverty rate* based on a regional Poverty Threshold, the *At-risk-of-poverty rate* based on a national Poverty Threshold, the *Gini Index*.

Estimates are based on the 2001 repetition of the European Community Households Panel (ECHP), a survey that was designed to provide reliable estimates for macro-areas (in Italy: North West, North East, Center, South and Islands). Admimistrative regions for which estimates are wanted are smaller.

To obtain reliable regional estimates of the parameters we are interested in , we use data from the ECHP survey. We obtain direct estimates using the survey's weights and derive estimates of their variances by means of a bootstrap resampling method. Then we propose small area estimators based on a univariate area level model and on two different multivariate area level models. Multivariate models are based on the idea of modeling jointly a set of different but correlated indicators. As auxiliary information, since Census related or Administrative data are either not available yearly or not fully reliable, we use the estimates of the average annual unemployment rate, provided by the Italian National Institute of Statistics (ISTAT). Uncertainty associated to these estimates are accounted for in the evaluation of estimators' variability.

As estimation method we use a Hierarchical Bayesian approach implemented by means of MCMC computation methods. Our main results are that model based estimation strategy proposed leads to significant gains in efficiency and that, among the models considered, multivariate models perform better than univariate ones.

We consider also the problem of overshrinkage that may lead to a distribution of estimated indicators across regions less variable than what it should. The problem is faced constraining estimates based on the proposed models. In view of exploiting the panel nature of the ECHP survey, we provide also some preliminary results based on models borrowing strength longitudinally as well as in cross section.

The results obtained show that the model based estimation strategy proposed leads to significant gains in efficiency and that, among the models considered, those borrowing strength from the sampling covariance between estimates of various parameters lead to a major variance reduction respect to the univariate model.

Eurostat (2003), *Laeken' Indicators – Detailed Calculation Methodology*, Working Paper, Working Group "Statistics on Income, Poverty & Social Exclusion", 28-29 April 2003.