New Indicators and Models for Inequality and Poverty with Attention to Social Exclusion, Vulnerability and Deprivation[1]

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Abstract

The main targets of WP1 are to analyze the mechanisms and the determinants of poverty and inequality and to translate them into effective indicators. It is divided into four coordinated tasks:

- Task 1.1: *The indicators of poverty*, i.e. the integration of the usual indicators of poverty with the definition of fuzzy monetary and supplementary indicators;
- Task 1.2: *EU-SILC over sampling*, i.e. the extension of the sample with 650 additional interviews for the Province of Pisa;
- Task 1.3: *Pooled estimates of indicators*, i.e. the construction of poverty measures at local level from several waves and the comparison between different EU-SILC waves results with focus on the local longitudinal changes;
- Task 1.4: *Indicators for Local Government*, i.e. the definition of effective indicators for the local government at NUTS4 or aggregations of the NUTS4 level.

Keywords: sample design and estimation, longitudinal data analysis, measuring poverty and inequality.

1. SAMPLE WP1 activity

Cridire and Gus have been mainly involved in 1.1 and 1.3, in particular, the first period was dedicated to these three main activities:1) reviewing the published scientific literature on poverty indicators; 2) writing a draft review of the main existing approaches to measure the economic dimension of poverty;3) envisioning and listing the most interesting research directions on fuzzy and non-fuzzy poverty indicators.

The partners of WP1 have established agreements with the National Statistical Offices: Polish GUS gives access to the project (all consortium members) to Polish LFS, HBS (Household Budget Survey) and EU-SILC microdata; Siena gives access to the project to EU-SILC microdata. In the last semester, CRIDIRE-Siena University has focused its activity on developing new multidimensional and fuzzy measures of poverty and re-sampling methods for variance estimation for these measures. In particular, a new approach (*Integrated Fuzzy and Relative Approach*) has been introduced: it combines the *Totally Fuzzy and Relative Approach* of Cheli and Lemmi (1995) and the approach of

Betti and Verma (1999). A factor analysis has been conducted to construct certain dimensions of non-monetary indicators of living conditions. Concerning the re-sampling methods for variance estimation, Jack-knife Repeated Replication (JRR) method has been adopted. The developed methodology has been tested with the first available waves of EU-SILC data. CRIDIRE has started to produce the first preliminary methodological and software developments; SAS codes have been developed for estimating the new fuzzy and non-fuzzy approach poverty measures and for the corresponding standard errors based on JRR. Programs from SAS to R for poverty measures and from SAS to R for small area estimates have been partially converted.

The partner of WP1 – WSE and CES-GUS - introduced proposition for including in the final set of indicators two additional fuzzy measures of the depth of relative poverty and deprivation (FMD and FSD). The *Integrated Fuzzy and Relative Approach* (CRIDIRE) contains indicators which are counterparts of headcount index in traditional approach whereas the *Fuzzy Monetary Depth* and the *Fuzzy Supplementary Depth* indicators (WSE) are counterparts of poverty gap index in traditional approach. The methodology of computing two additional indicators and variance estimation using bootstrap techniques has been tested with the last available data from Polish EU-SILC (2007). SAS codes have been developed for estimating *Fuzzy Monetary Depth* and the *Fuzzy Supplementary* and for the standard errors for all fuzzy measures (introduced by CRIDIRE and WSE) using bootstrap techniques.

Concerning task 1.2, the research requires enlarging the EU-SILC sample at NUTS4 level (oversampling). To this end, UNIPI-DSMAE and the PP signed an agreement with Istat (Italian National Institute of Statistics) for enlarging the 2008 EU-SILC sample with 650 more interviews in the Province of Pisa. According to the agreement, Istat is in charge of the entire microdata production process, from sample design to data validation. UNIPI-DSMAE has been involved in the following activities: i) taking part in Istat training meeting for EU-SILC interviewers ii) getting constantly in touch with Istat to be updated on EU-SILC over-sampling; preparing slides on the over-sampling state of the art for the Brussels and Elche meetings (which are available on SAMPLE web site); iii) writing Deliverable 7 (the work is still in progress). Moreover, Pisa Province have supported Istat for sampling design and selection of 650 interviews, for contacts with managers of Statistical Offices of Municipalities, for information and dissemination about EU-SILC oversampling and for training about EU-SILC. The Siena and Pisa team involved in this WP have participated to the meetings and the presentation of the oversampling project. In the second semester, it has been possible to analyze the first available statistics on the quality of the data production process of the EU-SILC oversampling. Thanks to oversampling, the sample size of Pisa Province increased from 5 to 25 municipalities and from 162 to 822 households. Preliminary results show that: around 7% of households in Pisa Province refused to be interviewed; the response rate is equal to 82.76% and the response rate (municipalities affected by oversampling) is equal to 81.63%. EU-SILC microdata will be released by the end of December 2009. At present Istat is completing the data check for missing values.

Moreover, in the same period, Siena University has started to produce the first preliminary methodological developments in Pooled estimates of indicators, the objective of task 1.3.

Finally, concerning task 1.4, the activity of Simurg was dedicated in the first period to the following main topics: 1) reviewing the published scientific literature on poverty indicators at local level, in particular in the area of Tuscany Region; 2) writing a draft review about the use of indicators and statistics in policies against social exclusion at local level; 3) reviewing and analysing the indicators available and used in social policy planning in Tuscany Region; 4) attending to meetings with the Social Observatories of Tuscany Region to define and to share a list of common indicators to monitor social exclusion, poverty and policies at local level; 5) collaborating to writing of the final list of common indicators to be employed for health and social policies planning. All these activities have been planned and realized jointly with PP-UROPS partner. Subsequently, Simurg has finalized, jointly with Social Observatories of Tuscany and PP-UROPS, the list of indicators to monitor social exclusion at LEA 1 (Municipalities) and LEA 2 (Health Societies) level, shared with the Social Observatories network. In the third semester Simurg has carried on the activities started in the first year, jointly with PP-UROPS. The list of indicators to monitor social exclusion developed at the end of 2008, has been widely discussed within the Social Observatories network in several meetings at regional level. Simurg has attended at these meeting and has actively participated at the methodological definition of the regional guidelines in the area of poverty and social exclusion indicators. Moreover, Simurg is planning with PP-UROPS the sharing of the indicators with the local public and private stakeholders by the way of a survey conducted on local stakeholders.

Task 1.4 is partially integrated with WP3 (task 3.4 "Observation System to monitor poverty, vulnerability and social exclusion"). In this months UROPS has realized the following activities:

- Creation of an early list of local stakeholders: Health's Societies; Provincial Coordination of Voluntary associations, of Social Cooperatives and of Social Promotion Associations; Poverty Associations; Immigrants Associations: operators of offices that perform actions to fight back poverty (house offices, social services, labour unions); Caritas' counselling centres. More than 200 stakeholders have been identified. In order to select stakeholders, few meetings with third sector provincial responsible – as a chartered representative - have been organised.
- Creation of the questionnaire that will be sent to stakeholders.

The aims of the survey are:

- Knowing stakeholders' information system and the arrangements for storing and managing information in their possession.
- Achieving stakeholders' point of view on poverty level as they have a privileged observation point. The questionnaire contains specific questions about their perception on the extension of poverty and about its changing in time-space (considering current economic crisis).
- Achieving stakeholders' point of view upon the importance of main poverty indicators. The questionnaire contains reference, with a simple language, to Laeken indicators and to indicators used in EU-SILC.
- Involving every stakeholder in the construction of the Observation System to monitor poverty, vulnerability and social exclusion.

In the second program semester, the activity of CRIDIRE - Siena University was dedicated mainly to develop Task 1.3 of the project: *Pooled estimates of indicators*, i.e. the construction of poverty measures at local level from several waves and the comparison between different EU-SILC waves results with focus on the local longitudinal changes. Methodological aspects, in particular concerning cumulation over space and time from repeated multicountry surveys, have been provided taking illustrations from European social surveys and simple models have been developed to illustrate the effect on variance of pooling over correlated samples. The first empirical results have been obtained from the 2005-2006 cross-sectional and longitudinal EU-SILC samples for Poland, providing an improvement in sampling precision.

In order to illustrate this topic to all partners of the project, Professor Vijay Verma of Siena University has taken part in the SAMPLE meeting in Warsaw (24 March 2010).

Moreover, Professor Verma has taken part in the "2010 International Conference on Comparative EU Statistics on Income and Living Condition" (Warsaw, 25-26 March 2010) where he has showed two papers shared with Professor Gianni Betti: "Sampling and non-sampling errors in EU-SILC" and "Robustness of some EU-SILC based indicators at regional level.

The activity of CRIDIRE - Siena University continued its activity in the third program semester developing especially Task 1.3 of the project: *Pooled estimates of indicators.* It focused on improving the sampling precision of indicators of poverty and social exclusion for sub-national regions in EU countries, in particular through the cumulation of data over rounds of regularly repeated national surveys. The reference data for this purpose are based on EU Statistics on Income and Living Conditions (EU-SILC). A standard integrated design has been adopted by nearly all EU countries. It involves a rotational panel in which a new sample of households and persons is introduced each year to replace one quarter of the existing sample. Persons enumerated in each new sample are followed-up in the survey for four years. The design yields each year a cross-sectional sample, as well as longitudinal samples of various durations. Two types of measures can be so constructed at the regional level by aggregating information on individual elementary units: average measures such as totals, means, rates and proportions constructed by aggregating or averaging individual values; and distributional measures, such as measures of variation or dispersion among households and persons in the region.

Estimation of variance and design effect with Jackknife Repeated Replication (JRR) method are been calculated for the cross-sectional 2006 and 2005 Poland datasets. Results showed an improvement in sampling precision thanks to the proposed method.

In this period, CRIDIRE worked also at the realization of the final report concerning Multidimensional and fuzzy poverty indicators.

Moreover, Professor Verma has taken part in the "45th Scientific Meeting of the Italian Statistical Society" (Padua, 16-18 June 2010) where he has showed the paper shared with Francesca Gagliardi and Caterina Ferretti "Cumulation of poverty measures to meet new policy needs".

On the other hand, SGH team activity devoted the last period to comparison of the incidence and the depth of monetary and non-monetary poverty (deprivation) in Poland and in Italy by regions in 2008. Moreover the regions were classified at the first stage into groups of similar structure of fuzzy incidence indicators and at the second one into groups of similar structure of fuzzy depth indicators. The study employed the developed

methodology based on fuzzy measures. Estimation for standard errors was based on a re-sampling approach (it was used a bootstrap method).

The traditional approach to measuring poverty based on monetary indicators, whose foundations were set forth by the Material Welfare School (Marshall, 1920), dominated in nearly all research into this phenomenon up to the 1970s. In this approach the evaluation of the level of needs satisfaction was conducted exclusively on monetary variables (income or expenditure). Nevertheless, the viewpoint that the identification of impoverished persons exclusively on the basis of pecuniary categories is greatly insufficient gradually began to meet with considerable criticism. Nowadays there is a widespread agreement that poverty is a multidimensional phenomenon and can not be reduced solely to monetary dimension but has to be also explained by diverse non-monetary variables.

Many researchers have postulated the necessity of treating poverty multidimensionally. Townsend was one of the first persons to single out the imperfection inherent in identifying poverty exclusively on the basis of the income criterion. He proposed for poverty analyses to incorporate dwelling conditions, affluence, education as well as professional and financial resources (Abel-Smith and Townsend, 1973; Townsend, 1979). A broader look at the problem of poverty than just through the prism of income (expenditures) was also presented, among others, by Atkinson and Bourguignon (1982), Hagenaars (1986), Desai and Shah (1988), Sen (1999), Bourguignon and Chakravarty (2003), Tsui (2002), and Deutsch and Silber (2005), Alkire and Foster (2007).

In this paper the multidimensional approach to poverty measurement based on application of the fuzzy set theory is presented (*Fuzzy Set Approach...*, 2006). This approach for the comparison of the incidence and the depth of monetary and non-monetary poverty (deprivation) in Poland and in Italy by regions in 2008 was applied. Moreover the regions were classified at the first stage into groups of similar structure of fuzzy incidence indicators and at the second one into groups of similar structure of fuzzy depth indicators.

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