CROATIA: Policy Workshop on the Use of Small Area Poverty Estimations
Project co–financed by the European Union from the European Fund for Regional Development
Objective

- Understanding spatial poverty and social exclusion in Croatia
- Supporting the policy making on social inclusion and integration of deprived areas
- Supporting the allocation decisions for EU-funded regional integration projects
How is this reimbursable advisory service organized?

Component 1. Small area estimation of absolute consumption poverty

Component 2. Development and calculation of indicators of multiple deprivations for small areas

Component 3. Poverty profiles for small sub-national areas

Component 4. Assessment of social benefit effectiveness

Component 5. Pilot survey of access to services and the quality of services
The objective of the proposed joint work program is to examine the levels of poverty and exclusion, as well as the effectiveness of social benefits in reducing poverty for small sub-national areas in Croatia.

The dimensions of poverty include risk of monetary poverty and the proposal for an Index of Multiple Deprivation, and subnational poverty profiles.

The project purpose is to assist the MRDEUF, MDFYSP, CBS and other government bodies to gain a more detailed and complete base of evidence on the geographic distribution of poverty and social exclusion and the resources available to combat poverty and social exclusion.

This evidence base may then be used by the Government of Croatia (GoC) to inform the design of policies and the allocation of resources to promote inclusion and regional development, and thus make most effective use of budgetary and EU resources.
How are These Different Activities Related?

- Consultations
- Workshops (Technical and Policy)
- Reports
- Power Points
- Dashboards
- Data
What is Our Timeline?

2nd Quarter 2016
- Poverty Map Estimation
- Start of IMD Data Consolidation

3rd Quarter 2016
- Poverty Map Dissemination
- Poverty Map and IMD Consultation

1st Quarter 2017
- Poverty Map Technical Training for CBS
- Poverty Map Policy Workshop
- IMD Policy Workshop
- Poverty Map Profile Presentation (February/March)

2nd Quarter 2017
- Social Benefit Presentation
- Presentation of the Results of Pilot Survey
The Plan

- What is a small area estimate of poverty?
  - Consumption and income poverty
    - AROP
  - Direct and Small area estimates
    - Direct and small, when small area?
    - The basics of the small area method used (ELL)
  - Data needs
  - The software
  - Validation
- The Croatian poverty map
  - Consumption poverty
  - Income poverty
- Poverty maps and policy making
  - Beyond poverty analysis
  - Designing and informing policy
    - Examples
  - Poverty maps and GIS
  - Accountability and transparency
  - Limitations
What are Small Area Estimates?
How do we Measure Monetary Poverty?

• The poor are identified as those who live below a poverty line
• Households welfare can be measured by their income or consumption
• A poverty line defines the level of income or consumption necessary to escape poverty
How do we Measure Monetary Poverty?

• **Population at Risk of Poverty (AROP)** \[ \frac{\text{#Poor}}{\text{#Population}} \] (Poverty head count ratio)

• **Poverty Gap (Poverty Depth)** Average Distance of the Poor in Respect to the Poverty Threshold (in terms of the value of the poverty line) \[ \frac{(Z-Y)}{Z} \]

• **Poverty Gap Squared (Poverty Severity)** Average Distance of the Poor in Respect to the Poverty Threshold Squared \[ \frac{(Z-Y)^2}{Z} \]
Income Poverty

- The standard in the EU is the at-risk-of-poverty measure (official survey for this measure is the EU-SILC).
- This is equivalent to the share of individuals who live on less than 60 percent of the median household equivalized disposable income after social transfers.
- Measures low income relative to other residents within a country, different across EU countries.
- It also varies across time, but may be anchored to a point in time to analyze trends.
- As the welfare of the population improves, the relative line will increase and thus there will always be individuals considered to be at-risk-of-poverty.
- Yields a threshold of 24,000 HRK for the 2012 SILC (adult equivalized).

Consumption Poverty

- Consumption poverty is an alternate measure, which is preferred in theoretical grounds as a better measure of welfare (smother).
- It is less susceptible to empirical problems that affect income data collection:
  - Individuals’ refusal to report income.
  - In the presence of informal economy it better captures welfare.
- There is currently no official consumption based poverty line in Croatia.
- Follow same at-risk-of-poverty concept and define the threshold as 60 percent of the median adult household equivalized consumption.
- Yields a threshold of 23,918 HRK for the 2011 HBS (adult equivalized).
Anchored and AROP thresholds

- Poverty based on the relative line has remained somewhat steady
- Poverty
Direct and Small Area Estimates

- An estimator computed using only the sample data is a direct estimate
  - We commonly refer to direct estimates as those that have sufficient precision
- A small area is commonly defined as “any subpopulation for which direct estimates of adequate precision cannot be produced” (Rao, 2003)
  - It can be geographical
  - It can be a sub-group of the population
- For example the Croatian EU-SILC direct estimates are only reliable up to NUTS 2, and for the HBS at the National level
Croatia Poverty Maps (level of representativeness)

Direct estimates based on 2012 SILC

Direct estimates based on 2011 HBS
The Big Picture on Small Area Estimates

- **Household surveys** such as EU Statistics on Income and Living Conditions (EU-SILC) or the Household Budget Survey (HBS) are the main sources of indicators of living conditions, poverty, and social exclusion.
  - Provide detailed information on multiple indicators of well-being
  - Samples too small to be representative for small sub-national units.

- **Population censuses**
  - Provide 100% coverage, permitting assessment for small areas
  - Very limited information on poverty and social exclusion indicators

Combine survey and census data to exploit the strengths of each information source. Requires hands-on work with national statistical institutes, use official data sources (population censuses and EU-SILC surveys) to estimate risk of poverty at lowest possible sub-national level.
The Basics of ELL (Elbers, Lanjouw, and Lanjouw 2003)

**household survey**

Develop simulation model
Regress W on X

\[ W = X, r, e \]

**Census**

\[ W = F(X, r, e) \]

W: Consumption or Income
X: Poverty correlates like employment, education
Ĉ=F(X): Simulated Consumption or income
Three Steps

- Prepare the data for the household survey and the Census
  - Ensure that data is comparable

- Prepare a welfare model using the household survey (SILC and HBS)
  - Fine tune welfare model

- Simulation phase
  - Take the parameters obtained from the welfare model from the household survey and apply these to the Census

- It is a bit more complicated than that, but we won’t bore you with the details. This is the gist of it.
Data Requirements

- HBS/EU-SILC and Census have variables in common between them
  - Questions should be defined in a similar manner in both data sources
  - Variables should have similar data generating processes

- Common variables should be sufficiently correlated with the welfare measure of interest (income or consumption)

- Additionally we need a location (cluster) variable in order to link the census and survey at that level

- Each location (cluster) in the household survey data should have at least 3 viable observations
Validation

How to ensure that the small area estimates are of good quality?

We should have:

1. Chosen characteristics between the household survey and the census that match

2. Chosen a welfare model that explains a sufficiently large proportion of the variance of the dependent variable (welfare)

3. A poverty rate that is close to the national, and to the poverty rate for lower levels of representativeness

ELL (2003) suggest that populations of at least 10,000 households are required to get precise estimates
CROATIA: Small area POVERTY estimations
Spatial Definitions in Croatia

- Spatial Disaggregation used: 429 (municipalities) + 126 (towns) + Zagreb (17 districts)

- Municipality level (LAU-2): 556

- NUTS 3: 21 Counties

- Between 2007 and 2012 there were 3 statistical regions
  - Northwest, Central and Eastern, and Adriatic

- As of September 2012 the statistical regions were consolidated into NUTS 2:
  - Adriatic, Continental
  - During the 2011 Census, there were 3 statistical regions
Process and Results

• Work in close collaboration with colleagues from the Croatian Bureau of Statistics (CBS)
  • Necessary to ensure that we get similar statistics that have been reported in the past using the same data
  • For example CBS colleagues informed us in initial stages that the poverty rate using the SILC did not match what had been previously reported
    • This brought to our attention that we were using incorrect weights for the data
• Methods from Elbers, Lanjouw and Lanjouw (ELL), and Empirical Bayes (EB) are implemented
  • The goal is to obtain simulated incomes for the entire population
Process and Results

• Estimate a model of adult equivalized/per-capita log income/consumption using the survey data (SILC and HBS)
  • Simulate welfare for every household in the census by using parameters from the survey estimated model
  • Using simulated welfare we estimate the expected level of poverty and inequality for each municipality in the country
• Variables used for modelling are chosen after comparing first moments of the variables, choosing those which are not considerably different, and that are defined similarly across the survey and the census
• The model chosen is one that provides a good fit (measured by the adjusted R-square)
• Additionally a low ratio of sigma eta over MSE is desirable
• Observations are lost due to employment inconsistencies and due to municipalities that have less than 3 observations
Disposable Income-Based Poverty Maps

- Using EU-SILC
  - Original Sample size in 2012: 5,818
  - Representative at the Statistical regional level

- Focus on net disposable income (HY020)

- Define at risk of poverty threshold as 60 percent of the median adult equivalized disposable income
  - Threshold is at 24,000 Kuna
  - Poverty rate is 20.4%
  - This threshold uses disposable income with negative values as well as zeroes
Validation Results for Croatia (SILC 2012)

<table>
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<th>Statistical region</th>
<th>EU-SILC</th>
<th>95% CI</th>
<th>Predicted</th>
<th>95% CI</th>
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<td>Central &amp; Eastern</td>
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<tr>
<td>Total</td>
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<td>18.5%</td>
<td>22.4%</td>
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Note: Poverty line is at 24,000 HRK per adult equivalent
SILC: Poverty Rate (left) and Proportion of the Poor (NUTS3)

Income poverty rate

Share of income poverty

Small area estimates
SILC: Poverty Rate and Proportion of the Poor (LAU2)

Income poverty rate

Share of income poverty

Small area estimates
SILC: Poverty Rate and Proportion of the Poor (LAU2, by NUTS 2)

Small area estimates
Consumption poverty map (HBS-2011)

- Using HBS
  - Sample size in 2011: 2,335
  - Representative at National level
- Per capita consumption, which has been calculated by the Croatian Bureau of Statistics
- Using adult equivalized consumption the at-risk-of-poverty threshold is very close to the income threshold (23,918 vs 24,000 Kuna)
- Using per capita consumption the at-risk of poverty threshold is of 18,011 Kuna
### Validation Results for Croatia (HBS 2011)

<table>
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<th>HBS</th>
<th>95% CI</th>
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<tr>
<td>Republic of Croatia</td>
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<td>14.1%</td>
<td>18.6%</td>
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</table>

Note: Poverty threshold 23,918.62 HRK per adult equivalent
HBS: Poverty Rate and Proportion of the Poor (NUTS3)

Consumption poverty rate

Share of consumption poverty

Small area estimates
HBS: Poverty Rate and Proportion of the Poor (LAU2)

Consumption poverty rate

Share of consumption poverty

Small area estimates
HBS: Poverty Rate and Proportion of the Poor (LAU2)

Small area estimates
HBS: Poverty Rate and Proportion of the Poor (LAU2, by NUTS 2)

Small area estimates
Poverty of Subgroups of the Population

- An additional possible output from the produced poverty maps are poverty rates for distinct subgroups of the population.
- This allows tracking of groups of the population which may be lagging behind.
- For Croatia we obtained poverty rates at the municipal level for the following groups:
  - Children
  - Elderly
  - Employed
  - Working age adults
Poverty Map for the Elderly

Elderly: Income Poverty

Elderly: Consumption Poverty

Small area estimates
Poverty Map for Those Who Work

In work: Income Poverty

In work: Consumption Poverty

Small area estimates