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Challenges, policies and governance of the territories in the post-covid era

EXTENDED ABSTRACT

Title: Assessing vulnerability in small domain of Tuscany

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1. Introduction

The COVID-19 pandemic outbreak affects all segments of the population and is particularly detrimental to members of social groups in the most vulnerable situations. The pandemic has created both a public health crisis and a severe crisis on both the global and national economies and continues to affect populations especially in economic and social areas. Some recent studies have shown that not all the EU felt the pandemic impact on their economies to the same extent: the southern European countries like Spain, Croatia, Greece, and Italy, where the tourism sector plays a relevant role, are the most fragile (EU, 2021). In this paper, the main aim is to study the impact of COVID-19 pandemics on economic poverty and vulnerability, going below the national level. The focus is on Tuscany, a region that heavily relies on exports and various forms of tourism. Moreover, considering the heterogeneity of the regional territory, we retain that it is particularly interesting to analyse the phenomenon of economic poverty and vulnerability considering a sub-regional level, like Nuts 3 level

or economic significant areas, and to examine the association between COVID-19 economic crisis and the previous status of area deprivation.

2. Economic and social vulnerability

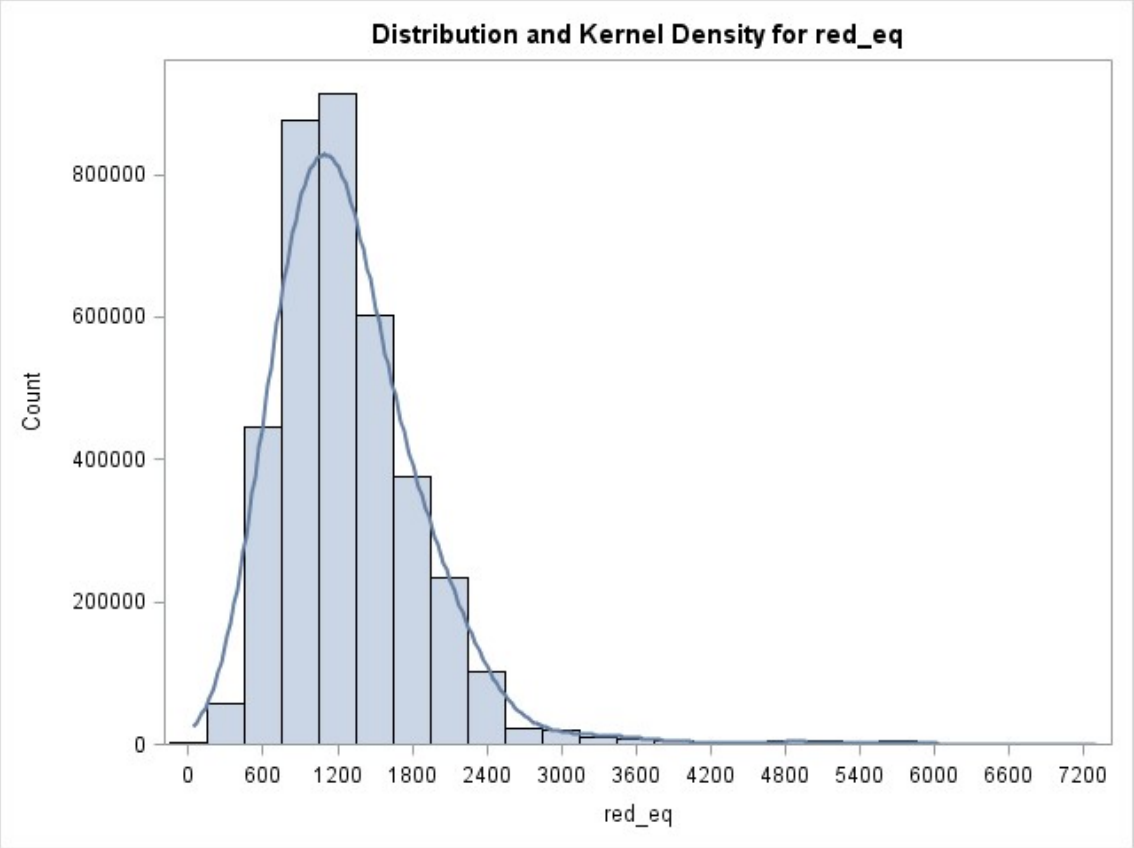
Social and economic vulnerability is determined by various factors such as physical, social, economic, and environmental factors or processes, which increase the susceptibilityof a community to the impact of hazards.
In the context of the COVID-19 crisis, people experiencing for sure an economic crisis, but also multiple deprivations.
In our work, we define households as vulnerable or not by assessing whether they could cover their usual basic expenditures. For that we analyse whether they could afford adequate food and utilities, cope costs for transport, education, health, leisure, and to cope with unexpected expenses.
To compute the vulnerability index we select eleven interlinked vulnerability indicators to the fuzzy approach to overcome the limitation of standard poverty measures, which treat poverty as a binary phenomenon (poor/non-poor). Considering the aim of producing estimates for small domanis in Tuscany, we emploit of another important advantage: fuzzy measures more informative than traditional economic poverty measures and have smaller standard errors (Betti et al., 2018). Therefore, fuzzy measures are more useful for subnational measures (Betti et al., 2012), which means that we can obtain estimations for areas with relatively small samples that are more statistically significant than those yielded by other measures.

3. Data and methodology

To achieve the objectives set, we refer to the sample survey "Indagine sulla Vulnerabilità alla Povertà" planned and conducted in September 2021 by the Regional Institute for Economic Planning of Tuscany (IRPET), focusing on the economic and social features of the Tuscan households, with particular attention to the current economic situation and future prospects. A sample size of 2512 households has been achieved planning the sample design to achieve a representative sample at NUTS3 level (Province's level) even if we also aim to study also smaller domains. Interviews was conducted by C.A.T.I and C.A.M.I methods, interviewing one adult household's member. After a weighting procedure, the sample totals conform to the population totals as regard to gender and age groups. As regards to item nonresponse, missing data have been imputed by deductive imputations based on logical or mathematical relationships between the variables, where it was possible. As regards to the remaining missing values we decided to delete the thirteen units having missing values for all the eleven vulnerability indicators collected for the present situation and for the pre-Covid normal situation, referred to 2019, that we consider as the core varibles of the analysis. So that the valid units for the analysis are 2499. Item nonresponse relative to some qantitative and qualitative variables have been dealt with stocastich imputetion method, assuming fully conditional specification (FCS method of the MI procedure of the SAS software). The largest amount of missing values (14,5%) was registered for the single question adopted to collect the an approximative monthly total net household income. The approximative values collected may lead to a bracket distribution, as follows: [0-600 euro]; [600-700]; [700-900]; [900-1100]; [1100-1300]; [1300-1500]; [1500-1700]; [1700-1900]; [1900-2250]; [2250-2750]; [2750-3500]; [3500-4500]; [4500-5500]; [5500-6500]; [6500-8000]; [8000-10,000]; [10,000 and more].

Continuous values within each bracket have been imputed taking into account the Kernel density estimation of the distribution reported in Figure 1 below.
On the basis of the total household disposable income, equivalised income was obtained with the OECD-modified equivalence scale, and the poverty line was obtained as 60% of the median of such equivalised income distribution among the 5523 individuals present in the valid 2499 interviewed households. Figure 1 shows the frequency distrbution and the estimated kernel density for the equivalised income.

Figure 1: distrbution and kernel density for the equivalised income



As regards to the eleven vulnerability indicators, a set of binary variables collected for the present situation (September 2021) and for the pre-Covid normal situation (referred to 2019). Following the usual path for computing multidimensional poverty measure, we finally obtain the multidimensional vulnerability index (VI), through the following steps:
- variable transformation into the range [0,1];
- exploratory factor analysis (EFA) to identify the hidden dimensions of vulnerability, successively the new latent structure is validated using a confirmatory factor analysis (CFA), the latent dimension identified are presented in table 1;
-construction of the weights to be assigned within each dimension, as defined in the previous step. We adopt the one proposed by Betti and Verma (1999); according to it, within each identified dimension h, the weight to attribute to each single item is computed, considering both the dispersion of a single score and its correlation with the other scores in any given dimension h;

-the deprivation score for each dimension h is computed as a weighted mean of the items' dimension. The output produced at this stage consists of a score for each dimension;
- an overall deprivation score for each statistical unit is computed by calculating the unweighted mean of the dimension scores;
- the alpha parameter is estimated using a loop procedure, iterating till the alpha parameter is such that the mean of the overall score is equal to the conventional at-risk-of-poverty rate (see Betti et al. 2015 for further details).
Finally, the membership function specific to each dimension is computed for each statistical unit.

Table 1: dimensions and indicators

Dimensions	Indicators
1 Basic needs and inclusive lifestyle	Meals with meat or fish // Household adequately warm // cover costs for health// cover costs for 1 week holiday// cover costs for cinema, theatre, eating out once a month
2 Children specific vulnerability	Costs for: transport// children (clothes, toys, child's food)// education (taxes, books and materials)
3 Financial vulnerability	Inability to cope with unexpected expenses: 5000, 2000, 800 Euros

5. Results and conclusions

According to that Eurostat-type poverty line (60% of the median equivalised income), the percentage of poor people (Headcount ratio) in Tuscany is equal to 11.58%; instead, calculating the poverty line according to the 50% of the mean equivalised income (Istat-type), the percentage of poor individuals is equal to 7.72%. Table 1 below reports the HCRs based on both methods for the 10 Provinces (small areas) in Tuscany.
It is interesting to observe that in some provinces the HCRs computed with the two definition of poverty line are quite remarkable, such as in the case of the provinces lapped by the sea (Massa Carrara, Livorno, Pisa e Grosseto) which are also the poorest ones, many households are located between the two poverty lines; whilst in the inner provinces the HCRs computed according the different poverty line are quite close, meaning that the poors are far from the poverty line, indeed also using the lower threshold the proportion of poors is more or less the same (see for example the case of Arezzo).

Table 1: Number of oservation and HCRs based on the two poverty line and Fuzzy Vulnerability Index (FV) by provinces

prov	n	Poverty Line	Mean	FV
Massa Carrara	202	60%	0.18	
		50%	0.13	0.23
Lucca	608	60%	0.14	
		50%	0.11	0.15
Pistoia	382	60%	0.12	
		50%	0.10	0.21
Firenze	1549	60%	0.09	
		50%	0.05	0.07
Livorno	326	60%	0.15	
		50%	0.08	0.17
Pisa	724	60%	0.14	
		50%	0.09	0.05
Arezzo	470	60%	0.09	
		50%	0.08	0.10
Siena	710	60%	0.11	
		50%	0.07	0.08
Grosseto	360	60%	0.15	
		50%	0.09	0.15
Prato	192	60%	0.06	
		50%	0.03	0.23

Concerning the vulnerability, of course the VI, computed at regional level is equal to the regional HCR based on Eurostat-type poverty line, so 11.58%. As regards to the disaggregated VI, we can observe that for some provinces like Massa Carrara, Pistoia and Pisa, the VI is larger than he HCR values, meaning that it appreciate that needs that cannot be appreciated just considering monetary variables.

As regards to the traditional poverty measures and the vulnerability indexes the next steps wil be to compute small area estimation to obtain results for smaller domains and

to put in evidence that the pandemic period situations of vulnerability have induced new poor.

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