# Supplementary Information for: Human Mobility in Response to COVID-19 in France, Italy and UK

Alessandro Galeazzi, Matteo Cinelli, Giovanni Bonaccorsi,
Francesco Pierri, Ana Lucia Schmidt, Antonio Scala,
Fabio Pammolli, Walter Quattrociocchi

April 19, 2021

## Mobility data

For what concerns mobility data, we exploit a dataset built by Facebook with proprietary methods. In particular, the number of people travelling between two locations in a given time interval is provided in two forms: a "baseline" value, that is computed as the average over the 45 days preceding day 0 of data collection for each country, and a "crisis" value that corresponds to near real-time data. Notice that a measurement is retained only if the baseline value exceeds 10, otherwise it is discarded.

## Different dismantling strategies

We addressed the impact of different dismantling strategies on node persistence. We consider strategies based on geographical distance (Fig 1) and edge betweenness (Fig 2). It can be observed that both strategies perform significantly worse in approximating the connectedness of the networks. In particular, edge betweenness appears to dismantle the network in very few steps, showing a steep transition to the state where the network is completely disconnected. This is because in the network a lot of edges have betweenness equals to 0 and thus are all disconnected at the same time.

## Correlation of economic and demographic indicators with nodes persistence
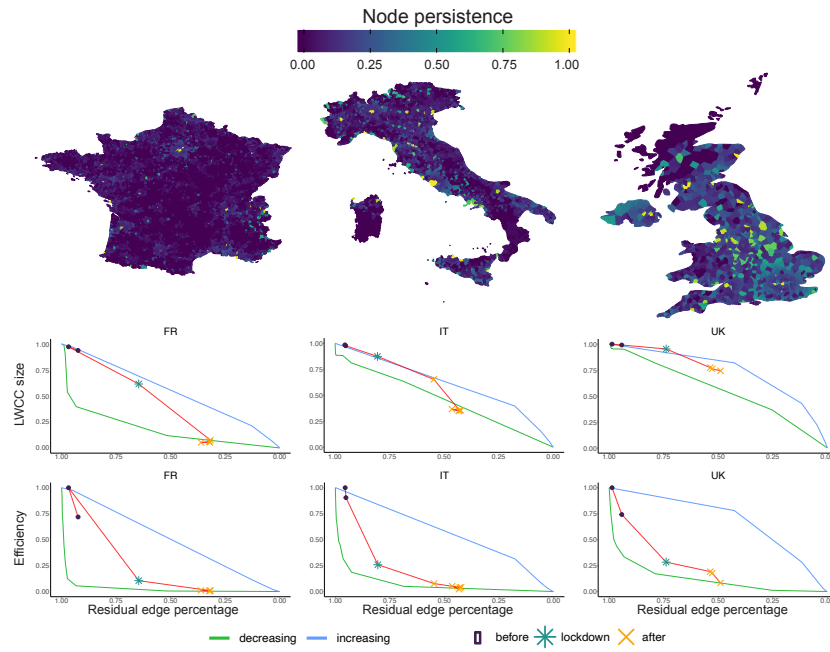
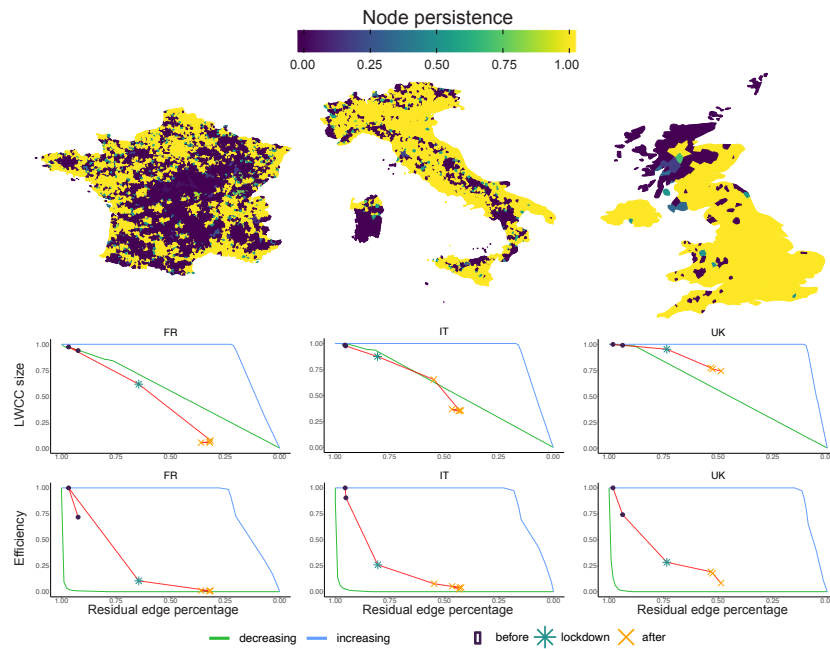Figure 1: Node persistence and dismantling process based on geographical distance



Figure 2: Node persistence and dismantling process based on edge betweenness

| | country | All observations | | | | Without top 1% | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pearson | Spearman | Kendall | obs | Pearson | Spearman | Kendall | obs |
| Gdp Per Capita (2016) | all | 0.3046 | 0.4154 | 0.2894 | 328 | 0.3732 | 0.3962 | 0.2745 | 324 |
| | ITA | 0.4305 | 0.5374 | 0.3866 | 110 | 0.4305 | 0.5374 | 0.3866 | 110 |
| | FR | 0.7751 | 0.5409 | 0.3836 | 93 | 0.5655 | 0.5101 | 0.3574 | 91 |
| | UK | 0.2294 | 0.2148 | 0.1529 | 125 | 0.1795 | 0.1964 | 0.1406 | 123 |
| | | *0.0101* | *0.0162* | *0.0122* | | *0.0469* | *0.0295* | *0.0224* | |
| Total Population (2019) | all | 0.2766 | 0.3344 | 0.2273 | 329 | 0.2234 | 0.3179 | 0.2152 | 325 |
| | ITA | 0.6543 | 0.4939 | 0.3581 | 110 | 0.3706 | 0.4507 | 0.3235 | 107 |
| | FR | 0.6035 | 0.7921 | 0.605 | 94 | 0.6358 | 0.7862 | 0.6001 | 93 |
| | UK | 0.4544 | 0.5095 | 0.3603 | 125 | 0.4544 | 0.5095 | 0.3603 | 125 |
| Value Added Per Capita (2016) | all | 0.398 | 0.4215 | 0.2917 | 328 | 0.3059 | 0.402 | 0.2762 | 324 |
| | ITA | 0.639 | 0.5987 | 0.4369 | 110 | 0.5433 | 0.5764 | 0.4171 | 108 |
| | FR | 0.794 | 0.7801 | 0.5954 | 93 | 0.6012 | 0.7655 | 0.5783 | 91 |
| | UK | 0.4214 | 0.5203 | 0.3744 | 125 | 0.4214 | 0.5203 | 0.3744 | 125 |
| Population Density (2016) | all | 0.5966 | 0.813 | 0.622 | 329 | 0.6594 | 0.806 | 0.6128 | 325 |
| | ITA | 0.8303 | 0.6612 | 0.4863 | 110 | 0.8303 | 0.6612 | 0.4863 | 110 |
| | FR | 0.8292 | 0.8542 | 0.6794 | 94 | 0.9265 | 0.8394 | 0.6588 | 91 |
| | UK | 0.5311 | 0.6985 | 0.5079 | 125 | 0.517 | 0.6911 | 0.4998 | 124 |

Table 1: Correlation among node persistence and economic and demographic indicators calculated for all countries together and separately on each country subset. Calculation performed on the full sample (columns on the left) and on the sample without the top percentile to avoid the influence of outliers. First row reports correlation coefficients, second row reports pvalues only for values greater than 0.001.