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Italian national policies in response to the COVID-19 pandemic: The case of the Friuli-Venezia-Giulia and Umbria Regions

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ABSTRACT

Italy was the first European country to experience a huge outbreak of the COVID-19 pandemic and to implement various policies in order to contain the spread of the virus. This paper analyses the effects of policies implemented by the Italian government in response to the virus’s spread in the first and the second wave of the pandemic. We analyze 307 municipalities of the Friuli-Venezia-Giulia and Umbria regions from 2 April 2020 to 7 February 2021. Our results show that the first relaxation policy implemented immediately after the lockdown had only a slight impact on the virus’s spread. Moreover, we find that the mild restriction policy (orange zone) implemented during the second wave in Umbria was successful in containing the virus’s spread in November 2020. However, this policy proved to be ineffective in countering new, more contagious variants of the virus.

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1. Introduction

In December 2019 [1] the world first encountered the coronavirus disease (COVID-19) caused by a new virus classified as ‘severe acute respiratory syndrome coronavirus 2’ (SARS-CoV-2). After more than a year since the beginning of the health emergency, the virus continues to be a threat for most countries worldwide as more contagious variants cause new, more intense waves of infection, and as death tolls rise.

Under the threat of an unknown virus that endangers the lives of citizens, restrictive measures that limit the transmissibility, such as lockdown, are seen as the only means to curb death tolls and prevent healthcare disasters [2–4]. These policies come with tremendous economic and social costs for society worldwide. Lockdown brings a country’s economy to its knees because it leads to business closures, skyrocketing unemployment, plummeting financial markets, decreasing investments, and slashed consumption, thus generating huge economic fallout.

After a decrease of cases during the summer of 2020, the world began to understand that the battle against COVID-19 was going to be hard, when a devastating second wave of infection begins to hit most countries in October 2020 [5], as the virus evolved into new, more contagious variants. Although vaccine approvals at the end of the 2020 raised hopes of a turnaround in the pandemic, most countries have still not managed to accelerate the pace of inoculation because of supply shortages, vaccine skepticism, bureaucracy and logistical obstacles [6].

In this work, we analyze the effects on the virus spread of anti-COVID-19 policies implemented by the Italian government at the local level during the first and second wave of the pandemic. Understanding the effects of the Italian policies is crucial, because the Italian government was the first one in Europe to face the pandemic with scant information regarding the virus or the effects of quarantine measures. Italy was also the first European country to implement relaxation policies that represented an exit plan from the lockdown. Moreover, the Italian government, during the second wave of infections (November-February 2021), implemented differentiated restrictive measures by classifying regions according to their risk of infections.

By employing an interrupted time series (ITS) method [7–9], we investigate the effect of four gradual relaxation policies implemented after the lockdown, analyzing as case studies the regions of Friuli-Venezia-Giulia (henceforth FVG) and Umbria. Moreover, we propose a timely assessment of the effectiveness in the Umbria region of the regional policies implemented by the Italian government to contain the dramatic second wave of the virus.

Another contribution that we make to the literature is the analysis of the national policies at the lowest Italian level of government (municipality) on an unexplored dataset, to the best of our knowledge. The heterogeneous spread of the virus across regions in most countries worldwide, and especially in Italy, calls for more thorough investigation of anti-COVID-19 policies at the sub-national level [2,10,11] in order to gain better understanding of the
territorial factors that may boost the containing and lifesaving effects of such policies.

Our econometric analysis shows that only the first relaxation policy had an immediate impact on the number of contagions, suggesting that it was prematurely implemented. We do not find any effect of the other three relaxation policies on the spread of the virus, highlighting that the exit plan was overall successful in both regions. Regarding the introduction of the regional restrictions implemented to mitigate the second wave, we find that restrictive-zone policies were not always efficient in containing the virus in Umbria. We argue that these policies should take rapid account of the virus’s evolution of and the compliance of citizens with health norms.

In the next section, we describe the Italian management of the pandemic emergency during the first and the second wave. Section 3 deals with data and empirical model. Section 4 sets out the results, which are discussed in section 5. In section 6 we provide policy recommendations.

2. Italian management of the pandemic emergency

In 2020 Italy experienced two waves of pandemic with peaks in April and November. The central government responded to the spread of the virus in two different ways. During the first wave, it opted for a full national lockdown where only essential economic activities were permitted. In the second wave, the central government adopted a region-based restriction policy differentiated according to territorial risk assessment, and it classified regions into three zones with different restrictions.

Even though anti-COVID-19 policies were decided at the national level, the regions participated in roundtables with the central government during policy decision-making. The main tasks of regions were to implement the central government’s decisions in their territory, to monitor the evolution of the epidemiological situation, and to organize mass screening and vaccination campaigns.

On 11 March 2020 (Law Decree no. 14/2020), the Italian government extended the unprecedented measure of lockdown to the entire country. During lockdown the government banned all public events and gatherings, shut all schools and universities, closed all businesses except essential ones, and limited unjustified movements of people. On 19 April 2020, Italy reached the peak of the first wave contagions with 108,257 positive cases.

Some scholars consider that the way in which Italy managed the first wave should be a lesson to other countries [10,12]. Others not only find that the Italian government was unprepared to manage a pandemic, but also argue that its policy design, state capacity, and institutional system made the crisis difficult to handle [11,13]. Further scholars find that the timing and pace of lockdown implementation is crucial in the fight against the pandemic [14,15]. Chintalaputi et al. [16] predicted that if the lockdown measure could have continued in Italy for another 60 days, the country would have experienced 35% fewer registered cases and 66% more recovered people.

From 4 May 2020 onwards, the country saw a gradual relaxation of the measures. Initially, movement of people was permitted only within the same region and only some categories of businesses were allowed to re-open. Gradually, the ease measures included fewer restrictions on movements (travel between regions was permitted), and more businesses began to re-open, but with due respect for social distancing and the wearing of personal protective equipment (for more details see Table A1). Scholars agree that a crucial factor in preventing an increase in the infection curve is the timing of easing the lockdown measures [14,15]. The exit strategies should be carefully designed to be gradual and prudent [17]. Regular mass testing [14], mass vaccination campaigns [18], enforced tracking and isolating measures of new cases [19,20], the raise of public awareness of epidemic prevention [17,21] should accompany an efficient loosening of the lockdown restrictions.

The relaxation phase was interrupted by the new wave of infections and deaths that gripped the country when the number of new cases rapidly increased in autumn 2020. From October, the government began once again to impose progressive restrictions. Initially, restrictions policies were implemented uniformly at the national level, whereas from 6 November (Prime Ministerial Decree of 3 November 2020) the Italian government adopted region-based restrictions in order to take account of regional heterogeneities of contagion and pressure on healthcare systems. The central government adopted three groups of progressive restrictions imposed on a regional basis according to epidemiological risk assessments, with regions classified into three zones: low risk (yellow), moderate risk (orange), and high risk (red). Every week, the Ministry of Health, on the basis of 21 different epidemiological parameters, decides the classification of the specific regions. The higher the risk assessment the more restrictive the measures that follow.

Very recent research on the effects of the zone-policy in Italy during November 2020 finds that the severe restrictions of the red zone had a significant impact in reducing the number of hospitalized cases and the transmission level (R0). Regarding the orange and yellow zones, the results are divergent, since Manica et al. [22] found that the orange zone is somewhat effective, while the Italian epidemiological association [23] did not find a homogeneous and significant impact of the mild and low restrictive measures related to the orange and yellow zones.

3. Data and empirical models

We analysed the effects of national policies implemented by the central government to manage the spread of the COVID-19 pandemic in Italy by using daily data for 307 municipalities of the Umbria Region and the FVG Region from 2 April 2020 to 7 February 2020. The data were provided by the Umbria Region and the Civil Protection of the FVG Region. The Umbria Region lies in the central part of the country and it is an ordinary statute region. The FVG region, situated in the northern part of the country, is one of the five Italian regions with autonomous status. In Italy, regions with autonomous status have more competences and decision-making power regarding fiscal and legislative decisions compared to other regions.

We assess whether relaxation policies uniformly adopted in Italian municipalities between May and June 2020 encouraged the virus’s spread. We estimate the ITS model (1) with panel data [7–9,24–27]. The ITS method allows to estimate the impact of a policy in the period immediately after the intervention (level change) and in the long-run (trend change) by observing changes in an outcome variable before and after the policy introduction. This model design is mainly used to evaluate the effectiveness of large-scale policy interventions, especially in the public health sector [28,29].

\[
SARS\text{CoV}2_{it} = \beta_0 + \beta_1 T_{it} + \beta_2 J_t + \sum_{j=1}^{n} \text{Post}_{ijt} + \beta_3 \sum_{j=1}^{n} \text{Post}_{ijt} \times T_{it} + \epsilon_{it}
\]

(1)

The outcome variable SARS\text{CoV}2_{it} for the \(i\) \(th\) municipality on day \(t\) represents the daily change in the number of people testing positive for COVID-19 per 1000 inhabitants. The variable \(T\) is the time since the start of the analysis and \text{Post} is a dummy variable that assumes value 1 during the post-intervention period and zero otherwise. In model (1) we investigate four \((n=4)\) national relaxation policies implemented over the period May-June 2020. The treatment periods are as follows:
- from 4 May to 17 May 2020, that concerns the reopening of certain economic activities and permitted movements of people within the region to visit relatives;
- from 18 May to 24 May 2020, related to unrestricted movements of people within the region and the reopening of hairdressers, restaurants, bathing facilities, museums, churches;
- from 25 May to 2 June 2020, when gyms, swimming pools, sports centres were reopened;
- from 3 June to 11 June 2020, when journeys between regions were allowed. We extended our analyses until 11 June, because we excluded two mild relaxations implemented on 12 June and 14 June. Our methodology could not efficiently capture the effect of these relaxations because they occurred close in time. We started our analyses on 2 April 2020 so as to have the same start date for both regions.

The intercept \( \beta_0 \) indicates the starting level of the dependent variable. The coefficient \( \beta_1 \) associated with \( T \) represents the slope or the trend of the dependent variable until the introduction of policy intervention. The coefficient \( \beta_2 \) is the change of the outcome variable in the period immediately following the policy intervention. The coefficient \( \beta_3 \) measures the slope change between pre-intervention and post-intervention. The coefficient after each intervention should be interpreted compared to the period before the specific policy intervention \([7,26]\). An error term \( \epsilon \) is included with zero mean and constant variance.

We also empirically evaluated whether the adoption of the zone-based policies implemented from mid-November 2020 onwards was effective in reducing the spread of the virus in the second wave of the pandemic. In this regard, we estimated ITS model (2), where Zone is a dummy variable that takes value 1 in the post-intervention period of zone-based policies and zero otherwise. The remaining variables are defined as in (1).

\[
SARScO\nu2_{tg} = \gamma_0 + \gamma_1 T_g + \gamma_2 j + \sum_{j=1}^{n} Zone_{ij} + \gamma_3 j + \sum_{j=1}^{n} Zone_{ij} \ast T_g + \epsilon
\]  

Model (2) includes the following two treatment periods:

- from 11 November to 5 December 2020, when the orange zone was in force in Umbria;
- from 6 December 2020 to 23 December 2020, when the Umbria region faced low restrictions of the yellow zone.

Our analyses extended until 23 December, because the next day all Italian regions became red zones. We chose as the starting point of our analyses 23 October 2020 in order to have a homogenous period of analyses \([28]\).

We also estimated the opposite scenario, where the Umbria municipalities changed from yellow zones (11 January 2021–16 January 2021) to orange ones (17 January 2021- 7 February 2021). On 8 February 2021, some municipalities in the Umbria region became red zones.

We did not conduct the same analysis for the municipalities of the FVG region. This was because during November and December 2020, their daily data were not accurate since they included diagnosed cases provided by private laboratories for the previous weeks \([30]\). The delayed imputation of the data created artificial daily fluctuations in diagnosed cases that did not depend on the evolution of the pandemic, thus hampering identification of the effects of anti-COVID-19 policies.

Models (1) and (2) were estimated as population-averaged panel-data models by using Generalized estimating equations (GEE) with Gaussian distribution.

### 4. Results

Table 1 presents the estimation results of model (1). Columns 1–3 of the table illustrate results using the full sample of municipalities. The remaining columns refer to the results obtained by using the sub-samples of the Umbria and the FVG municipalities separately. All estimates were performed with standard errors robust to both heteroscedasticity and serial correlation if detected in the error term structure by the Cumby and Huizinga \([31]\) general test for autocorrelation \([8,32]\).

In column (1) of the table, the estimated coefficient \( \beta_1 \) of the initial value of our outcome variable (daily variation in diagnosed cases) is 0.025 per 1000 inhabitants, statistically significant at 10% level. It declines slightly and significantly by about −0.002 per day prior to May 4. The first relaxation policy implemented on May 4 produced a significant immediate increase in the daily variation of diagnosed cases by 0.028 per 1000 inhabitants. This policy also produced a significant difference between the pre- and post-intervention trend \((\beta_1 + \beta_2)\) by 0.003. However, the post-intervention trend \((\beta_1 + \beta_2)\), even though positive, is not statistically significant. This suggests that the policy produced only an immediate effect which did not persist over the first treatment period \([7-9,33]\).

We reach similar conclusions when carrying out the analysis on the two regions separately. We find that the first relaxation policy had a larger immediate effect on the spread of the virus in FVG compared to Umbria. This may indicate that the inhabitants of the Umbria region were more cautious in interpersonal contacts immediately after the lockdown than residents of the FVG region.

The other relaxation policies did not have a significant impact on the contagions either in the immediate period or over time. These results confirm the evidence of Marziano et al. \([34]\) that the relaxation policies implemented by the Italian government did not provoke an acceleration in the virus’ spread. The reason for these findings may be the close compliance by citizens with health protection and social distancing measures during that period. Moreover, during the summer months there was a general shrinking of the outbreak’s intensity as the virus lost virulence with the increase of temperatures.

Fig. 1 provides a graphical representation of the results presented in Table 1. The figure clearly shows in panel (a) a significant break in the time series only in the first treatment period (4–17 May). Thereafter, no large jumps are observed when switching from one relaxation policy to another.

The estimation results of model (2) are displayed in Table 2. The first three columns (1)-(3) of the table make it possible to analyze the effect of the transition from a no-zone policy to the orange zone policy, and then to the yellow one, on the number of positive cases. The remaining columns (4)-(6) make it possible to analyze the shift from a yellow zone to an orange one that took place during mid-January 2021.

What clearly emerges from columns (1)-(3) of the table is that the orange zone, introduced on 11 November 2020, had no significant immediate effect after its introduction on the number of positive cases; but it significantly reduced them over time, compared with the pre-intervention trend by −0.029 \((\gamma_4)\). Moreover, the estimated value of the daily post-intervention trend \((\gamma_4 + \gamma_5)\) is negative and statistically significant at 1% level. This means that implementation of the orange zone decreased the trend of new positive cases from 0.012 \((\gamma_1)\) to −0.017 \((\gamma_4 + \gamma_5)\) per 1000 inhabitants.

The introduction of the yellow zone on 6 December 2020 did not generate an immediate variation of diagnosed cases since the estimated coefficient \( \gamma_2 \) is not statistically significant. Although we observe a significant increase of about 18 daily positive cases per inhabitant, between the pre- and post-intervention trend, the latter is not significant in the long-run. This suggests that the shift
Table 1

Estimation results of the impact of national relaxation policies implemented in Umbria and FVG on the daily change of diagnosed COVID-19 cases (per 1000 inhabitants).

|                | Full sample | Umbria | FVG |
|----------------|-------------|--------|-----|
|                | Coef.       | z      | P>|z| |
| T              |             |        |     |
| Post4May20     | $\beta_1$  | -0.002 | 2.94 | 0.003 | 0.004 | 0.003 | 2.23 | 0.026 |
| Post4May20 XT  | $\beta_{21}$| 0.028  | 2.90 | 0.004 | 1.66 | 0.007 | 0.039 | 2.44 | 0.015 |
| Post1May20     | $\beta_{23}$| 0.003  | 2.79 | 0.005 | 0.002 | 2.71 | 0.007 | 0.004 | 2.28 | 0.023 |
| Post1May20 XT  | $\beta_{23}$| 0.003  | 0.62 | 0.537 | -0.001 | -0.84 | 0.401 | 0.005 | 0.69 | 0.492 |
| Post2May20     | $\beta_{31}$| 0.0004 | 0.06 | 0.950 | 0.001 | 1.02 | 0.307 | -0.001 | -0.11 | 0.914 |
| Post2May20 XT  | $\beta_{33}$| 0.001  | 0.65 | 0.516 | -0.0001 | -0.67 | 0.501 | 0.001 | 0.69 | 0.488 |
| Post3May20     | $\beta_{34}$| -0.0001 | -0.04 | 0.965 | -0.0004 | -0.5 | 0.617 | 0.0001 | 0.04 | 0.969 |
| Cons           | $\gamma_0$ | 0.025  | 1.89 | 0.058 | 0.047 | 2.73 | 0.006 | 0.020 | 1.03 | 0.305 |
| Post-intervention linear trend: |             |        |     |
| $\beta_1 + \beta_{23}$ | 0.001  | 1.040 | 0.296 | 0.0001 | -0.32 | 0.746 | 0.001 | 1.070 | 0.284 |
| $\beta_1 + \beta_{31} + \beta_{32}$ | -0.0001  | -0.350 | 0.724 | 0.0001 | -1.96 | 0.050 | -0.0002 | -0.320 | 0.748 |
| $\beta_1 + \beta_{31} + \beta_{32} + \beta_{33}$ | 0.001  | 0.600 | 0.552 | 0.0002 | -1.30 | 0.195 | 0.001 | 0.660 | 0.509 |
| $\beta_1 + \beta_{31} + \beta_{32} + \beta_{33} + \beta_{34}$ | -0.0001  | -1.300 | 0.194 | 0.001 | 1.05 | 0.292 | 0.001 | -1.630 | 0.102 |
| Prob > $F_2$   |             | 0.000  | 0.005 | 0.000 |     |     |     |     |     |
| Group No.      | 307         | 92     | 215  |     |     |     |     |     |     |
| Obs. No.       | 20,898      | 6063   | 14,835 |     |     |     |     |     |     |

Note: Standard errors are robust to heteroscedasticity and corrected for autocorrelation of fourth order on estimates in columns (4)-(6).

Fig. 1. Daily COVID-19 diagnosed cases variation (per 1000 inhabitants) in the municipalities of the Umbria and the FVG regions between 2 April 2020 and 10 June 2020.

from the orange to the yellow zone produced, as expected, an increase in new positive cases but this trend does not persist over time.

Panel (a) of Fig. 2 provides a graphical representation of the daily variations of the diagnosed cases in the Umbria municipalities with the introduction of the orange zone on 11 November and the yellow zone on 6 December 2020. It clearly shows that the orange zone inverts the post-intervention trend without the creation of a large jump immediately after its introduction. Regarding the introduction of yellow zones in the Umbria region, we can observe that weaker restrictions reversed the decreasing trend observed during the orange zone.
Table 2
Estimation results of the impact of national zone-based policies implemented in Umbria on the daily change of diagnosed COVID-19 cases [per 1000 inhabitants].

|                     | Umbria |                     | |                     | Umbria |                     | |
|---------------------|--------|---------------------| |---------------------|--------|---------------------| |
|                     | Coef.  | z                   | P>z    | Coef.  | z                   | P>z    |
|                     | (1)    | (2)                 | (3)    | (4)    | (5)                 | (6)    |
| T                   | γ1     | 0.012               | 4.63   | 0.000  | 0.023               | 2.82   | 0.005               |
| Post-Orange11Nov20  | γ21    | 0.006               | 0.13   | 0.899  |                     |        |                     |
| Post-Orange11Nov20xT| γ22    | −0.029              | −7.66  | 0.000  |                     |        |                     |
| Post-Yellow12Nov20  | γ22    | 0.001               | 0.06   | 0.953  |                     |        |                     |
| Post-Yellow12Nov20xT| γ22    | 0.018               | 7.01   | 0.000  |                     |        |                     |
| Post-Orange17Jan21  | γ23    | −0.083              | −1.98  | 0.048  |                     |        |                     |
| Post-Orange17Jan21xT| γ23    | −0.014              | −1.54  | 0.125  |                     |        |                     |
| Cons                | γ0     | 0.308               | 9.58   | 0.000  | 0.135               | 5.11   | 0.000               |

Post-intervention linear trend coefficient:

|                     |                     |                     |
|---------------------|---------------------|---------------------|
| γ1+γ11              | −0.017              | −8.14               | 0.000               |
| γ1+γ11+γ12          | 0.001               | 0.78                | 0.434               |
| γ1+γ13              | 0.008               | 2.74                | 0.006               |

Prob > χ²

| Group No. | Obs. No. |
|-----------|----------|
| 92        | 5704     |
| 92        | 2576     |

Note: Standard errors are robust to heteroscedasticity and corrected for autocorrelation in the error term structure of fifteenth order on estimates in columns (1)-(3) and of ninth order on estimates in columns (4)-(6).

From 23 December 2020 until 10 January 2021, the Umbria municipalities, as well those in the rest of Italy, were subjected to seven color area changes, when red zones alternated with yellow and orange ones in very short periods of time (for more details see Table A2 in the Appendix). This makes it difficult to identify the causal effects of policies to contain the virus’s spread. We focus on the longer time period of policy intervention related to the transition from the yellow to the orange zone that took place in Umbria on 17 January 2021. Column 4 of Table 2 shows that this transition created a statistically significant reduction of new diagnosed cases amounting to approximately 8 positive cases per inhabitant in the period immediately following the introduction of more stringent restrictions. However, clearly visible in panel (b) of Fig. 2 is also a statistically significant positive post-intervention trend (+0.008) in the growth of diagnosed cases. These results show that the shift from yellow to orange zones decreased the number of new cases, although this policy was not able to reverse the trend, which remained positive. This may have been due to new, more contagious virus variants and/or the lack of citizens’ compliance with the norms as a result of frequent changes of the restriction policies during the Christmas and New Year holidays (see Table A2 in the Appendix).

5. Discussion

Italy was the first European country to be hit by an exponential outbreak of the COVID-19 virus, and its government was the first in Europe to manage the pandemic by implementing gradual restrictive policies. The pandemic has proved to be very heterogeneous not only across countries but also across regions. This highlights the importance of analyzing regional case studies in order to gain better understanding of the heterogeneous impact of national anti-COVID-19 policies and to design better tailored territorial policies.

Our empirical analysis has pointed out that the relaxing policies implemented nationwide by the Italian government after the lockdown period did not cause a significant increase in new positive cases in the FVG and Umbria regions. Only the first relaxation policy enacted on 4 May 2020, generated a slight worsening of cases, which, however, did not persist over time. This finding suggests that the policy was prematurely implemented by the national
decision-maker in those regions. Like other scholars [19,34], we argue that the success of these relaxing policies may have been due to compliance with the social distancing rules, heath prevention measures, and the seasonality of the virus.

Our results regarding the zone-based policies that the government implemented during the second wave of the virus show that mild stringent policies (orange zone) were effective in containing the virus in the Umbria region when the policy was first implemented. However, we find that the orange zone restrictive measures were not able to curb the virus’s spread during January 2021. One reason could be the spread of new variants of the virus (like the British and Brazilian variants) in the Umbria region, exponentially increasing the number of infections. Probably, in this adverse scenario, the orange zone was an inadequate policy to contain the new strains of the virus, which instead required more stringent measures. Another factor that may have contributed to the low efficiency of the orange restrictions was the government’s decision during December-January to change the colours of all the regions very frequently during the Christmas and New Year holidays. This may have caused a loss of credibility in the government’s policies followed by less compliance by citizens with the stringency rules.

6. Policy recommendations

Even though our analyses concerned only two regional case studies, they contribute to the literature with timely assessment of the effect of national anti-COVID-19 measures at the lowest territorial level, and they provide relevant policy recommendations.

Firstly, our findings highlight the importance of the timing of gradual relaxations after a lockdown, as suggested by other scholars [15–17]. The timing of the relaxing policies should be carefully designed by considering multiple factors, not only epidemiological data but also the virus’s seasonality, the aggressiveness of various virus strains, the vaccination rate, and the public awareness of epidemic prevention.

Secondly, our analysis of the regional restrictive policies implemented by the Italian government to contain the second wave of the pandemic suggests that the chosen restrictive policy was not always able to limit the spread of the virus. This failure highlights the importance to monitor the evolution of the pandemic at the lowest level of government. In this way, the government may obtain a granular picture of the epidemiological situation that might help to promptly manage different unexpected scenarios, like new virus versions. As a consequence, restrictive measures could be better tailored to local contagions and health needs. This may be enhanced by closer cooperation between the national and local governments.

Thirdly, the delay in the epidemiological data reporting of FVG calls for more attention of the central government regarding sub-national data imputation because it may distort the incidence pattern of the pandemic. The central government should give municipalities and regions uniform guidelines on how to handle epidemiological data. These guidelines would provide uniform updated data, representative of the current epidemiological situation of the local territory. These data should be publicly available so that the effects of policies at the sub-national level can be studied and important policy suggestions made to decision makers.

Finally the frequent changes of the zone-based policy, as happened during December and January 2021, may alter the perception of citizen’s increasing the confusion about the risk of contagious and the evolution of the pandemic. This may reduce the citizens’ trust and credibility in the management of the pandemic from the public institutions followed by less compliance by citizens with the stringency rules. The central government should design the policies in accordance with the evolution of the pandemic, avoiding frequent policy changes that may undermine their effectiveness.

As the world is preparing for new waves of contagion, one powerful weapon against the pandemic consists in the lessons learned so far in the management of the COVID-19 global challenge. However, more research is needed because the situation is constantly evolving.

Conflict of Interest Declaration

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Appendix

Tables A1 and A2.

Table A1

| Decree of law                | Relocations                                                                 | Start date       |
|------------------------------|----------------------------------------------------------------------------|------------------|
| Prime Minister Decree of 26 April 2020 | Movements within the region are allowed only to visit parents | From 4 May 2020  |
| Law Decree No. 33 of 16 May 2020; Prime Minister Decree of 17 May 2020 | Movements within the region are permitted without motivation, opening of shops, restaurants, museums, churches, bathing facilities, hair salons | From 18 May 2020 |
|                              | Opening of gyms, pools, sport facilities | From 25 May 2020  |
|                              | Movements between regions are permitted | From 3 June 2020  |

Table A2

| Period                | Zone       |
|-----------------------|------------|
| 11 November 2020 – 5 December 2020 | Orange  |
| 6 December 2020 – 23 December 2020 | Yellow  |
| 24 December 2020 – 27 December 2020 | Red  |
| 28 December 2020 – 30 December 2020 | Orange  |
| 31 December 2020 – 3 January2021 | Red  |
| 4 January 2021 | Orange  |
| 5 January 2021 – 6 January 2021 | Red  |
| 7 January 2021 – 8 January 2021 | Yellow  |
| 9 January 2021 – 10 January 2021 | Orange  |
| 11 January 2021 – 16 January 2021 | Yellow  |
| 17 January 2021 – 7 February 2021 | Orange  |

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