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Divided We Survive? Multi-Level Governance and Policy Uncertainty during the First Wave of Covid-19

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Abstract

We compare health system responses to the first wave of COVID-19 pandemic in Italy and Spain. In both countries, healthcare is managed at the regional level, but the central government behaved differently in the uncertainty surrounding the first wave, leaving more autonomy to regional governments in Italy than in Spain. Upon documenting national and regional health system responses, we show evidence of a significant gap in the number of infected cases, alongside regular and emergency hospital admissions, and mortality in the two countries, both at the national and at the regional level. We then discuss several potential mechanisms, such as policy stringency, the localization of the pandemic and mobility restrictions, measurement error, and especially the regional autonomy, enjoyed by Italian regions but not by Spanish regional governments amidst a state of alarm in both countries. We find that, given the strong localized effect of the pandemic, allowing more autonomy, and fostering experimentation and local solutions explains the gap between Italy and Spain in the first wave of the pandemic.

JEL-Codes: H750, I180.

Keywords: regional health systems, decentralization, policy stringency, health care, Covid-19, Italy, Spain.

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1. Introduction

Although the fight against COVID-19 is a 'global public good', which requires coordination of actions at the highest possible level, crucial local knowledge about how best to address the needs imposed by a pandemic might not be used when decision making is completely centralized. This issue is of particular relevance in many healthcare system in the European Union where health policy takes place at difference levels of government: whilst coordination across borders is required at a European-wide level to face a global pandemic, regional reactions might well idiosyncratic needs; hence, a 'one-size-fits-all' approach might not always be the most efficient solution, especially when the impact of policies are highly uncertain as in the presence of a completely new virus.

The territorial governance has been at the center of every policy reaction to new viruses before, (see for instance reactions to SARS-CoV in 2002, MERS-CoV in 2012 or the spread of known lethal viruses like EBOV in 2014); and the *balance of power* between a highly centralized governance and a more decentralized solution has played a central role. Proponents of centralized governance argue for a uniform response to counteract adverse effects of territorial self-interest (e.g., not sharing timely information, or circulating essential protective equipment). In contrast, advocates of decentralization put forward the role of innovation and low-cost experimentation when the optimal policy reaction is unknown, and the new virus is surrounded by uncertainty. Decentralized governance can still allow for some degree of coordination, for instance via Pandemic Plans, within and even between countries. Cross country and cross regional coordination via Pandemic Plans allow for a swift exchange of information on the characteristics of the pathogen, alongside the set-up of common standards to track its evolution and collect comparable data, regulations to manage the actions of infected

patients and prevent the spread of the disease further (including border closures and quarantines).

This paper examines the effects of national (central) and sub-national (regional) reactions to COVID-19 in Italy and Spain by exploiting the first wave of the pandemic, when the new virus was largely unknown and governments (both at the central and at the local level) had to decide what to do rapidly to protect the health of citizens with almost no information on the potential impact of specific policies. We contribute to a growing literature (such as Bailey et al., 2020, and Dodds et al., 2020), by examining how decentralized health systems have managed the pandemic expansion. More specifically, we discuss the impact on COVID-19 outcomes of the differences in regional autonomy across Italy and Spain after the declaration of the state of emergency. It is unclear whether regional autonomy provides an advantage to face a pandemic; or, alternatively, whether a centralized government is more advantageous when there is a large uncertainty in the effect of policies, as it had been the case during the first wave of COVID-19. In other words, what is the effect of governance in the management of *new* health care emergencies on health outcomes? Are regional governments that adapt the stringency of lockdown decisions to their local circumstances better suited to face the coordination of health care needs in a *new* pandemic?

Italy and Spain share common institutional backgrounds (e.g., decentralized health care systems), but differed in the governance of the first wave of COVID-19 pandemic. Both countries were hit hardly by the pandemic, approximately around the same time: Spain was only few weeks behind Italy in the spread of the virus. As of end of May 2020, when the 'first wave' was reaching an end and countries gradually re-opened their economies, reported cases in Italy (230,000) compared to those reported in Spain (240,000), and the same applies to deaths (33,000 and 29,000, in Italy and Spain respectively). However, despite sharing a heavily

decentralized health system, so that regional governments have a large say in health policy decisions and most of the expertise lies at the regional level, the two countries behaved differently in the actual role of central and regional governments during the crisis. For instance, while the Spanish government centralized the purchase of health care equipment and imposed a central level coordination, the Italian government did not enforce a full coordination among the regional governments.

Comparing evidence from Italy and Spain given their different governance during the first wave of the COVID-19 outbreak will inform the discussion on the optimal *balance of power* between a highly centralized and a more decentralized solution. Central level coordination runs the risk of amplifying the effect of a policy both when it succeeds, as well as when it fails. Hence, if a uniform response across the entire national territory is not the most effective, all the country is stacked in a bad equilibrium. In contrast, experimentation might be important when countries are in search for an optimal solution. If the regional governments can identify their own policy solution to face the spread of the virus, which proves effective, then other regions can adopt it, and the consequences of a 'one-size-fit-all' policy are avoided. We argue that this is the case of the Veneto Region in Italy. Despite bordering the Lombardy Region, Veneto experienced less than 20,000 cases as compared to about 80,000 in Lombardy during the first wave emergency.

Policy reactions to COVID-19 in Italy

The first COVID-19 case in Italy was officially identified on 20 February 2020, at a public hospital in Codogno, a small town close to Milan, in Lombardy, thanks to the intuition of an anesthesiologist, who tested a 38-years old patient against the national advices for COVID-19 testing. In fact, the Italian Prime Minister has declared a national emergency via an 'emergency

decree' since 31 January 2020, for a period of six months; but before detecting this first case, people to be checked and tested were only those returning from China.

A similar situation to that of Codogno was found in Vo' Euganeo, an even smaller village in the surrounding of Padua, in Veneto. Starting from 23 February 2020, Codogno and Vo' Euganeo were locked-down into a *red-zone* by the Central government. *Red-zone* rules required temporary closures of all economic activities but for essential services, and stay-at-home orders for all the people residing in the area. On 8 March 2020, the entire Lombardy, as well as few provinces in the bordering regions of Veneto, Piedmont and Emilia Romagna have been locked into *red-zones*. The whole country has been locked down in a national *red-zone* few days later, starting from 11 March 2020. After months of lockdown, a de-escalation of measures was started at the beginning of May, marking the end of the first wave of COVID-19 pandemic in Italy.

Despite the national lockdown, the evolution of the epidemic in Italy entailed a different spread and impact in different regions. Lombardy was by far the most affected Italian region, and one of the most affected in the world during the first wave. Conversely, in Veneto the evolution of contagion had been more mitigated. In general, Northern Italy experienced the most part of COVID-19 infection compared to both the Center and South, where the spread of the new coronavirus did not follow a similar exponential growth.

The Italian National Healthcare System (NHS), founded in 1978, provides universal healthcare coverage, and it is financed with taxes, mostly collected at the central level. During the Nineties, several policy reforms transferred administrative and organizational responsibilities from the central government to the regional administrations, so that Italian regions have significant autonomy in organizing their own healthcare system (Turati, 2013). This autonomy was

enjoyed also during the pandemic, and it helps explain the different policy patterns followed by Lombardy and Veneto.

Among the 21 regions, Lombardy is one of the top-ranked for socio-demographic indicators. Lombardy has a population of 10 million residents, it ranks among the most competitive areas in Europe for its economic indicators, and it has experienced extended and dynamic entrepreneurship growth despite the weak performances at the national level in recent years. Public expenditure for healthcare services reached 19 billion euro in the last year. The healthcare system comprises approximately 150 hospitals generating 1.5 million discharges annually. A regional reform in 1997 radically transformed the healthcare system in Lombardy into a quasi-market in which citizens are free to choose the provider, regardless of its ownership (private or public). Differently from all the other Italian regions, the healthcare system in Lombardy is entirely built on a clear separation between insurers (the Local Health Authorities, LHA) and providers, a prospective payment system based on DRGs, and the reimbursement for all the providers within the regional accreditation system (Brenna, 2011). This healthcare context tackled the COVID-19 epidemic by hospitalizing most of the patients, allowing the virus to spread into the hospitals and subjecting the hospital system to an excessive stress. The rapid growth of patients in need to be hospitalized forced hospitals in the provinces of Bergamo and Brescia to convert entire wards to COVID-19 wards, increasing the number of beds capacity in ICU, moving physicians and nurses from their usual activity to care patients affected by the coronavirus. This policy of increasing ICU beds capacity was later adopted across the country.

In contrast, the model adopted in Veneto is more centralized, with the regional government capable to better coordinate with a top-down approach the choices of hospitals. As for the pandemic, this model appeared more ready to deal with the epidemic outside the hospital.

Veneto addressed COVID-19 epidemic by extensive testing of symptomatic and asymptomatic citizens, broad contact tracing around positive cases, quarantine for cases and suspected with daily telephone monitoring, detailed practical guidelines on home isolation, minimization of contacts with physicians and nurses, and limited hospital admissions to patients with major healthcare needs (Binkin et al., 2020).

Policy reactions to COVID-19 in Spain

During the first wave, Spain was one of the countries in the world with the most detected cases, after the United States. The first positive case was detected on 31 January 2020, but it was from March when the diagnoses began to increase exponentially. As of 25 February 2020, cases in Spain skyrocketed because people with pneumonia of unknown origin were tested for COVID-19. On the same day, four new cases related to the Italian cluster were confirmed in Spain. By 13 March 2020, cases had been confirmed in all 50 provinces of the country. A state of alarm and national lockdown was imposed on 14 March. Full responsibility to the Spanish central government to implement measures to deal with the COVID-19 crisis has been declared.

On 29 March 2020 it was announced that, beginning the following day, all non-essential workers were to stay home for the next 14 days. On 28 April, the government announced a plan for easing lockdown restrictions. People were allowed out of their homes for short walks and individual sports from 2 May, marking the end of the first wave also in Spain.

Unlike in Italy, Spain adopted a 'command-and-control' approach despite healthcare decentralization in normal times. A newly appointed Minister of Health coordinated the commandment of the health system amidst the state of alarm, which was declared on 14 March 2020. The decree centralized the purchase of medical equipment, and the suspension of flights from Italy.

Impotently, the health system in Spain compares to the Italian in all of its relevant design features: it is organized along the lines of a National Health System, but during normal times, the governance of the system is decentralized at the regional level. Seventeen regions (called autonomous communities) have health care responsibilities with regards to providers' organization and funding, and the system is funded by unadjusted block grants and, to a lesser extent, by regionally devolved and own taxes. In examining the health system response, it is important to bear in mind that the previous evidence has documented that decentralized governance play a central role in lowering regional inequalities in health care use and in stimulating innovation (Costa-Font and Turati, 2018).

At the time of the first wave, health care policies were highly heterogeneous across regions, since regional governments were run by different political coalitions. At the time of the first outbreak, the region of Madrid, was run by a conservative coalition government, whilst Catalonia was run by a regional nationalist coalition. In contrast, the central government was supported by a left -wing coalition with different regional supports. Madrid was the focal point of the pandemic in Spain, followed by Catalonia, and other heavily affected regions the two Castile's, Basque Country and Navarra and Andalusia. Yet, although exposure to the pandemic differed by region considerably, as the speed of the pandemic differed by regions, a the state of emergency and a central level coordination was imposed. In contrast, in the second and third wave, regional governments kept their own responsibilities. This provides with some levels of policy variation where to examine the effects of decentralization on relevant health outcomes.

2. Materials and methods

2.1. Data

The aim of this research is to compare the reaction to the first wave of COVID-19 pandemic in Spain and Italy to learn about the effect of a different governance in terms of centralization/decentralization in the management of the pandemic. We focus on the first wave, from the start to about its exhaustion: this period is characterized by the novelty of COVID-19, hence by the uncertainty surrounding policies aimed at containing the spread of the virus. Spanish data are gathered from the website of Instituto de Salud Carlos III (<https://COVID19.isciii.es>), while Italian Civil Protection provides daily updated data in a Github repository (<https://github.com/pcm-dpc/COVID-19>).

Data reliability is clearly an issue for the comparison of performance in the first wave, and, more generally, for research related to COVID-19 (e.g., Odone et al., 2020). There are three main issues that affect data quality, missing a common framework at both supra-national and national level guaranteeing comparability. First, information on the number of affected people are influenced by the number of people that have developed the symptoms, have been treated by healthcare systems and have been tested by swab (the only method that produce reliable information). However, testing policies using swab have been very different across countries, and across regions within countries. In addition, testing policy have also changed during the pandemic, for different reasons, including the fact that swabs or reagents were unavailable, particularly in the first wave. Second, the number of hospitalizations, especially in ICU, have been influenced by the policies adopted by different regions and countries, and by the availability at the local level of beds, which were adapted according to needs to be able to treat all patients (see, e.g., Faggioli et al., 2020, on the dramatic situation experienced at the Hospital Giovanni XXIII in Bergamo, Lombardy). Third, similar problems related to the number of

infected applies to the number of deaths, which overlap with in-hospital mortality also for other causes. The absence of accepted standard for counting patients dying only for COVID-19 and patients affected by a number of other pathologies struck down by COVID-19 will produce noisy statistics in this respect. Considering these issues, ICU admissions and hospitalizations seems to be the most reliable information, at least for two reasons: these data reflect the strategy in contrasting the COVID-19 epidemic (Nacoti et al., 2020) and beds capacity has been increased in order to admit all possible patients, so that capacity constraints do not represent a crucial issue.

In addition to data on COVID-19 outcomes, we collect data on the Stringency index produced by the Blavatnik School of Government at the University of Oxford (available at <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker>) with the aim to compare the restrictions applied in our countries of analysis. The index summarizes information on how stringent the policy response by governments was, combining various measures including, e.g., school closures and stay-at-home orders (Hale et al., 2020).

2.2. Methods

Our discussion will be based on a descriptive analysis of COVID-19 outcomes across Italy and Spain, and across selected regions in the two countries. In particular, we examine the total number of infected cases, hospitalized patients, patients admitted in ICU together with evidence on regional and country specific mortality. To better interpret the evolution of the pandemic in the two countries during the first wave, we paired the time series for each country following the timeframe resulting from the day when Italy and Spain exhibited the same number of hospitalized patients, namely 7 March 2020 in Spain and 25 February 2020 in Italy

(t_0). Furthermore, we considered the same length in days of the time series (75) and truncated for Italy on 9 May and for Spain on 20 May for Italy (t_{75}), corresponding to the end of the first wave emergency.

Given that trends across spatial units might be affected by factors like differences in population age groups, we consider a simple regression model to complement our descriptive analysis. We estimate the following model:

$$y_{i,t} = \alpha + \beta_1 SI_{i,t} + \sum \beta_2 d_Month_t + \beta_3 d_ITA_i + \varepsilon_{i,t} [1]$$

where y is one of the four COVID-19 outcomes, observed in country i in day t , SI is the Stringency Index, d_Month are time dummies (February the excluded month category), d_ITA is a dummy for Italy, and ε represents the error term. We also investigate regional differences by considering the following model:

$$y_{i,t} = \alpha + \beta_1 SI_{i,t} + \sum \beta_2 d_Month_t + \sum \beta_3 d_Reg_i + \varepsilon_{i,t} [2]$$

where all the variables are defined as before, and d_Reg refer to dummy variables for Regional governments (Catalonia the excluded category).

3. Results

3.1 Descriptive Evidence at the National Level

Figure 1 displays the cross-country comparisons. All figures reveal a consistent picture: despite Spain having a population of about 47 million people compared to about 60 million people in Italy, Spain recorded a higher number of confirmed cases, hospitalized patients, patients

admitted in ICUs and deaths (although the Italian curve crosses the Spanish one at the end of the period we analyze here). More strikingly, whilst hospitalizations and admissions to ICU tail-off after 30 days in Italy, they continue growing in Spain.

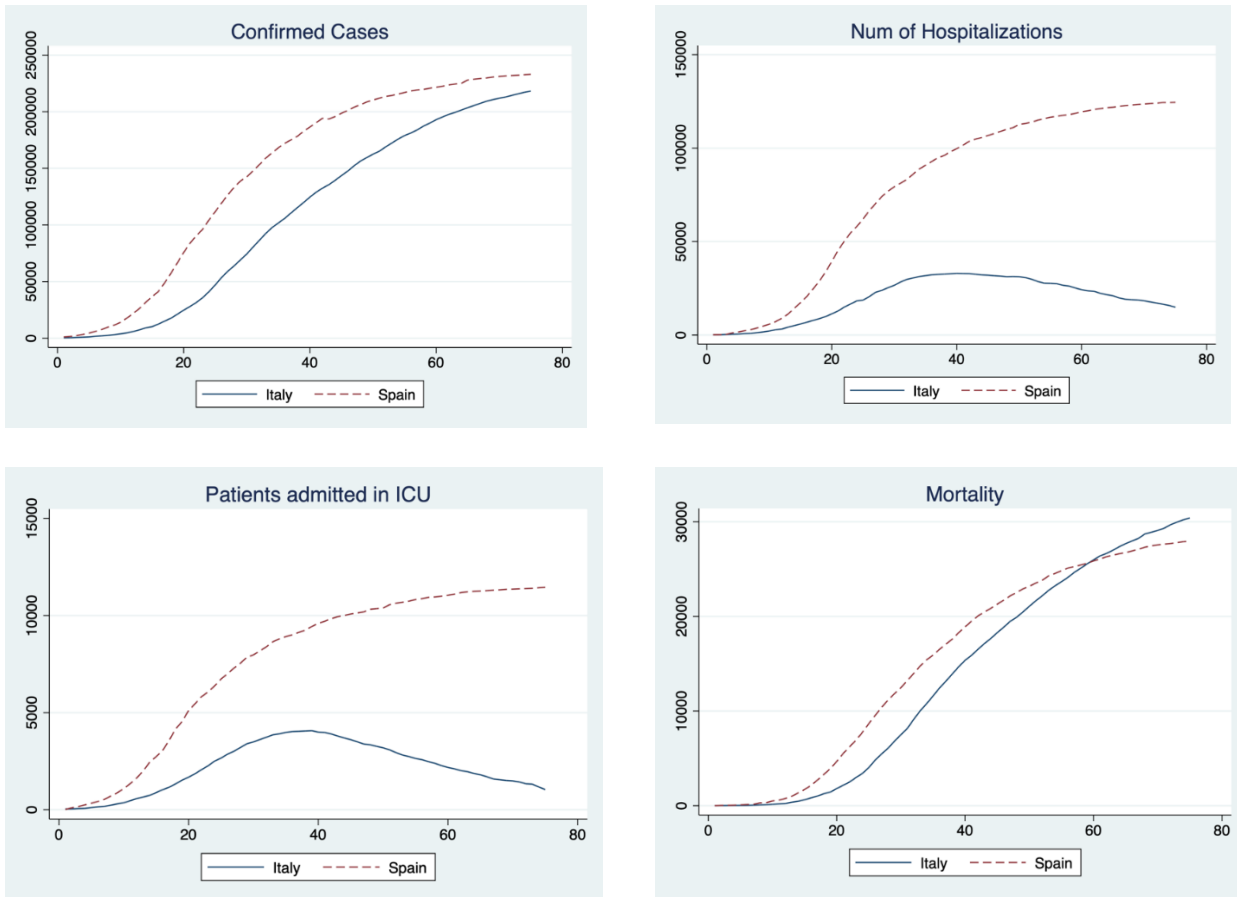


Figure 1: evolution of COVID-19 first wave in Italy and Spain

One potential explanation of the differences between Italy and Spain lies in the stringency of measures implemented in Italy. Let us consider the Stringency index produced by the Blavatnik School of Government. The index summarizes several information about government policies in terms of containment efforts and lockdown, such as school and workplace closures, cancelling public events, limits on private gatherings, closing of public transport, and restrictions on internal movement between cities/regions. The index is computed at the national level, and it goes from zero to 100: a higher value of the Stringency index suggests that the overall government response has become stronger during the course of the pandemic. The

comparison between Italy and Spain in terms of the Stringency index suggests that - although in the early days of the pandemic the two countries differed in the stringency of measures implemented to fight the pandemic - both countries ended up exhibiting the same index. The time delay in the two countries is different: 7th March in Spain and 25th February for Italy. Hence, the few days of delay with which central government in Madrid adopted harsh measures as compared to Italy might explain part of the difference in outcomes between the two countries (on this, e.g., Montesò-Curto et al., 2020).

The slight delay in response by the Spanish government with respect to the actions taken in Italy can be gauged also by looking at excess mortality in 2020 compared to mortality estimates in 2019. Information about overall mortality in Spain are gathered from the Spanish Mortality Monitor (MoMo, available at <https://www.isciii.es>). Spanish data are daily collected and include all-causes mortality obtained from the General Register of Civil Registers and Notaries of the Ministry of Justice, distributed among all the Autonomous Communities and including the 52 provincial capitals. During 2020, MoMo in Spain includes deaths from all causes from 3,929 computerized civil registries, representing 92% of the Spanish population. Daily data are available from 5 April 2018 up to 22 April 2020. The Italian Institute of Statistics (ISTAT) provides data about overall mortality in Italy. ISTAT focused on the municipalities with reliable data that show at least ten deaths in the period 1 January - 31 May 2020 and that recorded a 20% of increase in mortality in the period 1 March - 4 April 2020 compared to the average mortality for the same period in the years 2015-2019. ISTAT made available the data of 7,357 municipalities (out of a total of 7,904, 93.1%), for which a consolidation was possible until 31 May 2020, and covering 95% of the population resident in Italy. The comparison between Spain and Italy is performed limiting the analysis to the first four months (January-April) of 2019 and 2020 in Figure 2. It is clear that excess mortality is higher in Italy than in Spain. However, it is also evident that excess mortality in Spain was positive sharply after t_0 , while t_0 in Italy is about

ten days before excess mortality becomes positive. Once again, this supports the view that the Spanish government was some days late in adopting the same measures of the Italian government.

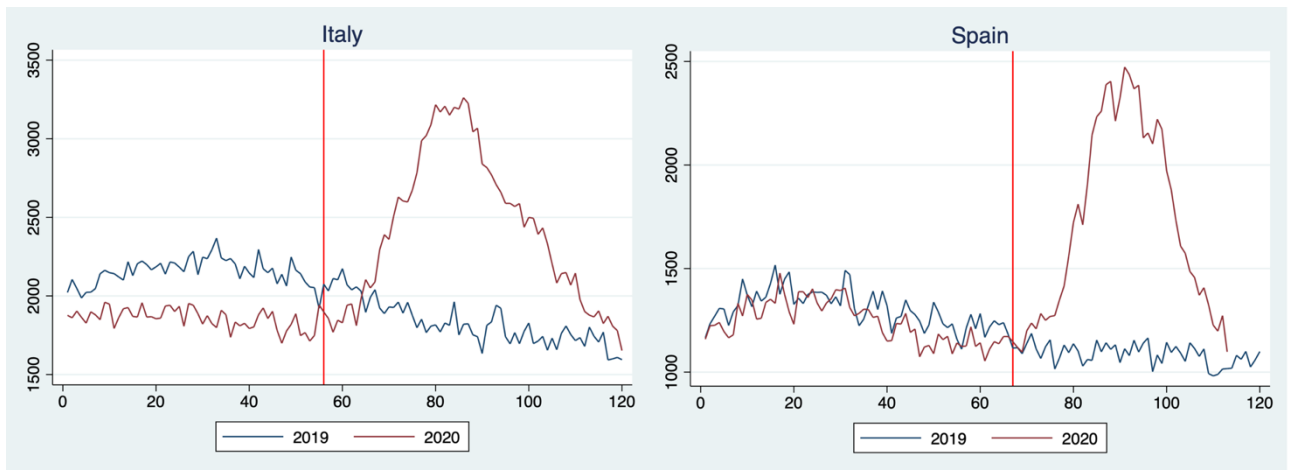


Figure 2: Excess Mortality 2019-2020 (January-April)

A further and connected explanation of the differences observed in the number of cases and the number of excessive deaths, calling into question the role of governance, is that the pandemic was strongly concentrated in very few regions in Italy because of the adoption of severe measures early from the start of the pandemic, while in Spain the region of Madrid remained open and contributed to spread the pandemic to other regions. To better understand the concentration of the pandemic, we compute the Gini index on the number of deaths in each region and each week from t_0 to t_{50} . Results confirm a higher concentration of the COVID-19 pandemic in Italy than in Spain. The concentration has a decreasing trend, suggesting an increase of deaths also in regions that were not hit at the beginning of the pandemic by the virus.

3.2. Regional Level Evidence

To better understand the role of regional patterns, we examine the regional trends of COVID-19 cases selecting two of the most affected regions in the two countries under analysis, namely

Lombardy and Veneto in Italy, and Catalonia and Madrid in Spain. As for Italy, the importance of focusing on Veneto and Lombardy is well described by Binkin et al. (2020) in terms of the different approach to COVID-19 epidemic in the two Italian regions. The authors showed that the community-based approach adopted in Veneto seems to be correlated with a limited rate of cases, hospitalizations, and deaths, whereas the approach based on a strong hospitalization of positive cases adopted in Lombardy overwhelmed the healthcare system with major consequences on the whole regional population. Similar arguments are discussed also by Costa-Font et al. (2020), who focus their attention on the different model of managed competition adopted by the two regions, with the one adopted by Lombardy more decentralized than the one adopted by Veneto. As for Spain, the importance of focusing on Madrid and Catalonia is supported by, e.g., Legido-Quigley et al. (2020). The Madrid region was the epicenter of the crisis in Spain. Catalonia requested a complete shutdown of the region together with a full range of social distancing measures, but the royal decree declaring national emergency contained new controversial measures attributing to the central government more and new powers over health services. Panels in figure 3 are defined following t_0 - t_{75} at the national level. They compare the four regions in the two countries. Panel representing confirmed cases shows evidence that the two regions that were the focus of the pandemic in both countries (Lombardy and Madrid) reveal increasing trends in terms of confirmed cases, but Catalonia in Spain follows Madrid closely while Veneto in Italy presents a very different pattern with respect to Lombardy.

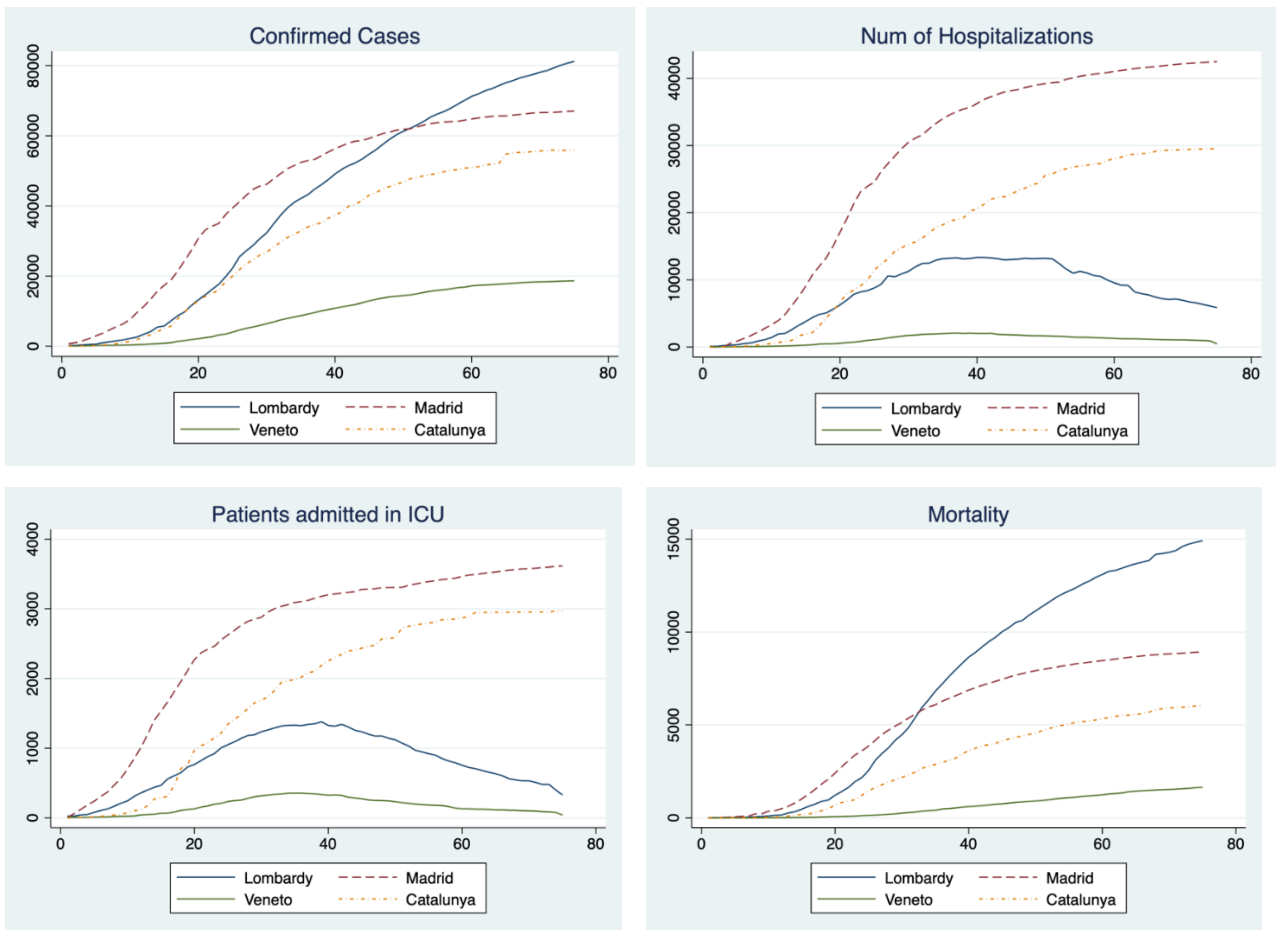


Figure 3: evolution of COVID-19 first wave in four regions in Italy and Spain

Panels relative to the number of hospitalizations and patients admitted in ICU describe the trends in the two variables in each of the four regions. The two Spanish regions clearly stand above Lombardy and Veneto following very similar patterns, while Lombardy performs differently from Veneto. As for mortality, Lombardy exhibits much higher numbers than all the other regions; trend in Madrid is very similar to trend in Catalonia, while Veneto clearly follow a very different pattern with respect to Lombardy. This is consistent with the differential role of regional autonomy in Veneto and Lombardy, compared to a much more centralized management of the crisis in Spain.

3.3. Regression analysis

Estimates of Equation [1] are reported in Table 1, Panel A. We use robust standard errors in all specifications. Coefficient for the Stringency Index is consistently positive and significant for all the outcomes: when cases are increasing, severe measures are positively associated with the number of cases. Monthly dummies are also significant and positive, picking up the increasing trend in the outcomes during the severe phase of the pandemic. The country dummy emphasizes that the number of cases is largely comparable across Italy and Spain. Differences in deaths are statistically significant at the 10% level, suggesting a higher mortality in Italy with respect to Spain. Hospitalizations and admissions to ICUs are instead lower in Italy than in Spain, suggesting a different approach to the management of the pandemic between the two countries.

We estimate Equation [1] also first differencing the four outcome variables. Results are reported in Table 1, Panel B. Coefficient for the Stringency Index is still positive and statistically significant: an increase in the measures adopted by the two countries to contain the spread of the COVID-19 is positively associated with the growth in outcomes. Interestingly, monthly dummies are not all significant. In particular, the growth of hospitalizations and admissions to ICUs is not different in April with respect to February, signaling that the most severe phase of the first wave is ending. As for the country dummy, only the rate of growth of deaths is comparable between Italy and Spain, while for the remaining outcomes Italy is characterized by lower numbers with respect to Spain.

Estimates of Equation [2] exploring the regional dimension are in Table 2, Panel A (levels) and Panel B (first differences). All the previous findings on the Stringency Index and the time dummies are largely confirmed. More interesting, dummies for Regional governments are almost all statistically significant; however, only the dummy for Veneto is consistently negative,

both for the model in levels and in first differences. In addition, and coherently with findings in Table 1, the dummy for Lombardy is negative in the model in first differences for hospitalizations and ICU admissions, albeit statistically significant at the usual confidence levels only in the case of hospitalizations. These results suggest that regional differences are much larger in Italy than they are in Spain, where the management of COVID-19 has been largely centralized in the hand of the central government in Madrid.

Table 1. Estimates of Equation [1] – Countries

Panel A – Levels				
VARIABLES	(1) Cases	(2) Hospitalized	(3) ICU	(4) Death
Stringency Index	0.0601*** 0.008	0.0736*** 0.006	0.0649*** 0.007	0.0923*** 0.012
Mar vs Feb	2.4122*** 0.288	1.9219*** 0.255	1.8025*** 0.234	2.5848*** 0.322
Apr vs Feb	3.7160*** 0.316	2.8139*** 0.286	2.3889*** 0.270	4.3358*** 0.390
Italy vs Spain	-0.1759 0.110	-0.5798*** 0.107	-0.5894*** 0.089	0.2584* 0.145
Constant	2.5840*** 0.561	1.2887*** 0.433	0.2751 0.487	-3.5418*** 0.838
Observations	105	105	105	105
R-squared	0.897	0.916	0.913	0.905
Panel B- First Differences				
VARIABLES	(1) Cases	(2) Hospitalized	(3) ICU	(4) Death
Stringency Index	0.0445*** 0.006	0.0529*** 0.005	0.0269*** 0.004	0.0700*** 0.016
Mar vs Feb	1.8143*** 0.300	1.3308*** 0.493	1.8758** 0.730	2.5727*** 0.434
Apr vs Feb	1.6184*** 0.319	0.4016 0.545	0.7309 0.759	2.8914*** 0.518
Ita vs Spain	-0.2970*** 0.086	-1.1600*** 0.165	-1.0563*** 0.140	0.0260 0.137
Constant	2.5403*** 0.501	1.8355*** 0.606	1.4618* 0.794	-3.2507*** 1.112
Number of Observations	102	86	84	103
R-squared	0.785	0.737	0.662	0.793
Note: Robust SE. Sig. Lev.: *** 1%, ** 5%, * 10%.				

Table 2. Estimates of Equation [2] - Regions

Panel A – Levels				
VARIABLES	(1) Cases	(2) Hospitalized	(3) ICU	(4) Death
Stringency Index	0.0640*** 0.006	0.1012*** 0.007	0.0700*** 0.006	0.0855*** 0.007
Mar vs Feb	1.8966*** 0.205	0.8749*** 0.203	1.0409*** 0.173	1.8955*** 0.244
Apr vs Feb	3.1109*** 0.232	1.5967*** 0.249	1.5640*** 0.216	3.7112*** 0.285
MAD vs CAT	1.0564*** 0.141	0.8726*** 0.180	1.0948*** 0.160	1.2562*** 0.182
LOM vs CAT	0.9758*** 0.125	0.5955*** 0.150	0.4424*** 0.146	1.7113*** 0.176
VEN vs CAT	-0.6025*** 0.127	-1.5148*** 0.147	-1.1867*** 0.148	-0.8848*** 0.172
Constant	0.8274* 0.432	-2.0075*** 0.521	-1.3144*** 0.444	-4.2655*** 0.541
Number of Observations	210	210	210	210
R-squared	0.902	0.913	0.882	0.907
Panel B – First differences				
VARIABLES	(1) Cases	(2) Hospitalized	(3) ICU	(4) Death
Stringency Index	0.0494*** 0.007	0.0495*** 0.006	0.0268*** 0.007	0.0666*** 0.011
Mar vs Feb	1.2914*** 0.304	0.9449*** 0.305	0.7896** 0.347	1.6888*** 0.354
Apr vs Feb	0.9873*** 0.325	0.1201 0.360	-0.1088 0.398	2.0218*** 0.405
MAD vs CAT	0.4842*** 0.143	0.7002*** 0.163	0.4091** 0.198	0.9653*** 0.192
LOM vs CAT	0.4462*** 0.102	-0.3759* 0.217	-0.2979 0.230	1.2412*** 0.186
VEN vs CAT	-1.0111*** 0.116	-2.3062*** 0.210	-1.8220*** 0.244	-1.1408*** 0.178
Constant	0.9303* 0.538	0.7644 0.490	0.7338 0.637	-3.9577*** 0.806
Number of Observations	206	171	164	198
R-squared	0.753	0.717	0.483	0.759
Note: Robust SE. Sig. Lev.: *** 1%, ** 5%, * 10%.				

To further discuss this issue, in Figure 4 we report the predictive margins for regional dummies obtained from estimates of Equation [2], both in levels and first differences. Several insights

emerge. First, Lombardy and Madrid seem to be largely comparable for most outcomes. The fact that they serve as hubs for their countries, they share connections with the rest of the world and of the country, they have a lively and strong economy, are all factors to account for in the spread of the pandemic and in the definition of containment policies. Second, and much more important for our purpose here, Catalonia and Madrid appear to be much more similar than Veneto and Lombardy, especially when looking at the model in first differences. This supports the view that a centralized solution in the management of a pandemic crisis homogenizes the outcomes across the regions, not allowing for experimentation, which might offer useful insights when governments are facing an unknown challenge like the COVID-19 in the first wave.

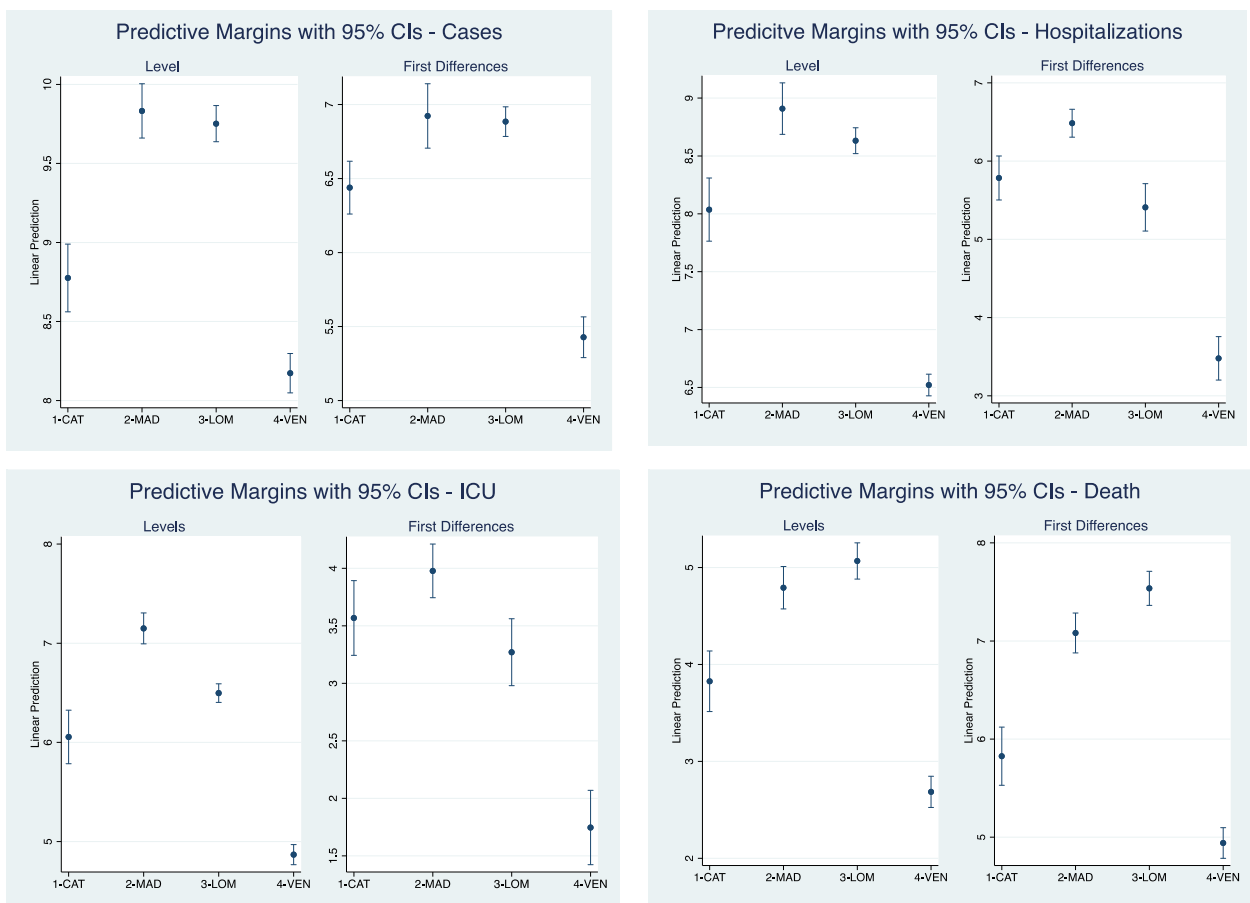


Figure 4: Predictive margins from Eq. 1 and 2

4. Discussion

Comparing cross country reactions to the pandemic in two countries that, despite similar financing and territorial organization, have shown clear differences in their governance of the pandemic such as Italy and Spain can help understand how best governments should react to a pandemic. Namely, whether to centralize or decentralize health care responsibilities. Our findings suggest that decentralized government offers an advantageous reaction to a pandemic. More specifically, we document a significant gap in the trends in cases, hospital and ICU admissions, and mortality in Italy and Spain, both at the national and at the regional level. Our analysis indicates that both the strong localization of the pandemic in Italy, and regional autonomy, fostering experimentation and local solutions to local problems, explain the differences across countries.

These findings suggest that, in a setting where the optimal reaction to a pandemic is unknown, even though coordination does play a role in solving potential collective actions problems (e.g., border closures), regional autonomy and hence experimentation and local knowledge can make a difference in the number of fatalities (lives saved), as well as in avoiding unnecessary hospitalizations. A system that encourages regional cooperation but that relies on regional autonomy such as the Italian model (but also the Spanish model in regular times and the German federal model) might be beneficial to face the challenges of pandemics, allowing the emergence of good practices to manage the pandemic, compared to more centralized approaches, especially when regional needs and knowledge are largely heterogeneous. Yet, whether these good practices are then extended to the whole country during later phases of the pandemic is an interesting issue to be discussed in future work.

5. Conclusion

This paper examines the influence of territorial healthcare system governance on COVID-19 outcomes in two countries that, despite similar financing and territorial organization, have shown clear differences in how the government addressed the challenges of the first wave of the COVID-19 pandemic (but not in other waves), and suggest that Italian decentralized reaction to the pandemic was more effective as it combines coordination and local experimentation and targeting of health policies. These results are explained by the localization of the pandemic and its associated restrictions, and especially regional autonomy. Consistently, in the second wave of the pandemic Spain followed Italy in keeping the governance of the pandemic decentralized.

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