Research Article

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What determines governments' response time to COVID-19? A cross-country inquiry on the measure restricting internal movements

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Abstract: After the appearance of the first COVID-19 cases and deaths, countries' responses were enacted at different points in time. This paper explores the factors behind the timeliness of travel restriction policies at the onset of the pandemic. Using instrumental variable techniques on a sample of 149 countries, our empirical exercise shows that while urban population and political stability are conducive to a prompt activation of a government's lockdown policy after initial cases, a country's wealth and the rule of law may produce an opposite effect. When the time from first deaths is considered, the presence of a female leader, net migration levels, voice and accountability, and political stability are associated with a quicker launch of a domestic travel restriction policy, while democracy and a country's wealth may represent an obstacle to an immediate policy activation.

Keywords: Covid-19; lockdown; institutions.

JEL code: H1, I18, P16, E65.

1 Introduction

The spread of COVID-19 has been an enormous challenge for governments worldwide. In order to contain the spread of the virus, avoid the overload of health facilities and counteract the socio-economic effects of the disease, countries have launched non-pharmaceutical interventions (NPI) (e.g., school closures, travel restrictions, or even complete lockdowns) which have differed among countries by typology, timeliness, enforcement, and field of application (Ferguson et al., 2020).

This study investigates possible socio-economic and institutional factors behind governments' capacity to promptly provide adequate response measures at the onset of the coronavirus pandemic. Using cross-sectional data concerning restrictions on internal movements from the Oxford Government Response Tracker (OxCGRT) 2020 dataset, our analysis contributes to identifying possible cross-country differences in the timeliness of the introduction of lockdown, measured as the distance between first cases and first deaths, and the enactment of domestic travel restrictions.

The motivation of the study is two-fold. On the one hand, given the rapidity of the diffusion of the virus, scientists have demonstrated the importance of timeliness as a key factor for public health measures to be successful in controlling the epidemic (e.g., Kretzschmar et al., 2020), an attribute which is considered to have much importance in the case of non-pharmaceutical interventions as well (Correia et al., 2020; Kévorkian et al., 2020). On the other hand, while most of the literature has investigated the effectiveness of NPI measures in containing COVID-19 transmission and deaths (e.g., Alfano and Ercolano, 2020a; Amuedo-Dorantes et al., 2020; Askitas et al., 2020; Boretti, 2020; Ferraresi et al., 2020a;), as well as the socio-economic and political consequences of government interventions (see Nicola et

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al., 2020 for a review by economic sector), only a restricted group of papers has focused on possible determinants of government measures to tackle the pandemic (e.g., Aksoy et al., 2020; Ferraresi et al., 2020b; Frey et al., 2020). We fill this gap by providing an inquiry into the conditions favoring or delaying governmental responses, an argument which, as far as we know, is rather new in the debate around motivations and effectiveness of government measures against the pandemic. Analysis confirms that institutions play a role in securing a prompt reaction, especially when political stability is considered. At the same time, they can be an obstacle if one considers possible red tape related to the excess of law and regulations. Women leaders can be conducive to a faster response when we consider distance from first death to the launch of domestic restrictions, and so can the presence of net migration, which seems to be an alarm bell for politicians. National wealth, on the other hand, can represent a brake to lockdown policies as these entail bigger economic costs.

All in all, our findings offer a fruitful contribution to the ongoing debate on drivers of COVID-19 policy actions (Aksoy et al., 2020; Ferraresi et al., 2020b; Frey et al., 2020).

The paper is organized as follows. Section two briefly reviews the most recent literature relevant to our study. Section three and four respectively present data and methodology we rely upon. Section five illustrates our results. Finally, section six concludes.

2 Timeliness and government measures against COVID-19

The relationship between national economies, institutional and socio-political environments, and decisionmaking concerning the policy agenda in the midst of a global pandemic has attracted an ever-increasing scholarly interest. Literature has strongly investigated determinants of effectiveness of government measures against the spread COVID-19 as well as the socio-economic and political consequences of government interventions. For example, Alfano and Ercolano (2020b) showed that effectiveness of lockdown measures was strictly related to the kind of social capital characterizing the population of the Italian regions, while Alfano et al. (2020) proved that the pandemic increased religious attendance in the Italian population at a regional level.

More in details, timeliness of enacted measures was also another important issue at stake.

Aksoy et al. (2020) examined the relationship between the time of adoption of five domestic social distancing measures, individual attention paid to the pandemic, and institutional quality data in 78 countries that adopted NPI from January 1 to March 31, 2020. They found that the effect of public attention is driven by countries with better institutional frameworks. Frey et al. (2020) estimated the impact of institutions on the effectiveness of mobility restrictions in democratic and authoritarian regimes across 132 countries. They found that autocratic countries were more likely to impose stricter measures, whereas democratic ones were more likely to adopt less stringent lockdowns, while simultaneously experiencing a sharper decline in geographic mobility. Baccini and Brodeur (2020) explored possible determinants of stay-at-home orders in US states, finding that a governor's political ideology and the existence of term limits influenced the implementation and timeliness of lockdown measures. Similar results can be found in Pulejo and Querubín (2020), who proved that the variability of governments' responses to the COVID-19 pandemic in 65 countries was related to reelection concerns and ideological orientation, with incumbents facing close elections and additional terms less likely to adopt stringent measures. Ferraresi et al. (2020b) explored possible determinants of lockdown measures in relation to different socio-economic and political dimensions. They concluded that countries characterized by: i) low political stability; ii) low levels of development; iii) low levels of digitalization; iv) a high degree of decentralization; v) a closed economy; and vi) not being pre-electoral, adopted less stringent measures than others.

To our knowledge, however, few scholars have inquired into the factors promoting faster responses by governments at the onset of the pandemic. This is surprising, since much of the debate concerns the rapidity or sluggishness of NPI measures (e.g. Amuedo-Dorantes et al., 2020; Ferraresi et al., 2020a,b;), which is also at the root of different response models. Countries like Singapore, South Korea, and Taiwan reacted promptly to the pandemic (Barron, 2020; Woo, 2020), whereas the USA has been greatly criticized for its slow and uncoordinated response (Haffajee and Mello, 2020).

In light of earlier studies, we formulate the following research hypothesis: were countries characterized by different degrees of timeliness in the adoption of lockdown measures against the COVID-19 pandemic? Is such heterogeneity

in timeliness of adoptions mostly a matter of country-level institutional environment? Are there socio-economic and political characteristics which may further delay or speed up the process?

The establishment of lockdowns in various countries can be theoretically modeled as a bargaining process, where the timeliness of the measure is dependent upon relative valuations of the gains and costs associated with the expected outcome of the bargain, which is the implementation of lockdowns. In particular, we suppose that the presence of institutions is able to mitigate the implementation costs because they improve the governance of the transactions at stake, while economic losses from containment measures are supposed to be greater in more developed countries. Finally, other socio-economic as well as political characteristics may further condition the timing of policy adoption by influencing related expected benefits and costs.

Data selection and alleged linkages between selected variables will be clarified in the following section.

3 Data

Lockdown measures have varied significantly at an international level. To date, one of the most reliable and widely used datasets on governments' pandemic responses is the Oxford Government Response Tracker (OxCGRT) (Hale et al., 2020). Given the heterogeneity in governments' responses, instead of an aggregate index measure (like the OxCGRT stringency index, widely used in recent literature like in Ferraresi et al., 2020a,b), we decided to concentrate on a single indicator, C7_Restrictions on internal movement, which records restrictions on internal movement between cities/regions on an ordinal scale (0 – no measures; 1 – recommended not to travel between regions/cities; 2 – internal movement restrictions in place; Blank – no data). The use of this indicator has already been taken as an effective proxy of lockdown measures by a special issue of the BBC,[1] and is used as a source of NPI data in recent academic works (e.g., Miikkulainen et al., 2020). We selected both targeted and general data, and thus we do not distinguish between different geographic scopes in this work.[2] Our sample consists of 149 worldwide countries.

Our dependent variables concern the rapidity of the establishment of our "lockdown" selected measure in each country. Similarly to Correia et al. (2020), which, in order to measure how quickly an NPI was implemented by city officials, used the number of days elapsed between the rising city death rate and the first day of enforcement of a local NPI, we constructed a first variable measuring the number of days between the first reported death due to COVID-19 and the establishment of lockdown in each country. Furthermore, as many countries decided to react before the surge of initial deaths, we also included another dependent variable accounting for the number of days between the first reported case of infection due to COVID-19 and the establishment of our lockdown measure.

Concerning the set of possible control variables, first of all, we assumed that higher-quality institutions, by reducing transaction costs related to the implementation of measures, should be conducive to a faster response to the crisis, although the available results are mixed (Aksoy et al., 2020; Ferraresi et al., 2020 a, b). The World Bank's Worldwide Governance Indicators (WGI) are used to measure institutional quality (Kaufmann et al. 2011), namely Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The six aggregate indicators are reported in percentile rank terms from 0 to 100, with higher values corresponding to better outcomes.

Other covariates include socio-economic conditions data like trade openness (exports of goods plus imports as a percentage of GDP), real GDP per capita, and the percentage of people living in urban areas (*Trade Openness; Real GDP pc (log); Urban pop,* respectively), and were extracted from the World Bank's World Development Indicators. Following Ferraresi et al. (2020b), we suppose that the higher a country's level of openness is, the less prompt its adoption of our lockdown measure will be. In line with the same authors, we also control for the level of economic development, which is supposed to influence lockdown timeliness, as developed economies face higher lockdown costs related to the interruption of economic activities, which may delay our domestic travel restrictions measure. Urban density is also

1 https://www.bbc.com/news/world-52103747

2 Detailed explanation of the data is provided in an online codebook : https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md

proven to have conditioned the timing of the outbreak in every US county (Carozzi et al., 2020) and is thus supposed to favor response timeliness.

Other related data concern net migration, *net_migrants* (net total of migrants as the total number of immigrants less the annual number of emigrants, including both citizens and noncitizens), level of democracy, *Fh_Ipolity2* (a scale ranging from 0-10 where 0 is the least democratic and 10 most democratic), and party system *Bti_ps* (which measures on a 1-10 scale the extent to which there is a stable and socially rooted party system able to articulate and aggregate societal interests), which were drawn from the Quality of Government Standard Dataset, version Jan20 (Teorell et al., 2020). Migration can be considered a proxy of people's movement across borders; we suppose that the higher net migration is, the less prompt lockdown measures will be, as the domestic restriction measures will imply higher implementation costs. Previous studies have indeed demonstrated that migration patterns influence COVID-related policy decisions (Lee et al., 2020). Recent studies (e.g. Frey et al., 2020) have revealed differing behavior between democracies and autocracies in handling government responses during the outbreak. Relying on an index (PanDem) that captures the extent to which state responses to Covid-19 violate democratic standards for emergency responses, Baverlein et al. (2020) demonstrated that populist governments provided inadequate responses to counteract the effects of the pandemic disease as they experienced excess mortality as a consequence of their incapacity of enacting less far-reaching policy measures and support the effort of citizens to combat the pandemic. Another interesting paper (Kavasoglu, 2020) showed that, in electoral autocracies, the ability of autocratic incumbents to co-opt a particular opposition party is related to some opposition party organizational features and ideological positions which, in turn, influence autocratic regime stability and its capacity of providing an effective decisionmaking. In line with this literature, we suppose that the less democratic a country is, the faster its response will be, as more authoritarian governments find fewer obstacles to imposing mandatory lockdowns. Following Kavasoglu (2020) the agreement between autocratic incumbents and the opposition party can be more likely when they are ideologically closer and when an opposition party is not characterized by an extensive organization. On the other hand, the more and heterogeneous interests are represented by the party system, the more likely it is that parties engage in political bargaining that can slow the adoption process. This reasoning follows from Baverlein et al. (2020)'s findings and is based on Ferraresi et al. (2020b), which underline that the introduction of stringent measures was less likely to occur in countries characterized by political instability.

We also assumed that women played a major role in handling the political decisionmaking process during COVID-19, an argument strongly supported by both the media[3] and international organizations.[4] Studies like Wasserman's (2018) showed how women politicians tend to shorten negotiation periods during their careers. Coscieme et al. (2020) found that countries led by female heads of government were more successful in containing COVID-19 diffusion and deaths. We will thus analyze in particular the role of women politicians as heads of the governments involved. To control for this intuition, we built a dichotomous variable to account for the presence of a woman as leader of government.

Onset of the disease is also a fundamental aspect that conditioned the timeliness of governments' reactions. We thus included epidemiological data on deaths and cases by country as retrieved from the European Centre for Disease Prevention and Control (ECDPC).[5] In details, data on cases represent the cumulated daily number of new reported COVID-19 cases since the onset of the pandemic at the time of first launch of travel restriction policies (C7_Restrictions on internal movement variable drawn from the Oxford Government Response Tracker (OxCGRT) 2020 dataset). Similarly, data on deaths represent the cumulated daily number of COVID-19 deaths since the onset of the pandemic at the time of first launch of travel restriction policies (C7_Restrictions on internal movement variable drawn from the Oxford Government Response Tracker (OxCGRT) 2020 dataset.

A table of variable labels and their Descriptive Statistics is available in the Appendix.

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3 https://www.nytimes.com/2020/05/15/world/coronavirus-women-leaders.html; https://www.theguardian.com/world/2020/apr/25/why-do-female-leaders-seem-to-be-more-successful-at-managing-the-coronavirus-crisis;https://edition.cnn.com/2020/04/14/asia/women-government-leaders-coronavirus-hnk-intl/index.html;

4 https://www.unwomen.org/en/news/stories/2020/6/take-five-vjosa-osmani

5 It should be noted that differences in testing policies/contact tracing could affect the number of observed cases/deaths, but we suppose that while these differences influenced a country's virus detection capability as well as its containment effectiveness, they did not influence a country's ability to provide a prompt response (our research topic), which is supposed to be more dependent on socio-economic, political and institutional characteristics. Moreover, we do not consider our restrictions to internal movement measure as a possible alternative/complement to testing policies or other typologies of NPI (for a discussion see Piguillem and Shi, 2020).

4 Methods

A major issue when using OLS for estimation is the endogeneity issue. The endogeneity issue in our case arose from the expected (and later validated by a Durbin-Wu-Hausman test) high correlation among certain aprioristically considered exogenous variables. When an OLS is run without taking attention to this high level of correlation among right-hand-side variables, the empirical literature has proved the existence of several biases (Wooldridge, 2009, is a well-spread textbook which details this statement).

Running a proper test (Durbin-Wu-Hausman), we tested whether the number of deaths due to COVID-19 as a share of the population are exogenous if regressed by urban density of each country, number of infected people per million people, and a variable identifying the 'continent' of each country. We rejected such a hypothesis (p-value: 0.002). To overcome this, we have to use instrumental variable approaches, namely Two Stages Least Squares. Considering IV estimations, we have to report tests of both underidentification and weak identification. As we have used the Stata routine ivreg2, we will resort to the method of Sanderson-Windmeijer (2016). Tests reported in the tables support the quality of the estimates involving instrumental variables.

We will therefore model our empirical system of equations as follows (equations 1 and 2): Considering the standard modeling of two stages, we will proxy the endogenous variable (the number of deaths due to COVID-19 as a share of the population) by the set of variables X_{2i} (urban density of each country (Carozzi et al., 2020), the number of infected people per million people (Johnson, 2020), and a variable identifying the 'continent' of each country. The number of deaths due to COVID-19 as a share of the population is regressed by the set of variables X_{2i} (urban density of each country (Carozzi et al., 2020), number of infected people per million people (Johnson, 2020), and a variable identifying the 'continent' of each country. The theoretical rationale for this equation (2) relates to the socio-epidemiological studies on epidemics like COVID-19, which have been found as justifying most of the fatalities by population density, incidence of the disease, and geographical concentration.

At the second-stage regression (equation 1), $DistanceDLock_i$ will be the dependent variable for the i_th observation (i represents each observed country). We will use two different dependent variables: first, the number of days between the first reported infected case due to COVID-19 and the establishment of lockdown in each country, and, second, the number of days between the first reported death due to COVID-19 and the establishment of lockdown in each country.

$$DistanceDLock_i = DeathsMillion_i \beta_1 + X_{1i} \beta_2 + u_i \quad (1)$$

$$DeathsMillion_i = X_{1i} \pi_1 + X_{2i} \pi_2 + v_i \quad (2)$$

To improve the explanatory power of the model, we will use socio-economic and political explanatory variables identified in the literature as affecting political decisionmaking in the COVID-19 crisis, namely variables accounting for party system representativeness and level of democracy (bti_ps; fh_ipolity2); density of urban population (urban pop); flows of goods and people (net_migration; trade openness); and level of economic development (log of GDP per capita).

Following the literature on the topic of social crisis and on epidemiologic issues, it is also advisable to include the square of the number of deaths due to COVID-19 per million of the population, and to analyze the non-linear relation between a dependent variable related to time duration and independent variables that also depend on time (as in several classical studies inspired by Mincer, 1958). Although the number of deaths per million inhabitants was found to be endogenous, its square was not (the p-value of the test to exogeneity of square of deaths per million = 0.381).

As we are particularly interested in evaluating the role of the Governance Indicators in the pressure to establish lockdowns at earlier dates, we will evaluate each Indicator in a different system of equations suggested by the previously introduced equations 1 and 2.

Considering the explanations in Baum et al. (2010), the method of Sanderson-Windmeijer (SW) first-stage chi-squared and F statistics provides tests for underidentification and weak identification, respectively, of individual endogenous regressors. They are constructed by "partialling out" linear projections of the remaining endogenous regressors. The SW chi-squared Wald statistic is distributed as chi2 (L1-K1+1)) under the null that the particular endogenous regressor in question is unidentified. In the special case of a single endogenous regressor, the SW statistic exhibited is identical to underidentification statistics reported for the Cragg-Donald Wald statistic (if errors are estimated under the assumption of being i.i.d.) or the Kleibergen-Paap rk Wald statistic (for robust errors). Actually, when the i.i.d. assumption is dropped

and we estimate robust errors, the Cragg-Donald-based weak instruments test is no longer valid. A correspondingly robust statistic is the Kleibergen-Paap Wald rk F statistic (Baum et al., 2010). The degrees of freedom adjustment for the rk statistic is identified at (N-L)/L1, as with the Cragg-Donald F statistic (except in some specific cluster-robust cases). The critical values for the Kleibergen-Paap statistic are then the Stock-Yogo critical values for the Cragg-Donald i.i.d. case (Baum et al., 2010). The SW first-stage F statistic is the F form of the same test statistic. It can be used as a diagnostic for whether a particular endogenous regressor is "weakly identified".

5 Results

We considered it important to develop our analysis supported by two distances in relation to the establishment of "lockdown" in each country. In the first analysis (Table 1), we look at the distance between the first case of COVID-19 infection in each country and the establishment of "lockdown". In the second analysis (Table 2), we look at the distance between the first death of a national citizen infected with COVID-19 and the establishment of "lockdown" in the country.

Tables 1 and 2 below exhibit our major results.

Through the estimated results for Table 1 we see that countries with higher levels of GDP per capita tended to leave more days between the first reported case of COVID-19 and the establishment of "lockdown". On average, a 1% higher GDP per capita led to an additional week (around 8 days) between the detection of the first COVID-19 infections and the establishment of "lockdown". This result is in line with our predictions and confirms that developed countries may hesitate to establish lockdowns due to their related economic welfare costs (Ferraresi et al., 2020b; Kaplan et al., 2020).

However, the concentration of the population in urban space was estimated to have a negative effect on the number of days between the detection of the first COVID-19 infections and establishment of "lockdown". An additional percentage point in this variable was estimated to be associated with a reduction of 0.3 days in the period studied; otherwise, 3 additional percentage points in this variable led to a reduction of one day in the period under analysis. This result confirms that urban density, affecting the timing of outbreaks (Carozzi et al., 2020), may be related to prompt containment measures.

As regards the WGI indicators, only two of them had estimated coefficients with statistically significant values. Political Stability, although only significant at 10%, tends to shorten the period under analysis (second column). "Rule of law" tends to increase the period under analysis.

This result can be interpreted following the previous literature. High quality institutions may react sluggishly to COVID-19 (Ferraresi et al., 2020a) because they entail red tape and may significantly increase the administrative burden related to the implementation of the lockdown measure according to the rule of law. At the same time, good institutions are able to ensure a prompt implementation of government measures (Aksoy et al., 2020), and thus may also be conducive to a faster response to the first appearance of COVID-19.

The presence of women in the leadership of the country's executive did not lead, in this case, to significant changes to the extension of the period under analysis.

The various statistical tests shown reveal that the estimates are of quality for analysis.[6]

We then proceeded to the analysis of Table 2.

This reveals the results obtained from the TSLS estimation of the period between the first COVID-19-related death and establishment of "lockdown". Following classic studies, the public impact of one or more deaths associated with an epidemic accelerates the dynamics of public discussion (Ruggiero, 2006). In the countries observed, we found from the outset that the estimated coefficient for the impact from the number of deaths per million inhabitants was centered around 15.00, and the estimated value for the square of the number of deaths per million inhabitants was around -2.5. Thus, the critical point was the value of 3 deaths per million inhabitants – above this, the probability of establishing a lockdown increases greatly.

6 On the one hand, the F-value reveals that the estimated values are statistically significant as a whole. The estimated values for the "Underidentification test" in relation to the definition of the instruments revealed values that allow rejecting the "underidentification" hypothesis. We recall that our "first stage regression" had as a dependent variable the number of deaths per million inhabitants and as independent variables the population density of each country, the continent of each country and the number of cases per million inhabitants. Thus, the values obtained for the Cragg-Donaldson tests as well as the Kleibergen-Paap tests also allow us to reject the hypothesis of "weak identification", so the definition of "first stage regression" has proved to be a strong one in avoiding problems of endogeneity in the regressions. Finally, the Hansen-J test had values that do not allow us to reject the "over-identifying restrictions" hypothesis.

Table 1: Explaining the distance between the first case and lockdown.

	Distance 1st Case to Lockdown (Second-Stage regression)					
	Voice and Accountability	**Political Stability and Absence of Violence**	**Government Effectiveness**	**Regulatory Quality**	**Rule of Law**	**Control of Corruption**
Nr. Deaths	5.509	10.46	6.66	3.65	6.81	4.93
	(14.667)	(14.44)	(15.0)	(14.6)	(14.9)	(14.5)
Nr. Deaths^2	-1.56	-2.43	-1.74	-1.73	-1.18	-1.44
	(2.8)	(2.78)	(2.92)	(2.80)	(2.86)	(2.83)
Trade Openness	0.05	0.078	0.036	0.043	0.027	0.042
	(0.04)	(0.051)	(0.048)	(0.048)	(0.050)	(0.049)
Real GDP pc (log)	8.81***	11.47***	6.48***	8.47***	5.25**	8.20***
	(2.29)	(2.41)	(2.75)	(2.38)	(2.31)	(2.25)
Urban Pop (%)	-0.27**	-0.29**	-0.23*	-0.25**	-0.18	-0.26**
	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.12)
Women Leaders	1.799	1.083	1.809	2.206	2.114	1.483
	(6.41)	(6.354)	(6.481)	(6.278)	(6.276)	(6.364)
Stable Party System	-1.09	-0.567	-1.084	-0.867	-1.278	-0.893
	(1.36)	(1.357)	(1.285)	(1.331)	(1.295)	(1.319)
Level of Democracy	-0.87	0,728	0.175	0.145	0.103	0.165
	(1.50)	(0.957)	(1.014)	(1.068)	(0.958)	(1.018)
net_migrants	-5e-6	-4e-6	-4e-6	-5e-6	-5e-6	-5e-6
	(3e-6)	(3e-6)	(3e-6)	(3e-6)	(3e-6)	(3e-6)
WGI Indicator	0.209	-0.168*	0.186	0.082	0.269***	0.210
(column's label)	(0.184)	(0.098)	(0.119)	(0.097)	(0.085)	(0.079)
F-value	3.72***	3.98***	4.07***	3.90***	4.53***	4.02***
UnderId. Test	8.836	8.587	8.699	9.204	9.105	8.843
(Chi-sq, p-val)	(0.032)	(0.035)	(0.033)	(0.026)	(0.027)	(0.032)
Craag-Donaldson	27.321***	26.889***	26.599***	27.927***	27.674***	27.674***
K-P	23.311***	25.628***	26.544***	27.638***	25.630***	25.630***
Hansen J	4.119	4.335	4.635	5.230	5.240	5.215
Chi-sq (p-val)	(0.249)	(0.228)	(0.200)	(0.155)	(0.155)	(0.157)
Number Obs.	109	109	109	109	109	109

Legend – Significance levels: *, 10%; **, 5%; ***, 1%. Details on First-Stage Regressions: Instrumented variable – Number of Dead per 1 Million population. Included Instruments – Trade Openness, Real GDP pc (log), each WGI at time, Square of Number of Dead per 1 Million population, Urban Population, Level of Democracy, Stability of Party System, Migrants. Excluded instruments – Population Density, Number of infected people with COVID-19 per 1 Million population, Square of Number of infected people with COVID-19 per 1 Million population, Continent of each country.

Table 2 reveals, once again, that richer countries tended to take longer to establish a "lockdown". However, the role of women with executive power was identified here as a variable with a coefficient estimated to be statistically significant at a level of 1%. According to most of the estimates in Table 2, if the country had a woman leading the government, it tended to reduce the period between the first COVID-19-related death and establishment of lockdown by around 8 days.

Political stability is confirmed as being associated with a quicker reaction in the form of domestic travel restrictions (now together with Voice and Accountability), confirming that good institutions can play a role in securing a prompt government response (Aksoy et al., 2020). However, a higher level of democracy, in some cases, can be associated with

Table 2: Explaining the distance between the first death and lockdown.

	Distance 1st Death to Lockdown (Second-Stage regression)					
	Voice and Accountability	**Political Stability and Absence of Violence**	**Government Effectiveness**	**Regulatory Quality**	**Rule of Law**	**Control of Corruption**
Nr Deaths	14.63***	18.58***	14.68**	14.95***	14.65**	15.359***
	(5.55)	(5.54)	(6.23)	(5.83)	(5.98)	(5.702
Nr. Deaths^2	-2.49**	-3.27***	-2.6**	-2.70**	-2.58**	-2.70**
	(1.136)	(1.12)	(1.27)	(1.18)	(1.22)	(1.16)
Trade Openness	-0.003	0.026	-0.007	0.009	0.003	0.005
	(0.027)	(0.031)	(0.029)	(0.030)	(0.031)	(0.031)
Real GDP pc (log)	8.201***	4.557**	5.115***	4.516**	3.462*	4.054**
	(2.213)	(1.891)	(1.947)	(2.094)	(2.068)	(1.893)
Urban Pop (%)	-0.025	-0.028	-0.032	-0.065	-0.054	-0.053
	(0.102)	(0.108)	(0.100)	(0.104)	(0.104)	(0.101)
Women Leaders	-7.71***	-8.96***	-8.79***	-8.59***	-8.3***	-7.99***
	(2.95)	(3.191)	(3.031)	(2.81)	(2.91)	(2.83)
Stable Party System	0.277	0.155	-0.322	-0.163	-0.148	-0.102
	(1.080)	(0.985)	(1.136)	(1.108)	(1.120)	(1.102)
Level of Democracy	2.853***	1.397*	0.918	1.351*	1.114	1.186
	(0.982)	(0.764)	(0.756)	(0.767)	(0.792)	(0.783)
net_migrants	-5e-6**	-5e-6**	-6e-6**	-5e-6**	-6e-6**	-6e-6**
	(3e-6)	(2e-6)	(2e-6)	(2e-6)	(2e-6)	(2e-6)
WGI Indicator	-0.295**	-0.183**	0.111	-0.076	-0.020	-0.063
(column's label)	(0.122)	(0.079)	(0.081)	(0.066)	(0.066)	(0.053)
F-value	20.91***	18.19***	18.89***	17.97***	17.96***	17.57***
UnderId. Test (Chi-sq, p-val)	8.610	8.400	8.523	8.939	8.921	8.699
	(0.035)	(0.038)	(0.036)	(0.030)	(0.030)	(0.034)
Craag-Donaldson	25.019***	24.308***	24.260***	25.592***	25.215***	25.422***
K-P	18.498***	20.647***	20.411***	20.802***	21.061***	20.190***
Hansen J	4.592	4.328	4.910	4.845	5.830	4.444
Chi-sq (p-val)	(0.204)	(0.228)	(0.178)	(0.184)	(0.120)	(0.217)
Number Obs.	109	109	109	109	109	109

Legend – same as Legend for Table 1.

a greater distance between first deaths and the enactment of lockdown. This result confirms the critical nexus between freedom of democracy and the mandatory nature of NPI (Bayerlein et al., 2020; Ferraresi et al., 2020a; Frey et al., 2020).

Another challenging result is linked to the pressure exerted by migrants. Countries with the highest net migration were pressured to reduce the period analyzed in Table 2. This result is counterintuitive, as one would expect that countries characterized by a great movement of people would impose measures more slowly given higher costs of implementation. In our case net migration seemed to work as a "wake up bell", triggering domestic restriction measures to prevent further virus spread. Openness of goods, meanwhile, is never significant.

Most of the tests displayed in the last 4 lines suggest the quality of the estimates involving instrumental variables.[7]

7 The F-value reveals that the estimated values in the set are statistically significant, again. The estimated values for the "Underidentification test" in relation to the definition of the instruments again revealed values that allow us to reject the "underidentification" hypothesis. The

6 Conclusion and further challenges

The implementation of a better governance agenda to counteract the spread of COVID-19 is a great challenge for governments. The present paper reflects on the varying timeframes of governments' decisions to implement lockdown policies. Focusing on a specific measure, domestic travel restriction, to improve reliability of comparison of different countries' behavior, and exploring a sample of 149 countries, this study suggests possible correlates favoring prompt governmental action. After the appearance of first cases, while a country's wealth and the rule of law are less conducive to swift domestic travel restrictions, given the high economic costs and possible red tape related to such policies, urban population and political stability seem to hasten them.

In the case of the distance between first deaths and our lockdown measure, the presence of a female leader, net migration level, voice and accountability, and political stability are associated with a more timely response, while democracy and a country's wealth may curb the launch of a government's domestic travel restriction policy.

While some of our results must be interpreted as significant estimations, *ceteris paribus*, they raise interesting issues that contribute to the discussion of the role of institutional devices in conditioning governments' handling of the COVID-19 crisis. First of all, we have emphasized that the institutional framework not only matters regarding NPI effectiveness (e.g., in reducing deaths or cases), but also regarding the timeliness of these measures, another fundamental aspect that so far has received little attention. Secondly, in line with previous contributions (Frey et al., 2020; Ferraresi et al., 2020a), we confirm that the interplay between lockdown measures and institutions can produce opposite results; in some cases, a more stable political environment can be conducive to prompt government action, whereas in others stronger democracy and the rule of law may slow the enactment of domestic restrictions. These findings open the way for a discussion on what kind of institutions were more conducive to a faster lockdown adoption and suggests examination of institutional specificities and complementarities to understand better drivers and effects of different policies arranged by each country. As COVID-19 created further transactions costs, the speed of the response is likely to depend on the presence of a government structure that is best suited to coordinate the new transactions. A study on the characteristics of different modes of governance across countries at the onset of the pandemic will help to shed more light on factors affecting institutional success or failure in the fight against COVID-19.

It is interesting to note that our results confirm that having a woman as a leader was associated with a faster reaction to first deaths, and that the capacity to handle the crisis may also be related to gender specificities, findings that require further research. The negative association between a country's wealth and timeliness of response may be justified in the light of the tradeoff between economic costs and health benefits related to the enactment of a lockdown measure which confirms the multi-faceted nature of the analyzed issue and the necessity to explore it by considering economic as well as societal and political features. Some cautionary remarks should alert readers to the limitations of our cross-country comparisons. First of all, as noted by Correia et al. (2020), some countries may have been characterized by possible imitation effects in the adoptions of lockdowns, supposing that policy learning may have occurred among neighboring countries which were hit by the pandemic at different times. Timeliness of response may have been conditioned by such a "learning" advantage which we do not consider in our model. Moreover, rapidity of the response may also be influenced by the different approaches to the pandemic. Future research shall analyze the timeliness of complementary policy interventions (e.g. contact tracing, quarantine, and social distancing measures) inside different reference approaches, in order to explore possible economies of scale or policy frictions among them, by also considering the role of different layers of governments concerned in their implementation. As additional avenues for research from this paper, we also add the possibility of analyzing the spillover effects between countries considering policies' mimicry due to the virus diffusion in contiguous spaces (Krisztin et al., 2020) or to the adoption of similar solutions to tackle the pandemic as a form of policy transfer and cross-national policy learning in times of crisis decisionmaking under conditions of uncertainty (Powell and Hill, 2020). We also suggest the possibility of exploring panel data analyses for

"first stage regression" associated with these regressions was identical to the regressions shown in Table 2 and had as a dependent variable the number of deaths per million inhabitants and as independent variables the population density of each country, the continent of each country and the number of cases per million inhabitants. Thus, the values obtained for the Cragg-Donaldson tests as well as the Kleibergen-Paap tests also allow us to reject the hypothesis of "weak identification", so that the definition of "first stage regression" turned out to be a strong relationship (again), avoiding endogeneity problems in the regressions. Finally, the Hansen-J test had values that do not allow us to reject the "over-identifying restrictions" hypothesis, and, therefore, validate the relationship described by the "first stage regression".

studying population fatigue along the various phases of each national lockdown as well as we also suggest the interest on researching the survival analysis of each lockdown's length.

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Appendix

Table 1: Variable descriptions and summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Distance between the 1st infected case Covid19 and lockdown establishment	137	19.9927	18.16975	-18	75
Distance between the 1st dead people Covid19 and lockdown establishment	136	19.17647	13.41082	0	61
Trade Openness (% GDP)	133	89.52412	55.41731	22.59447	387.1033
Real GDP pc (log)	139	9.4307	1.113403	6.717972	11.6316
Voice	147	49.35827	28.93822	1.477833	100
Political Stability	149	45.60562	28.2549	0	100
Gov. Effectiv.	148	51.48454	28.21774	0	100
Regulat.	148	51.89709	28.54741	0.4807692	99.51923
Rule of Law	148	50.18841	28.5338	0	100
Control of Corruption	148	49.61993	28.90917	0.4807692	100
Women Leaders	149	0.1275168	0.3346759	0	1
Nr Covid19 Deaths per 1 Million	149	.7175367	3.681287	0	32.72659
Sq. Nr Covid19 Deaths per 1 Million	146	216.1727	692.1873	.1364965	7952.999
Nr Covid19 Cases per 1 Million	149	43.28014	109.7876	0	769.5723
Sq. Nr Covid19 Cases per 1 Million	149	13845.59	63513.54	0	592241.5
Continent (1: Asia; 2: Europe; 3: Africa; 4: America; 5: Oceania)	149	2.530201	1.182971	1	5
Urban Pop (%)	148	62.41407	22.02392	13.169	100
Stability Party Syst (bti_ps)	109	4.706422	2.113899	1	10
Level of Democracy (fh_ipolity2)	142	6.669014	3.123287	0	10
Net Migrants	140	14169.25	736483.9	-3266243	4774029
Continent	140	2.530201	1.182971	1	5