The influence of national policy characteristics on COVID-19 containment policies: a comparative analysis

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ABSTRACT
This article discusses the correlation between national policy characteristics and the success in “flattening the curve” of infection of the COVID-19 virus, which is a generally acknowledged measure to contain the worst medical outcomes of a pandemic. While individual cases require careful and granular analysis to properly unpack, the article finds that the best correlation is found when looking at the pattern of choice related to either proactive or reactive approaches to the implementation of containment measures. This is especially evident for countries that have either very low or very high infection rates per million persons. For intermediate rates we find that a variety of institutional, political, and procedural variables intervene in the process.

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Introduction
Policy making during a pandemic presents two main challenges: on the one hand it is very complex because it must address multiple policy fields and be implemented at a variety of jurisdictional levels (Bennett and Carney 2015), affecting the health care, social, economic, and public security policy fields and creating unique challenges (Carney and Bennett 2014; Keller 2019). On the other hand, especially early in the pandemic, it requires initial containment responses that often appear out of scale with the early level of threat. At this time, policy makers must rely on limited, emerging scientific knowledge and therefore preexisting beliefs and plans about variables such as disease severity and the impact on the health care system can deeply affect the choices that are made (Rosella et al. 2013). Generally, however, containment policies are the approach of choice followed by most jurisdictions faced with a pandemic and the COVID-19 outbreak proved no exception to this rule.

However, containment measures can help reduce transmission but can also be controversial (Smith et al. 2012). If we limit our consideration to calculating their...
economic impact, public officials practically are faced with balancing economic and health risks in what often resembles a zero-sum game (Anderson et al. 2020). For example, a lockdown decision like that imposed by the Chinese or Italian governments can have very extensive effects in a globalized world, generally increasing individual costs, work disruptions, increased hospital care, and sick leave (Fan, Jamison, and Summers 2016; Gasparini et al. 2012). Broadly restricting the capacity of citizens and organizations to operate, work and travel means accepting that an economy will contract significantly, jobs will be lost and major uncertainly will emerge in the world economy (Nicola et al. 2020). Hence, policy decisions addressing pandemic management in the health sector create new issues in other policy fields forcing decision-makers and administrator to calculate ancillary cost-benefit distributions. Is it better to approach COVID-19 by keeping the economy running while trying to protect the most vulnerable like Sweden (Pierre 2020) and South Korea (Lee, Hwang, and Moon 2020) did, implement a mixed model supported by broad financial support (Migone 2020) as Canada chose to, or develop a national lockdown as Italy did (Capano 2020)?

Practically, pandemic management means that public administrators must deal with everything from regulating social distancing, developing protocols for international trade and travel, creating economic support packages for businesses and individuals, and managing medical responses. All of these possible policy choices involves multiple options in terms of implementation and often requires a granular focus on specific groups like health care workers (Maunder et al. 2008) and populations at risk (O’Sullivan and Phillips 2019), an example here being how COVID-19 struck the elderly particularly hard (Daoust 2020). To further complicate the policy landscape, each of these policies has a broad range of choices available, such as the tensions that have emerged about limiting individual choice through lockdowns and wearing masks, but is also dependent on how prepared a country is at the onset of the pandemic (Capano 2020). Each one of these areas can generate complex policy and political issues: both domestically, consider the conflict that emerged about whether wearing masks was necessary in the West (Tso and Cowling 2020; Vogel 2020), and internationally when countries apply very different approaches, like Canada and the United States did, but traditionally share large flows of tourists, travelers, and commerce.

Hence, national policy responses to pandemics vary (Silva et al. 2015) and are politically, culturally, and historically mediated (Tyshenko and Paterson 2010) and can be affected by partisan politics (Kushner Gadarian, Goodman, and Pepinsky 2020). Furthermore, pandemic management must engage a very large portion of the population to be successful and this presents decision-makers with important challenges in terms of aligning emergency policy-making with their political vision and leadership approaches, working with the extant policy styles that are dominant in their jurisdictions (Richardson, Gustaffson, and Grant 1982), and in dealing with the capacity of the institutions that are in charge of the response as was exemplified by the discussion surrounding behavioral choices in the UK in the early stages of the spread of COVID-19 (Sibony 2020). This article is divided in three parts: after this introduction, section two briefly discusses our approach to measuring COVID-19 containment responses and presents the data, finally some conclusions are offered.
Measuring COVID-19 containment responses

This article focuses on policy responses aimed at containing the COVID-19 pandemic for the period between January and June 2020. This timeframe is long enough to accommodate a variety of early policy choices but does not extend into a more “routinized” management of the pandemic. Containment interventions and their timing when dealing with influenza pandemics are subject to a mix of costs and results that are not linearly distributed (Hollingsworth et al. 2011). For example, Anderson et al. (2020) note how different approaches to pandemic management, and therefore infection rates, carry different mixes of economic/health costs: case isolation means that cases peak early limiting economic issues but could potentially strain the health care system, resulting in more deaths. If social distancing policies are applied throughout the epidemic, this flattens the curve but has greater economic impacts, and a time-limited more effective social distancing is often followed by a new peak in infections, potentially exacerbating the situation. This article chooses, somewhat subjectively but in line with the majority of the countries analyzed, to measure the relative success/failure of these containment polices on the basis of the rate of infection per million persons in each jurisdiction. Measuring policy success is always complicated and subjective (Newman 2014), and in particular measuring COVID-19 responses presents a series of complex challenges (George et al. 2020), but we believe that this measure can be justified in two ways: on the one hand it has been adopted as a shorthand for success in the containment of the pandemic by a majority of countries around the world. The second is that the data is available for all the countries in the sample even if we are aware of the fact that different jurisdiction record this type of information differently. In terms of selecting which countries were included in our sample, we decided to include all of the OECD countries, Asian countries and as many African and South American countries as we could for which high enough numbers of tests per million inhabitants were in place (only countries that had at least 1,000 tests per million people were included). This meant that we excluded countries that might be very interesting to examine, but that had extremely low tests per million inhabitants, such as Nigeria.

A limitation of the data is that it measures national dimensions: federal jurisdictions like the United States, Canada, or Germany have important sub-national dimensions both in terms of their institutional structures and of the organization of their health care system that are not captured here. Within these limitations we hope to provide a general snapshot for these jurisdictions that can be augmented and refined by further analysis. The resulting sample is composed of 46 countries from all continents, which are presented in Table 1 below. The table includes the number of confirmed cases, the number of confirmed deaths and the number of tests, all per million population. To facilitate the analysis, countries are somewhat arbitrarily divided in five distinct groups based on how many confirmed cases per million have been reported (Table 2).

Containment measures have been shown to help with the management of pandemics (Halder, Kelso, and Milne 2010; Kelso et al. 2013) and can have very important effects for high-risk populations (O’Sullivan and Phillips 2019), especially if they are properly contextualized with public engagement (Joint Centre for Bioethics Pandemic Ethics Working 2009). However, their application and scope vary among jurisdictions (Ren 2020) and they have very broad effects on socio-economic variables (Bonaccorsi
| Country | Total cases per M | Confirmed death per M | Tests per M | Rank | Country | Total cases per M | Confirmed death per M | Tests per M | Rank | Country | Total cases per M | Confirmed death per M | Tests per M | Rank |
|---------|------------------|-----------------------|-------------|------|---------|------------------|-----------------------|-------------|------|---------|------------------|-----------------------|-------------|------|
| VNM     | 4                | 0                     | 2825        | Very low | FIN     | 1316             | 59                     | 49,630      | Low | PRT     | 4533             | 162                     | 129,115      | Very high |
| TWN     | 19               | 0.3                   | 3284        | Very low | NOR     | 1655             | 46                     | 68,677      | Low | RUS     | 4937             | 77                      | 155,605      | Very high |
| THA     | 46               | 0.8                   | 8648        | Very low | AUT     | 2085             | 78                     | 76,790      | Moderate | IRL     | 5181             | 353                     | 99,541      | Very high |
| CHN     | 58               | 3                     | 62,814      | Very low | DNK     | 2235             | 105                    | 208,339     | Moderate | BEL     | 5389             | 844                     | 117,490      | Very high |
| MNG     | 69               | 0                     | 8299        | Very low | MEX     | 2242             | 265                    | 55,46       | Moderate | ISL     | 5532             | 29                      | 277,588      | Very high |
| JPN     | 164              | 8                     | 4273        | Very low | DEU     | 2383             | 109                    | 76,094      | Moderate | ESP     | 6438             | 607                     | 122,651      | Very high |
| KEN     | 181              | 3                     | 3866        | Very low | FRA     | 2616             | 460                    | 21,211      | Moderate | SWE     | 7415             | 547                     | 59,402       | Very high |
| HKG     | 191              | 0.9                   | 46,329      | Very low | CAN     | 2838             | 232                    | 83,249      | Moderate | LUX     | 7629             | 176                     | 425,482      | Very high |
| KOR     | 261              | 6                     | 27,246      | Very low | NLD     | 2972             | 358                    | 39,795      | Moderate | SGP     | 7824             | 4                       | 148,006      | Very high |
| IDN     | 271              | 13                    | 3798        | Very low | IRN     | 3036             | 150                    | 23,175      | High | BRA     | 8502             | 326                     | 21,509       | Very high |
| URY     | 284              | 8                     | 22,239      | Very low | CHE     | 3789             | 227                    | 78,403      | High | PER     | 9691             | 349                     | 57,101       | Very high |
| NZL     | 308              | 4                     | 85,319      | Very low | ISR     | 3943             | 38                     | 132,799     | High | USA     | 9988             | 413                     | 124,151      | Very high |
| GRC     | 358              | 19                    | 34,872      | Very low | ITA     | 4016             | 578                    | 96,836      | High | QUA     | 36,729           | 52                      | 145,736      | Very high |
| AUS     | 375              | 4                     | 118,372     | Very low | ZAF     | 4226             | 65                     | 34,676      | High | GBR     | 4244             | 658                     | 169,945      | High |
| MOR     | 421              | 7                     | 23,417      | Very low | GBR     | 4244             | 658                    | 169,945      | High | ZAF     | 4226             | 658                     | 169,945      | High |
| PHL     | 495              | 13                    | 8545        | Very low |         |                 |                        |             |      |         |                 |                        |             |      |
| IND     | 605              | 16                    | 8191        | Very low |         |                 |                        |             |      |         |                 |                        |             |      |
| EGY     | 784              | 36                    | 1319        | Very low |         |                 |                        |             |      |         |                 |                        |             |      |

Source: World of Meters COVID-19 data for 11 July 2020; Ranking is linked to the total cases per million.
et al. 2020), which makes their implementation a matter of political and practical debate. This section looks at the correlation between how stringent national policies have been in managing social distancing and public interactions and the rate of growth in the number of confirmed COVID-19 cases. The policy data comes from the Stringency Index developed at the Blavatnik School for Government by Hale, Webster et al. (2020). The data for confirmed cases is charted on a logarithmic scale and the zero value represents the day when the jurisdiction reported at least 100 confirmed cases of COVID-19. This allows us to trace the percentage change in infections – our measure of success being the so called “bending of the curve” – in relationship with the level of stringency of containment policies imposed by the national government. Even within these groups there is variation, this depends on the fact that these measures are very high level and to an extent proxies: for example, the stringency index does not speak to compliance. Furthermore, when discussing containment policies in the field of pandemics, the role of organizations like the World Health Organization (WHO) in setting priorities is very important but, we know that individual jurisdictions retain important degrees of independence in their choices. For example, many countries adopted containment measures as a package and at the same time, contrary to the WHO’s advice of scaling the adoption in the light of the virus’ behavior (Hale, Angrist, et al. 2020). Nonetheless, some common trends can be highlighted; we now turn to the analysis of each group of jurisdictions.

**Very low rate of infections**

Among the countries with very low infection rates as of early July 2020, we can find four patterns. Many intervened early on with containment measures that either kept ahead of the increasing rate of infection, or that matched it closely. A small group, comprising Thailand, South Korea, Japan and Australia lagged the infection rate very early on but escalated their policy intervention as they came close to 100 confirmed cases. Finally, we find a group of five countries that while currently having very low rates of infection per million population, have not managed to slow the growth of the infection. We should note that all of these countries are very diverse institutionally, historically, demographically and in terms of capacity, hinting perhaps at the importance of early intervention above these other variables.

In the first subgroup are present Taiwan, the People’s Republic of China (PRC), Mongolia, Hong Kong and Uruguay (see Chart 1), countries that always moved pro-actively with regard to the infection pattern with their containment policies. One of the distinctive elements in this group is that there are relatively different levels of stringency in their approaches: from the very low stringency approach in Taiwan, where policy-makers relied on collective efforts, trust in institutions that was built on the experiences of the 2003 SARS pandemic, and on early intervention (Huang 2020), to the more stringent one in the PRC (Mei 2020).
In the second subgroup we find that early on containment policies lagged the rate of infection but they were followed by patterns of policy escalation, which appear to have curbed the pandemic (see Chart 2 below).

Explaining these results is likely to be more complex, with elements such as compliance, leadership, and capacity coming into play, but we can certainly note a similar pattern to the one highlighted above. The exception being Vietnam, which seems to have fallen behind the stringency curve not once, but twice and yet has managed to do extremely well because of very good communication and a high level of early cooperation among all stakeholders (La et al. 2020). Early movers seem to have enjoyed a strong return on their policy investment and most of them either never reached very high stringency levels, like Taiwan and Mongolia, or were able to decrease them, like Vietnam, Greece and New Zealand.

The countries in the third subgroup lagged the growing infection rate early on but responded by sharply escalating at a time when very few cases were confirmed and this appears to have been a successful approach. Japan, Australia, Thailand and South Korea (See Chart 3 below) all have proven the importance of knowledge from previous pandemics and strong institutional structures that reacted proactively to the virus’ dynamics (Bello 2020; Lee, Hwang, and Moon 2020; Moloney and Moloney 2020; Tashiro and Shaw 2020).
These four jurisdictions present relatively similar dynamics in terms of policy approach and, with the exception of Australia, they all proactively escalated their containment policies well before the country reached 100 confirmed cases.

The final subgroup of countries comprises jurisdictions that have low infection rates and, with the exception of Egypt, appeared to have acted proactively with their containment policies but that still have been unable to “flatten the curve.” More granular research is needed to explain these dynamics but it is unlikely to be a coincidence that

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**Chart 2.** Very Low Infection Rates with Policies Matching Early Detection.

**Chart 3.** Very Low Infection Rates with Early Policy Lagging but Quick Escalation.
all of these jurisdictions are developing nations that have very high urban densities and have economic and health care dynamics are likely to force many people into difficult choices between containment and economic survival (Ntoumi and Velavan 2020).

Ultimately, countries that managed the COVID-19 pandemic using early policy (See Chart 4) interventions proactively and managed to engage the public like Taiwan (Huang 2020), Greece (Tsiotas and Magafas 2020) and New Zealand (Duckett 2020; Wilson 2020) have reaped very important benefits, including a uniformly extremely low rate of death per million people; this extends even to countries that have struggled to reduce the rate of growth in the number of new infections.

**Low rate of infections**

Only Finland and Norway reported infection rates between 1000 and 2000 people per million and both show some lagging in the early phase of containment policy with a quick escalation at the point when infection neared 100 people. It should also be noted that Finland did escalate quickly its stringency policies and compliance allowed them to later not reach as high a peak of stringency as some other countries had to (See Chart 5 below).
However, what is in place in both countries is the use of evidence informed decision making linked to health institutes (Fretheim, Brurberg, and Forland 2020; Moisio 2020) and, especially in the Finnish case, a very strong intervention of the state that framed the discussion around COVID-19 as a national security issue (Moisio 2020). This has apparently enabled an effective containment policy even if more granular analysis would be needed to unpack the process.
Moderate rate of infections

This group represents various policy approaches (See Chart 6 below). The Netherlands initially embraced a policy aimed at developing herd immunity, but sharply reversed course later. Other jurisdictions, like Germany and Canada, instead attempted to match policy changes to increased rates of confirmed infections in a bid to maintain the capacity of their decentralized medical systems (Kirchhof 2020; Migone 2020), whereas in Mexico the impact of the virus was complicated by low levels of trust in the capacity of the authorities to handle the emergency and by the very much delayed response that
the federal political structure, especially President López Obrador chose in the face of the pandemic. In turn this may be due to the state of flux in the institutional structure of the country at the onset of the pandemic (Caldera-Villalobos et al. 2020). In the case of Mexico, these variables may account for the fact that the country could not significantly reduce its rate of infection. Five of these jurisdictions tended to lag their policy
responses. Various explanations are possible: from the complexity in managing federal and decentralized systems, to political and institutional dynamics. In France, further to the lag in containment policies, issues of compliance and political divisions seem to have reduced the effectiveness of the interventions (Ghanchi 2020).

Austria and Denmark, however show a similar pattern to countries in the low and very low categories, and implemented relatively strict containment policies that led the infection rate (See Chart 7 below).

More granular research will be needed to assess both the policy patterns and to unpack some of the health outcomes like the very broad range in mortality per million population in this group, but containment policies, even if they do not lead the infection rate by much, can be very effective, especially if communication with citizens is clear and open and trust levels are high (Moshammer et al. 2020; Olagnier and Mogensen 2020).

**High rate of infections**

This group has both much higher rates of infection per million and higher mortality rates while containment policies include different approaches: ranging from Great Britain where the initial approach was to create immunity in the population (Kirchhof...
to Israel where disproportionate policy responses prevailed (Maor, Sulitzeanu-Kenan, and Chinitz 2020). Italy itself is a complex case to unpack because capacity gaps among institutions are dramatic (Gatto et al. 2020) and where regionally delivered health care meant very different approaches at the local level (Capano 2020), with Lombardy taking on a more reactive approach and paying an enormous price for it. Within this group are Iran and South Africa, two countries that have been unable to “flatten the curve.” In Iran, insufficient institutional coordination and lack of access to personal protective equipment and medicines limited the effectiveness of contextual containment policies (Raoofi et al. 2020), further reinforcing the perception that the long term evolution of the pandemic will depend on a variety of dynamics, including preparedness (Gilbert et al. 2020). The patterns in the containment policies for these countries are not dramatically different from some of the ones we have seen in the group showing moderate infection rates, Germany and Holland being good examples of these better results, and yet we find both higher infection rates and, at least in the cases of Iran and South Africa, difficulty in flattening the rate of infection (See Chart 8 below).

Aside from cases, like Great Britain, where policy decisions were made against containment early on, this group appears to suggest that institutional and capacity factors coupled with even a mild lag in the containment stringency can lead to problematic results.

**Very high rate of infections**

Finally, we grouped jurisdictions that recorded rates of infection above 4500 persons per million. These countries can be further divided in two subgroups: the first chose a reactive approach, with containment policies lagging the infection rate and often allowing a relatively steep increase in confirmed cases to go unchecked early (See Chart 9). The second group, composed of Russia, Iceland, Luxembourg, Peru and Brazil while showing a proactive approach failed to moderate the growth in infections. Another commonality is that a variety of these countries continue to struggle with climbing infection rates.

Among the jurisdictions in this group we find countries like Sweden (Pierre 2020) and the United States (Rocco, Béland, and Waddan 2020) where the choice was to be reactive and others, like Singapore, where failure to protect migrant workers, who live in cramped conditions and tend to be “forgotten” by official policy, from infection seem to have driven the results (Woo 2020) (See Chart 10).

The second subgroup includes countries that, at least formally, show a pattern of proactive containment policies (See Chart 11) but that in some cases like Brazil under President Bolsonaro had politically mixed messages (Crokidakis 2020) or because of the size and density of their population, like Luxembourg, presented a more complex challenge in unpacking the causal patterns. In Peru, for example, the application of containment measures was able to sharply mitigate the infection rate, but it could not prevent the enormous strain that the pandemic placed on the medical system (Gonzales-Castillo et al. 2020). The Russian example demonstrates the importance of leadership in highly centralized and usually proactive systems. While focused on sending medical help to foreign countries and closing access from China early on, the
Russian leadership initially minimized the threat of the virus for Russia and the following measures remained uncoordinated, with continued communication issues (Åslund 2020).

In Iceland the focus was on widespread tracing and testing aiming at ensuring the viability of the health care system and protecting the most vulnerable members of society (Sen-Crowe, McKenney, and Elkbuli 2020), which appears to have been successful in that the mortality rate is very low considering the extremely high rate of infection.

This group seems to suggest that reactive policy approaches to containment of COVID-19, whether this depended on poor communication, institutional and political dissonance, lack of trust or a specific choice, led to very high numbers of infections and very often high death rates. A specific note must be made for Brazil and Russia: in both countries the top political leadership minimized the threat of the virus at every turn but the policy stringency still led the number of infections early on. It seems logical to assume that many people would have disregarded public health notices in the face of contrasting communication from their leaders and this underscores the importance of correct communication during a pandemic from the authorities.

**Conclusions**

This article aims to provide a high-level snapshot of possible correlations between either anticipatory or reactive approaches to COVID-19 containment policies and the rate of confirmed cases in various jurisdictions. At the same time, these categories are grounded in complex structural foundations and simple incremental adjustments are unlikely to make too much of a difference in outcomes. As such, the results are general and we should be cautious with them: while COVID-19 responses in the various jurisdictions were reviewed as part of the research, much more in-depth analysis is needed to understand and explain specific results. However, some general comments can be put forward. First, countries that acted early and proactively fared better. This appears to hold independently from how strict the final policies were: Australia, Japan and South Korea targeted early on the spread of the disease and generally the Stringency Index was relatively low. Countries like Spain and Belgium ramped up their policy measures dramatically but appear to have done so after the window of opportunity had closed and very stringent rules seem to have had limited effect on medical outcomes.

With the exception of the first group, we find that the mortality rate per million population is very broadly distributed. Countries that have basically the same infection rate per million like Italy and Israel or Belgium and Iceland have staggering different mortality rates. While the reporting of causes of death differs among countries many of these variations seem to imply that once the initial window is missed the relative difference in factors like treatment capacity, the protection offered to vulnerable populations, and the effectiveness of the health care system have important effects. Another trend that is evident through the various groups is that, outside countries like the United States and Sweden where the early policy approach was not containment, the countries that are struggling most with reducing infection rates are developing ones, replicating the pattern that is evident within countries where people in more precarious economic conditions are hit harder (Patel et al. 2020).
Disclosure statement

No potential conflict of interest was reported by the author(s).

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