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## Short Communication

## Role of institutional, cultural and economic factors in the effectiveness of lockdown measures

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## ABSTRACT

**Objective:** This study considered the role of institutional, cultural and economic factors in the effectiveness of lockdown measures during the coronavirus pandemic. Earlier studies focusing on cross-sectional data found an association between low case numbers and a higher level of cultural tightness. Meanwhile, institutional strength and income levels revealed a puzzling negative relationship with the number of cases and deaths.

**Methods:** Data available at the end of September 2021 were used to analyse the dynamic impact of these factors on the effectiveness of lockdowns. The cross-sectional dimension of country-level data was combined with the time-series dimension of pandemic-related measures, using econometric techniques dealing with panel data.

**Findings:** Greater stringency of lockdown measures was associated with fewer cases. Institutional strength enhanced this negative relationship. Countries with well-defined and established laws performed better for a given set of lockdown measures compared with countries with weaker institutional structures. Cultural tightness reduced the effectiveness of lockdowns, in contrast to previous findings at cross-sectional level.

**Conclusion:** Institutional strength plays a greater role than cultural and economic factors in enhancing the performance of lockdowns. These results underline the importance of strengthening institutions for pandemic control.

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*Nothing is possible without men, but nothing lasts without institutions.*

Jean Monnet

Countries that adopted lockdowns (Hale et al., 2021) observed heterogeneity in limiting the coronavirus pandemic (Figure 1A). This study considered the roles of institutions, captured by the rule of law (ROL); cultural norms, captured by cultural tightness (CT); and economic well-being, captured by gross domestic product (GDP) per capita, in the effectiveness of lockdown measures. Figure 1B shows that stronger ROL was associated with wealthier countries (Acemoglu et al., 2005), and Figure 1C shows that countries with stronger ROL tended to have looser cultures.

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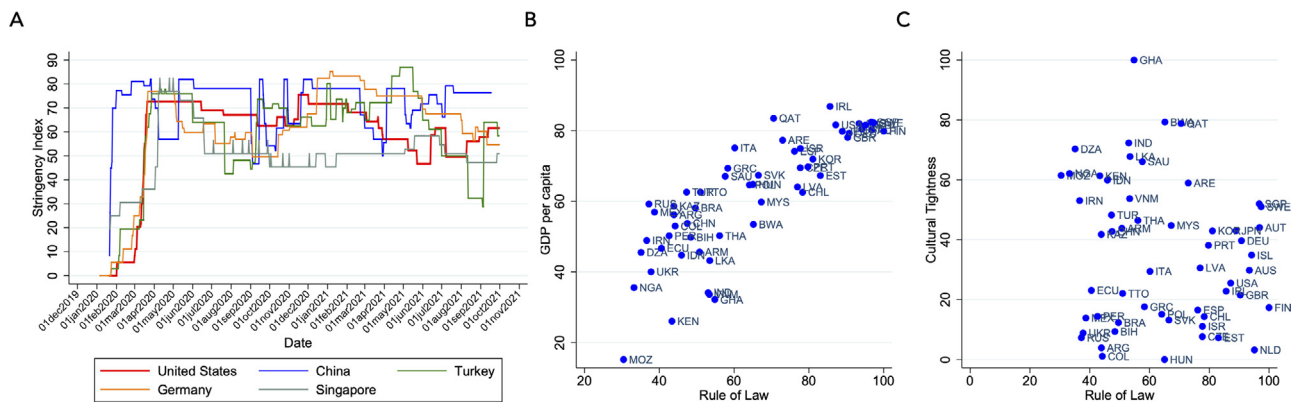
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Previous cross-sectional studies found an inverse relationship between case numbers and CT (Gelfand et al., 2021). Institutional strength and income were negatively associated with the number of cases and deaths (Jamison et al., 2020; Engler et al., 2021; Ergönül et al., 2021).

This study exploited the time series aspect of the data. Rather than investigating the pandemic at a point in time, this study investigated the factors that affected the efficacy of lockdown measures over time. Daily data on new cases, tests, vaccinations and lockdowns were used. While lockdowns had multiple social effects on society, including mental health (Le et al., 2020), education, deterioration in income distribution, and disproportionate burden on minorities, this study focused on factors that influenced the effectiveness of lockdowns.

Ordinary Least Squares was used as the estimation technique. The dependent variable was new cases in a country. Country-specific factors were controlled for using 'fixed effects', which exhaust variation that may be specific to a country. The number of



**Figure 1.** (A) Government stringency indices for the USA, China, Turkey, Germany and Singapore. The countries exhibit great variation in their lockdown strategies. The OxCGRT Stringency Index was used for pandemic-related measures (Hale et al., 2021). (B) Relationship between rule of law (ROL) and gross domestic product (GDP) per capita in 2019. Strong correlation was found between ROL and GDP per capita. ROL data were obtained from worldwide governance indicators, whereas GDP per capita data were obtained from the World Development Indicators of the World Bank. (C) Relationship between cultural tightness (CT) and ROL. No strong association was found between these measures. Gelfand et al. (2020)’s measure was used to measure CT.

**Table 1**  
Testing the efficacy of stringency measures.

Dep. Var: LogNewCases	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) RuleofLaw_Stringency14	-0.0218*** (0.002)			-0.0222*** (0.003)		-0.0231*** (0.003)	-0.0234*** (0.003)	-0.0257*** (0.003)	-0.0229*** (0.004)
(2) GDPcapita_Stringency14		-0.0184*** (0.002)		0.0010 (0.003)	-0.0171*** (0.004)				
(3) Tightness_Stringency14			0.0120*** (0.002)		0.0082*** (0.002)	0.0097*** (0.002)	0.0105*** (0.002)	0.0099*** (0.002)	0.0097*** (0.002)
(4) Stringency1	1.8018*** (0.057)	1.7946*** (0.057)	2.1351*** (0.093)	1.7942*** (0.057)	2.1320*** (0.093)	2.1510*** (0.093)	2.1310*** (0.093)	2.1477*** (0.097)	2.2461*** (0.115)
(5) Stringency14	-0.6015*** (0.105)	-0.8782*** (0.103)	-2.5592*** (0.114)	-0.6179*** (0.108)	-1.3670*** (0.272)	-1.0061*** (0.220)	-1.0189*** (0.220)	-0.8039*** (0.225)	-0.7531** (0.266)
(6) LogNewCases1	0.2678*** (0.003)	0.2673*** (0.003)	0.2263*** (0.005)	0.2661*** (0.003)	0.2263*** (0.005)	0.2251*** (0.005)	0.2246*** (0.005)	0.2027*** (0.005)	0.2169*** (0.007)
(7) LogNewCases14	0.5104*** (0.003)	0.5117*** (0.003)	0.5522*** (0.005)	0.5115*** (0.003)	0.5540*** (0.005)	0.5548*** (0.005)	0.5547*** (0.005)	0.5552*** (0.005)	0.4593*** (0.007)
(8) LogNewTests	24.0619*** (0.693)	23.7268*** (0.705)	21.9034*** (1.063)	24.2745*** (0.708)	21.7138*** (1.063)	21.7372*** (1.062)	21.9912*** (1.040)	23.4949*** (1.122)	35.3685*** (1.393)
(9) Vaccines14	-0.7523*** (0.088)	-0.7740*** (0.088)	-0.7295*** (0.130)	-0.7598*** (0.088)	-0.7048*** (0.130)	-0.6465*** (0.130)	-0.7912*** (0.131)	-0.8481*** (0.135)	-1.5454*** (0.171)
Country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	58,820	58,231	27,270	58,231	27,270	27,270	27,270	25,614	18,770
R-squared	0.84	0.84	0.82	0.84	0.82	0.83	0.83	0.82	0.78

Official daily counts of new cases, tests and the number of vaccinations were obtained from the “Our World in Data COVID-19 Dataset.” Log New Cases was used as the dependent variable in the estimations.

Columns 1–7 show the Ordinary Least Squares results for the full sample of 125 countries over the period from 22 January 2020 to 30 September 2021. Columns 8 and 9 exclude the countries that suffered from deaths and infections during the severe acute respiratory syndrome coronavirus-1 pandemic, respectively. In all columns except column 7, the total number of people who received one dose of vaccine was used to control for the potential impact of vaccination on the number of cases. In column 7, to control for this effect, the total number of fully vaccinated people was used. The variables used in the estimation were standardized to take a value between 0 and 100. Standard errors are shown in parentheses.

\* $P < 0.1$ , \*\* $P < 0.05$ , \*\*\* $P < 0.01$

vaccinations and lags in the stringency index were included. The first lag addressed reverse causality between lockdown measures and new cases. While the increase in lockdown measures reduced the number of cases, an increase in the number of new cases prompted governments to impose more stringent measures. The 14th lag was included to isolate reverse causality.

Cultural, institutional and economic factors were interacted with the stringency measures of countries. The interaction terms measured the impact of these factors on the effectiveness of lockdowns.

Controls were used to prevent omitted variable bias. Lags of new cases were used to control for intertemporal dependence (1-day lag), and potential long memory in the high frequency (14-day lag). Daily tests were included to control for new case identification.

Table 1 shows the results. In all columns, greater stringency with 14-day lag (row 5) and higher number of vaccinations (row 9) were associated with fewer cases. Greater stringency with 1-day lag (row 4) and higher number of tests (row 8) were closely correlated with the number of cases.

Columns 1–3 show the impact of institutional, economic and cultural factors in isolation of each other. Column 1 suggests that lockdowns are more effective when complemented by stronger institutions. The coefficient is negative and significant (row 1). The long-term effects of the lockdowns are the sum of rows 1 and 5. In the absence of any ROL (index=0), a 10-unit increase in lockdowns led to a 6% reduction in the number of new cases, on average (row 5). In countries with the highest ROL (index=100), the total effect of a 10-unit increase in the stringency index increased to 8% (6+2).

Thus, ROL in a country was found to increase the efficacy of lockdowns by 30%.

Column 2 suggests that lockdowns are more effective in wealthier nations. The interaction term is negative and significant (row 2). In column 3, lockdowns are interacted with CT. The coefficient is positive and significant, suggesting that lockdowns are less effective in tighter cultures; this finding is in contrast to the results of Gelfand et al. (2021). Once the long-term dynamics of the data are incorporated, the initial 'tightness reflex' may backfire and work against the efficiency of lockdown measures, as in India.

Columns 4–6 incorporate institutional, economic and cultural factors pairwise. ROL appears to be the most robust variable, while GDP loses significance once it is included with ROL (column 4). CT maintains its 'perverse' sign.

In column 7, the total number of fully vaccinated people (instead of the number of people who received one dose of vaccine) is used as a robustness check. The coefficient increases, reflecting the greater impact of full vaccination in controlling the pandemic (row 9).

The countries that experienced severe acute respiratory syndrome coronavirus-1 (SARS-CoV-1) performed better in curbing the present pandemic (Ru et al., 2021). When those countries that experienced SARS-CoV-1-related deaths (column 8) and infections (column 9) are excluded, the results remain intact. Additional robustness checks with constant sample size and number of deaths are available upon request.

These findings have important policy implications. Countries with well-established institutions do better in containing a pan-

demic because of the imposed sanctions when people do not follow lockdown measures. Although CT may appear to limit spread of the virus at earlier stages of a pandemic, it reduces the effectiveness of lockdowns once the number of cases increases.

### Ethical approval

This study used public datasets and did not require ethical approval.

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