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Government policies, national culture and social distancing during the first wave of the COVID-19 pandemic: International evidence

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ABSTRACT

We assess the impact of national culture and government policies on social distancing to fight COVID-19 across major economies during the first wave of the pandemic. To do so, we regress government stringency index from Oxford COVID-19 government response tracker together with Hofstede's national culture scores on social distancing data from Google mobility reports. We find that government stringency has a far larger impact on social distancing than national culture. Social distancing increases with government stringency. We find two cultural dimensions matter: social distancing decreases with 'Long-term Orientation'; the opposite is true for 'Indulgence'. Our results convey that policymakers must act decisively rather than blaming the culture.

1. Introduction

Social distancing emerged as an efficient way to fight COVID-19 spread (Chudik et al., 2020; Ferguson et al., 2020; Maloney and Taskin, 2020). However, the degree of social distancing varies from country to country. Understanding such variations in social distancing is important because COVID-19 spread is still ongoing (Maloney and Taskin, 2020). Growing literature is now trying to explain cross-country variations in social distancing. For instance, Maloney and Taskin (2020, p 2) report that the government's "non-pharmaceutical interventions (NPIs), such as the closure of nonessential businesses, stay-at-home orders, or school closings" did increase social distancing. Maloney and Taskin also report that social distancing has mainly increased thanks to people's own decision to voluntarily avoid public places as a response to more COVID-19 cases. Likewise, Morita et al. (2020) report that the efficiency of government policies like the closure of workspaces, public transportation, and travel restrictions within the country significantly increase social distancing. Additionally, scholars have applied the framework of Hofstede's cultural dimensions to examine this difference: Frey et al. (2020) report people practice more social distancing in low 'Individualism' culture. Huynh (2020) reports that people in high 'Uncertainty Avoidance' culture are more likely to practice social distancing. Furthermore, Im and Chen (2020) report whether people practice social distancing or not even with high 'Uncertainty Avoidance'

and low 'Individualism' depends on the time period.

Our study aims to re-visit the analysis of determinants of social distancing across economies during so-called the first wave of the pandemic. We find three gaps in the current literature. First, Maloney and Taskin (2020) and Morita et al. (2020), that also focuses on the first wave, do not control for national culture included in Huynh (2020). On the contrary, Huynh (2020) does not control for government policies included in the above two studies. Thus, all three studies based their conclusions on misspecified models which might be subject to omitted variable bias. Second, Huynh (2020) uses social distancing data proxied by the Google mobility index on 58 economies just for a single day (2020.03.29), which is an early first wave. Given that daily data on social distancing is available starting from 2020.02.15 on 131 economies, focusing on a single date may weaken their results – the relationship may not hold if one uses data for another date. To show this we have replicated Huynh (2020) for alternative dates and failed to achieve the same conclusions (See Appendix 1). Third, the existing studies scrutinize only part of Hofstede's six cultural dimensions on social distancing without any justification for overlooking part of cultural dimensions. For instance, Frey et al. (2020) investigate the impact of 'Individualism'. Im and Chen (2020) test the impact of 'Individualism' and 'Uncertainty Avoidance' and Huynh (2020) of 'Individualism', 'Uncertainty Avoidance', and 'Power Distance' on social distancing.

To address the above gaps in the literature we include institutional,

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cultural, and economic variables into our models and use panel data. By doing so, we make sure to control for a possible bias due to omitted variables. Including proxies for government policies and national culture variables into a single model has clear implications for policy. We can compare the relative importance of government policies and national culture on social distancing. Our study tests the impacts of government policies and national culture on social distancing for 147 days (from 2020.02.15 to 2020.07.10) across 80 economies. The results show that government stringency and only two cultural dimensions ('Long-term Orientation' and 'Indulgence') significantly affect social distancing. We observe that social distancing increases with the stringency of government policies. People seem less likely to follow social distancing in cultures with high 'Long-term Orientation'. On the contrary, social distancing increases with high 'Indulgence'. Government policies have a far larger impact on social distancing compared to national culture. Our results are robust for alternative controls and samples.

Note that we focus on the first wave of the COVID-19 outbreak for two reasons. One is that the second stage of the pandemic has just started in part of the countries. Thus, it is not clear when it will end.¹ We, therefore, need to observe more data to be able to conclude the second wave. The other reason is that the first stage pandemic came as a surprise to all countries and therefore countries had no sufficient lessons from their peers to learn. All countries have been experimenting with their approach to tackle COVID-19. Hence, we think that in the first wave we can better isolate the impact of culture and government policies than in the second wave. In the second wave, people's awareness and perception of COVID-19 have changed and as a result, they have understood the importance of social distancing, such as wearing masks.

This paper is the first to compare the impacts of government policies and national culture on social distancing. We are also the first to investigate the relationship between social distancing and all six of Hofstede's national culture dimensions. Knowing which factor is more important may help policymakers to select the most efficient instrument to achieve greater buy-in to social distancing in this urgent time.

The next section outlines the construction of our dataset, including data collection, processing, and descriptive statistics. We introduce our model and summarize our main results in Section 3. After robustness checks in Section 4, we acknowledge the related literature and give discussions in Section 5. We draw our conclusions and explain our limitations in Section 6.

2. Data collection

This study includes social distancing, government policies, national culture, and control variable datasets. Like in Maloney and Taskin (2020), Morita et al. (2020), and Huynh (2020) we use mobility data from Google Community Mobility Reports² (GCMR) as the proxy of social distancing. Using smartphone data Google constructed mobility indexes that show "how visits and length of stay at different places change compared to a baseline" (Maloney and Taskin 2020, p 3). In Huynh(2020, p 1), these indexes show "changes in the percentage of people gathering in different areas such as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces in comparison with the median value of baseline day" (i.e., the baseline is determined through the median value of the weekday from January 03, 2020, to February 06, 2020). The advantage of these data is that such mobility indexes are constructed for (1) Workplaces, (2) Retail and Recreation, (3) Grocery and Pharmacy, (4) Parks, (5) Transit Stations, and (6) Residential areas. We retrieved

Google Community Mobility data on July 15th, 2020. These mobility indexes are at a country-level and available for 135 economies and 1844 subregions. For all the 135 economies these data start from 2020.02.15. We use country-level social distancing data for 147 days from Feb 15, 2020, to July 10, 2020. Accordingly, we exclude 3 economies (Georgia, Afghanistan, Serbia) for missing values from May 19, 2020, to July 2, 2020. Matching other data sources in this study results in a sample consisting of 80 economies (See Appendix 2). Fig. 1 visualizes mobility related to social distancing at six areas across our 80 sample economies.

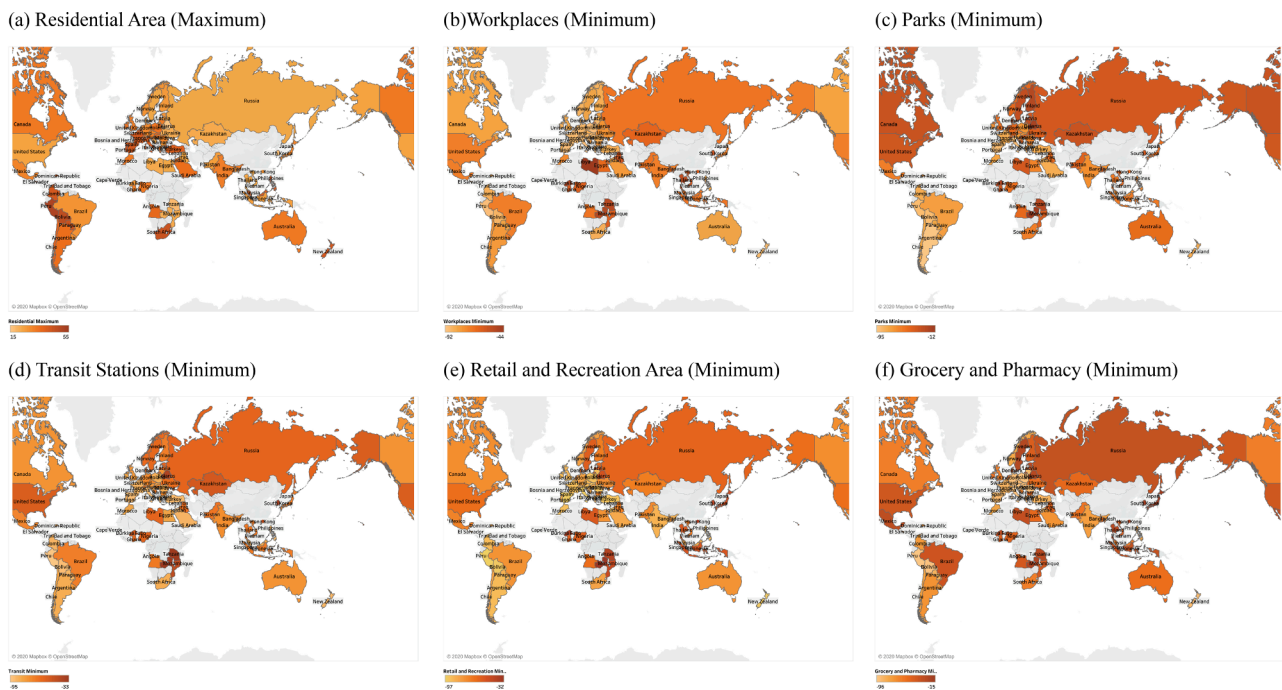
Panel A in Table 1 describes social distancing data. Each economy in our sample has observations for 147 days therefore in total we have 11,760 observations. 3 economies have some missing values on Grocery and Pharmacy (Norway 3; Poland 1; Switzerland 1) and 2 economies miss values for 24 days in Residential areas (Cape Verde 22; Luxemburg 2). Thanks to the large sample, we think that these missing values have no significant impact on the robustness of our estimates. The mobility index for 'Transit Stations' is -35.79, meaning that people's attendance of 'Transit Stations' has dropped 35.79 percent compared to the baseline. Indeed, 'Transit Stations', 'Retail and Recreation', and 'Workplaces' are three areas that have seen the largest drop in attendance. 'Grocery and Pharmacy' and 'Parks' on the average have seen a modest drop. Variance in 'Parks' attendance is the largest. On the contrary, to all other indexes, the mean of 11.98 shows that people's gathering in 'Residential areas' has increased 11.98 percent relative to the baseline. Consequently, social distancing means a decrease in people gathering/attendance in public areas and an increase in time spent in 'Residential areas'.

As noted in GCMR and elsewhere, the representativeness of the above mobility data is likely to vary from country-to-country. One reason for such variations in the representativeness of the data, as explained by Maloney and Taskin (2020), is the difference in smartphone penetration. In those economies with high smartphone penetration, the data is likely to be representative and in others it may not be. As a result, mobility indexes may not be comparable across economies. To overcome this, we follow Maloney and Taskin (2020) to include smartphone penetration into the analysis. Smartphone penetration is an indicator reflecting the percentage of the population owning a smartphone. However, the list of available smartphone penetration only includes 50 economies (Maloney and Taskin, 2020 p17). To address this, we used GDP per capita to predict smartphone penetration for economies with missing values. Since 3 of the above 50 economies have missing values of GDP per capita (Taiwan, Iran, and Venezuela), we correlate smartphone penetration of the remaining 47 economies with the natural logarithm of GDP per capita (log GDP per capita). The correlation coefficient equals 0.9230. It fits our conjecture. We then exclude an additional 8 economies from the list of available smartphone penetration, including 5 economies without social distancing data (Algeria, China, Ethiopia, Sudan, Uzbekistan), 1 economy without government stringency data (Uganda), 1 economy without national culture data (Myanmar) and 1 economy with only four culture dimensions (Kenya). Thus, only 39 economies with smartphone penetration are kept. The correlation coefficient between smartphone penetration of these 39 economies and the natural logarithm of GDP per capita (log GDP per capita) equals 0.9117. We then run a country-level linear regression between smartphone penetration and Log GDP per capita. Since R^2 equals 0.83, GDP per capita predicts 83 percent of the variation in smartphone penetration (See Appendix 2). As described further, we construct different samples of economies with a relatively similar level of smartphone penetration and re-run all our analyses for these alternative samples. Panel B in Table 1 shows the mean smartphone penetration is 0.51. It implies 51% population owns a smartphone across 80 sample economies.

We followed Frey et al. (2020) to use government stringency index

¹ There's a second wave of Covid-19 coming, and it could be rough. Last accessed on 2020.11.08 at URL: <https://www.trtworld.com/magazine/there-s-a-second-wave-of-covid-19-coming-and-it-could-be-rough-40115>

² Google COVID-19 Community Mobility Reports. Last accessed on 2020.09.11 at URL: <https://www.google.com/covid19/mobility/>



Notes: We use minimum for all areas except maximum for Residential area. Social distancing data come from Google Community Mobility Reports.

Fig. 1. The Visualization of Mobility Related to Social Distancing at Six Areas across 80 Sample Economies.

Table 1

Descriptive statistics.

Panel A. Time-series variables						
Variable	N	Mean	Sta. Dev.	1st Percentile	50th Percentile	99th Percentile
Residential areas	11,736	11.98	10.43	-4	11	38
Workplaces	11,760	-26.15	24.01	-79	-25	17
Parks	11,760	-3.96	51.74	-85	-9	184
Transit Stations	11,760	-35.79	26.71	-87	-36	12
Retail and Recreation	11,760	-32.25	28.20	-90	-28	12
Grocery and Pharmacy	11,755	-12.76	21.45	-84	-7	24
Government stringency	11,760	58.78	28.85	0	67.13	100
Panel B. Country-level variables related with main results						
Variable	N	Mean	Sta. Dev.	1st Percentile	50th Percentile	99th Percentile
Power Distance	80	63.50	20.75	11	67.50	100
Individualism	80	41.09	22.93	10	32.50	91
Masculinity	80	47.60	18.92	5	48.50	100
Uncertainty Avoidance	80	66.51	21.62	8	66.50	100
Long-term Orientation	80	44.10	24.68	0	39.50	100
Indulgence	80	46.67	23.12	0	46	97
GDP per capita	80	31,296	23,678	1334	27,659	121,293
Smartphone penetration	80	0.51	0.21	0.01	0.56	0.89
Mobile cellular subscription	80	118.2	30.1	43.13	119	270

Notes: Social distancing data are from Google Community Mobility Report. We use Government stringency Index from the Oxford COVID-19 Government Response Tracker. We use 2019 GDP per capita (PPP Current International Dollars) and mobile cellular subscription (per 100 people) from the World Bank Development Index. Culture values come from *Hofstede Insights*. Smartphone penetration is predicted by data in [Appendix 2](#).

from Oxford COVID-19 Government Response Tracker (OxCGRT) to proxy government policies. OxCGRT systematically collects available information “on which governments have taken which measures, and when”³. Government stringency index is a composite measure based on nine response indicators including school closures, workplaces closures,

and travel bans, rescaled to a value from 0 to 100. It represents the strictness of government policies rather than an evaluation of the appropriateness or effectiveness of a country’s response (Hale et al., 2020). The higher is the government stringency index, the stricter is the government policies on social distancing. We retrieved government stringency index dataset on July 22th, 2020. It provides data for 177 economies across the whole period from Jan 1st, 2020 to July 15th,

³ Coronavirus Government Response Tracker, Last accessed on 2020.09.11 at URL: <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker#data>.

2020. Panel A in Table 1 shows that the mean government stringency index is 58.78 during 147 days across 80 sample economies.

National culture data come from *Hofstede Insights*⁴. Hofstede's culture model uses indexes ranging from 0 to 100 to represent cultural values for six dimensions, including 'Power Distance', 'Individualism', 'Masculinity', 'Uncertainty Avoidance', 'Long-term Orientation' and 'Indulgence'. The higher is the index, the stronger the value is within the culture. Hofstede's model provides cultural values to 118 economies. Specifically, 95 economies have values for all six dimensions. 18 economies miss 'Long-term Orientation' index, 22 economies miss 'Indulgence' index and 17 economies miss both 'Long-term Orientation' and 'Indulgence' index. 'Power Distance' represents a hierarchical order: it measures the degree to which the less powerful social members accept the unequal distribution of power (Hofstede, 2001). A high index implies citizens can easily accept social hierarchy. A low index implies a more egalitarian society. 'Individualism', representing a loosely knitted social framework, is opposite to 'Collectivism'. It measures the extent to which social members care about themselves versus making sacrifices for the wider community (Hofstede, 1994a). A high index refers to individual values related to the social image of 'I' or 'We'. A low index refers to collectivism. 'Masculinity', as the opposite of 'Femininity', prefers toughness to tenderness. It measures the extent to which society emphasizes values traditionally associated with males, such as assertiveness, achievement, performance, competitiveness, and success (Hofstede, 1994b). A high index represents resoluteness and power. A low index represents femininity. 'Uncertainty Avoidance' presents the degree to which certainty and definiteness are desirable to social members. Uncertainty and ambiguity are novel, surprising, but also dangerous (Hofstede, 1994a). A high index tends to be more risk-averse while a low index tends to display a higher tolerance for risks. 'Long-term Orientation' highlights delayed gratifications (Hofstede, 2011). It is opposite to 'Short-term Orientation'. It measures the degree to which people plan for the future rather than today. A high index indicates caring more about the future. A low index indicates caring more about the present. 'Indulgence', as the opposite of 'Restraint', praises the value of 'living for today' (Hofstede, 2011). It represents to the extent which people abandon themselves to the enjoyment of life and pursue instant gratification. A high index indicates a society which values leisure. A low index highlights restraint in the long run. This study only selects economies with all six culture dimensions to match other datasets. Panel B in Table 1 shows the mean 'Uncertainty Avoidance', 'Power Distance', 'Masculinity', 'Indulgence', 'Long-term Orientation', and 'Individualism' equal 66.51, 63.50, 47.06, 46.67, 44.10, and 41.09 respectively. We use quartiles of national culture dimensions to separate sample economies into four groups. Fig. 2 visualizes how social distancing at all areas varies with different levels of cultural dimensions. Activities at all areas have the tendency back to zero value compared to the early stage of the virus spread. This is partly due to more COVID-19 knowledge mastered publicly which helps overcome fearlessness from ignorance.

We use GDP per capita from the World Bank Development Indicator⁵ as the economic status control. This study adopts GDP per capita by PPP Current international Dollars in 2019. GDP per capita (PPP, current international \$) is Gross Domestic Product converted to international dollars using purchasing power parity rates and divided by the total population (Mankiw, 2014). Panel B in Table 1 shows the mean GDP per capita is 31,296 \$. To avoid excessive variance, we run natural logarithm of GDP per capita in the model.

3. Models and results

To estimate the impact of government stringency and national culture on social distancing, we include the Lagged variable for social distancing besides main variables due to current social distancing possibly depending on behaviors of the last time period. It helps to overcome serious specification bias. Hence, we estimate the below model:

$$Y_{it} = \alpha + \beta_1 \text{National culture}_i + \beta_2 \text{Government stringency}_{it} + \beta_3 \text{Lag } Y_{it} + \beta_4 \text{Controls}_i + \xi_{it}$$

Y_{it} is social distancing in the economy i at for a day t , which is a function of government stringency and national culture. GDP per capita is controlled for economic status. We also control smartphone penetration for the reliability of social distancing data.

Table 2 shows the correlation matrix of Hofstede's culture dimensions. When the absolute value of the correlation coefficient is between 0.40 and 0.69, it means a strong relationship between two variables.⁶ To avoid multicollinearity of the six culture dimensions and outstand the impact of each Hofstede's cultural dimension, we use one culture dimension and government stringency together with other controls as independent variables to predict social distancing. Hence, Table 3 presents the regression results in six panels corresponding to six culture dimensions. Because we want to assess the relative importance of government stringency versus national culture, we report standardized beta coefficients. Gujarati (2009) explains that the standardized beta coefficient shows a standard deviation change in the dependent variable as a response to the standard deviation change in the independent variable. This approach helps judge the relative importance of variables relative to each other independent of the way these variables are measured.

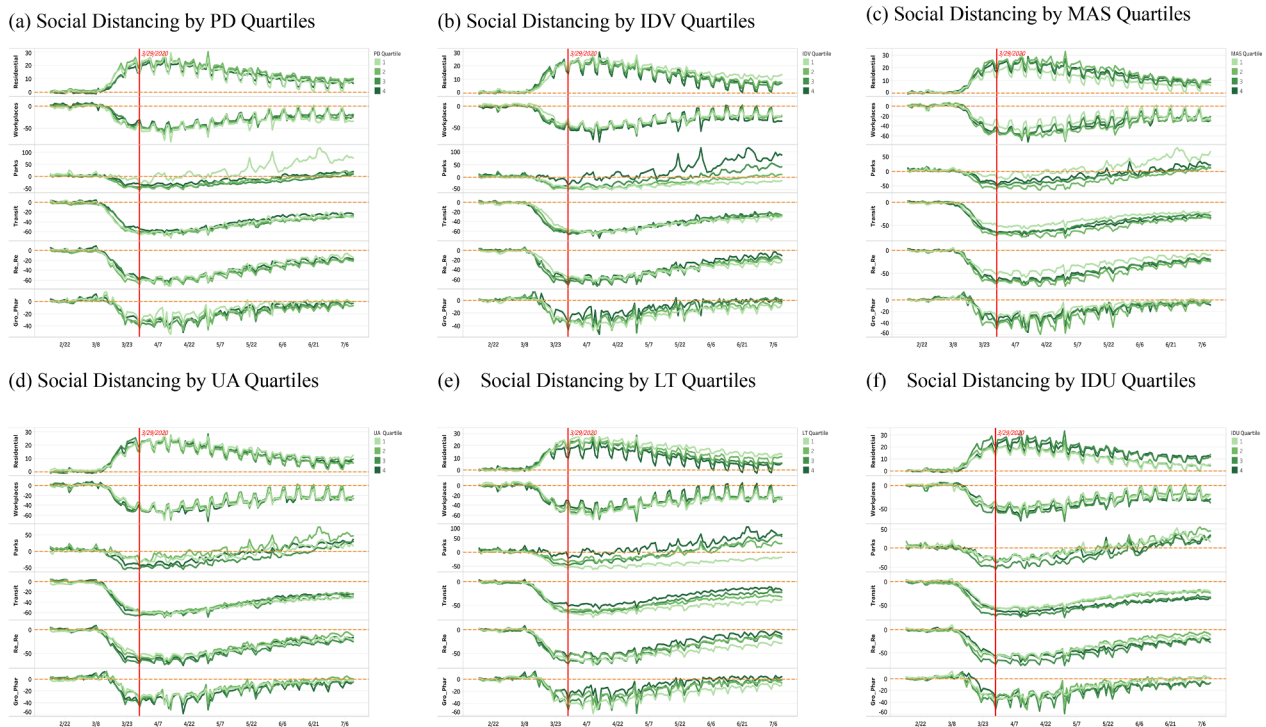
First, government stringency has strong significance with social distancing. For instance, in panel A we use government stringency and 'Power Distance' together with other controls as independent variables to predict social distancing. As a statistically significant and positive coefficient on 'Residential areas' but negative coefficients on the other five areas show, the strictness of government policies increases social distancing. In particular, drops from the largest to the smallest in the percentage of people gathering have been in 'Workplaces', 'Grocery and Pharmacy', 'Retail and Recreation', 'Transit Stations' and 'Parks' as a result of the stringency of government policies: one standard deviation increase in government stringency has decreased the percentage of people gathering in 'Workplaces' by 0.24 standard deviations, followed by 0.22, 0.10, 0.08 and 0.03 standard deviations for 'Grocery and Pharmacy', 'Retail and Recreation', 'Transit Stations' and 'Parks' respectively. On contrary, the percentage of people gathering in 'Residential areas' has increased by 0.14 standard deviations as a response to one standard deviation increase in government stringency. Interestingly, the sign and significance of coefficients on government stringency in the other panels, where we experiment with alternative culture dimensions, prove the robustness of our results.

Second, two cultural dimensions ('Long-term Orientation' and 'Indulgence') have strong significances with social distancing. The beta coefficients of 'Long-term Orientation' are significant and positive for all areas except 'Residential areas' while those of 'Indulgence' are significant and negative for all areas except 'Residential areas'. One standard deviation increases in 'Long-term Orientation' decreases the percentage of people gathering in 'Residential areas' by 0.04 standard deviations. Meanwhile, one standard deviation increases in 'Long-term Orientation' leads to an increase of 0.05 standard deviations for 'Grocery and

⁴ Culture Comparison Tool, Last accessed on 2020.09.11 at URL: <https://www.hofstede-insights.com>.

⁵ GDP per capita, PPP (current international \$), Last accessed on 2020.09.11 at URL: <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>.

⁶ Correlation Coefficient: Simple Definition, Formula, Easy Steps, Last accessed on 2020.10.08 at URL: <https://www.statisticshowto.com/probability-and-statistics/correlation-coefficient-formula/>



Notes: PD, IDV, MAS, UA, LT and IDU represent Power Distance Index, Individualism Index, Masculinity Index, Uncertainty Avoidance Index, Long-term Orientation Index and Indulgence Index respectively; Re_Re, Gro_Pharm represent Retail and Recreation, Grocery and Pharmacy respectively. Social distancing data come from Google Community Mobility Reports. National culture data come from *Hofstede Insights*.

Fig. 2. The Visualization of Social Distancing by National Culture Quartiles across 80 Sample Economies.

Table 2

Correlation matrix of Hofstede’s culture dimensions.

	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-term Orientation
Individualism	-0.692				
Masculinity	0.034	0.142			
Uncertainty Avoidance	0.273	-0.213	0.006		
Long-term Orientation	-0.048	0.235	-0.018	0.200	
Indulgence	-0.287	0.134	0.013	-0.275	-0.488

Notes: Hofstede’s cultural values come from *Hofstede Insights*.

Pharmacy’, followed by 0.03, 0.02, 0.02 and 0.01 standard deviation increases in ‘Transit Stations’, ‘Workplaces,’ ‘Parks’ and ‘Retail and Recreation’ respectively. However, the percentage of people gathering in ‘Residential areas’ has increased by 0.04 standard deviations as a response to one standard deviation increase in ‘Indulgence’. One standard deviation increase in ‘Indulgence’ has decreased 0.04 standard deviations for ‘Grocery and Pharmacy’, followed by 0.02, 0.02, 0.02, and 0.01 standard deviations in ‘Transit Stations’, ‘Workplaces’, ‘Parks’ and ‘Retail and Recreation’ respectively. Hence, ‘Long-term Orientation’ hurts social distancing and ‘Indulgence’ has a positive one. No evidence shows the other four cultural dimensions significantly affect social distancing (‘Power Distance’, ‘Individualism’, ‘Masculinity’, ‘Uncertainty Avoidance’).

Third, when comparing the impacts on social distancing between government stringency and national culture, we find that government stringency significantly affects social distancing in all experiments we have done. However, only two of the six national culture dimensions are significant. Further, government stringency has stronger impacts on social distancing than ‘Long-term Orientation’ and ‘Indulgence’ do. For instance, one standard deviation change in government stringency leads to 0.24 and 0.15 standard deviation changes in ‘Workplaces’ and ‘Residential areas’ individually. This is almost twelve and four times the changes we observe relating to ‘Long-term Orientation’ and

‘Indulgence’.

4. Further robustness checks

As announced, the quality of social distancing data may vary from country to country depending on the density of the smartphone data. In this section, we therefore construct alternative samples of economies based on levels of smartphone penetration, as well as differentiating between OECD and non-OECD economies. We report the results in *Tables 4–9*. Each table includes six panels and shows the impact of government stringency and only one cultural dimension together with controls on social distancing. In Panel A to C, we construct samples of economies that have at least 60%, then at least 50%, and at least 40% smartphone penetration which includes 38, 46, and 55 economies respectively. We omit samples of at least 70% smartphone penetration or above, as only 14 or fewer economies are included in these groups. Too small a sample distorts the real significances.

We introduce and control mobile cellular subscription (per 100 people)⁷ data from the World Bank for all 80 sample economies to

⁷ Mobile Cellular Subscription (per 100 people), Last accessed on 2020.09.11 at URL: <https://data.worldbank.org.cn/indicator/IT.CEL.SETS.P2>

Table 3
Country-level OLS regression results of Government stringency and Hofstede’s national culture on social distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Cultural dimension of Power Distance						
Government stringency	0.14*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Power Distance	-0.01 (0.13)	0.02*** (0.00)	-0.02*** (0.00)	0.01** (0.03)	0.00 (0.83)	-0.00 (0.54)
Log GDP per capita	0.07 (0.19)	-0.23*** (0.00)	-0.06 (0.26)	-0.04 (0.23)	-0.05 (0.18)	-0.24*** (0.00)
Smartphone penetration	-0.07 (0.20)	0.18*** (0.01)	0.08 (0.12)	0.03 (0.32)	0.05 (0.23)	0.27*** (0.00)
Panel B. Cultural dimension of Individualism						
Government stringency	0.14*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Individualism	-0.01*** (0.00)	-0.02*** (0.00)	0.03*** (0.00)	-0.00 (0.69)	0.00 (0.32)	0.03*** (0.00)
Log GDP per capita	0.06 (0.28)	-0.23*** (0.00)	-0.05 (0.33)	-0.04 (0.26)	-0.05 (0.20)	-0.22*** (0.01)
Smartphone penetration	-0.04 (0.41)	0.18*** (0.01)	0.06 (0.20)	0.03 (0.40)	0.04 (0.29)	0.24*** (0.00)
Panel C. Cultural dimension of Masculinity						
Government stringency	0.14*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Masculinity	0.01** (0.04)	0.01** (0.02)	-0.02*** (0.00)	-0.00 (0.48)	-0.01*** (0.00)	-0.01 (0.20)
Log GDP per capita	0.06 (0.23)	-0.22*** (0.00)	-0.06 (0.23)	-0.04 (0.28)	-0.05 (0.20)	-0.24*** (0.00)
Smartphone penetration	-0.06 (0.26)	0.16** (0.02)	0.09* (0.06)	0.03 (0.43)	0.04 (0.26)	0.28*** (0.00)
Panel D. Cultural dimension of Uncertainty Avoidance						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Uncertainty Avoidance	-0.02*** (0.00)	0.00 (0.62)	-0.01* (0.08)	0.01** (0.03)	-0.01* (0.06)	-0.02*** (0.00)
Log GDP per capita	0.10* (0.06)	-0.22*** (0.00)	-0.05 (0.30)	-0.05 (0.16)	-0.04 (0.28)	-0.20** (0.01)
Smartphone penetration	-0.10* (0.07)	0.16** (0.02)	0.08 (0.10)	0.04 (0.27)	0.04 (0.36)	0.24*** (0.00)
Panel E. Cultural dimension of Long-term Orientation						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Long-term Orientation	-0.04*** (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.03*** (0.00)	0.01*** (0.00)	0.05*** (0.00)
Log GDP per capita	0.09* (0.09)	-0.23*** (0.00)	-0.08 (0.11)	-0.05 (0.10)	-0.06 (0.13)	-0.27*** (0.00)
Smartphone penetration	-0.07 (0.18)	0.16** (0.02)	0.10** (0.04)	0.03 (0.34)	0.05 (0.22)	0.29*** (0.00)
Panel F. Cultural dimension of Indulgence						
Government stringency	0.16*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.23*** (0.00)
Indulgence	0.04*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.04*** (0.00)
Log GDP per capita	0.19*** (0.00)	-0.28*** (0.00)	-0.11** (0.03)	-0.09*** (0.01)	-0.08** (0.04)	-0.36*** (0.00)
Smartphone penetration	-0.19*** (0.00)	0.22*** (0.00)	0.14*** (0.01)	0.08** (0.01)	0.08* (0.05)	0.40*** (0.00)
<i>Number of observations</i>	11,637	11,680	11,680	11,680	11,680	11,670
<i>Number of economies</i>	80	80	80	80	80	80

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

substitute smartphone penetration in Panel D. Since two economies have missing values in 2018, we use the 2017 value for Libya and Peru. Table 1, Panel B shows the mean mobile cellular subscription is 118.2, i. e. for every 100 people there are 118.2 mobile cellular subscriptions across 80 sample economies. Mobile cellular subscription data covers the subscription for all mobile phones (per 100 people) rather than just smartphones, so it is not a perfect measure. In Panel E and F, we separate the 80 sample economies into OECD economies and non-OECD economies. The OECD has a total of 37 economies and two of them are excluded for missing culture of mobility values (Israel and Iceland). Accordingly, 35 OECD economies and 45 non-OECD economies form our two samples in this study. All the robustness checks have confirmed the above results except Panel A in Tables 8 and 9. The results for a sample

of 38 economies with at least 60 percent smartphone penetration only shows that only government stringency significantly affects social distancing, while no evidence shows ‘Long-term Orientation’ and ‘Indulgence’ affect social distancing. This demonstrates that government stringency has a stronger impact on social distancing than national culture does for the alternative sample.

5. Discussion

As everyone is vulnerable to infection during the current COVID-19 pandemic, social distancing is an effective strategy to mitigate the spread of the virus. However, variance exists in levels of social distancing compliance across economies. Different variables have been

Table 4
Country-level OLS regression results of Government stringency and Power Distance on social distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.31*** (0.00)
Power Distance	0.04*** (0.00)	0.03*** (0.00)	-0.04*** (0.00)	-0.00 (0.80)	-0.01 (0.29)	-0.05*** (0.00)
Log GDP per capita	0.07*** (0.00)	-0.04*** (0.00)	-0.01* (0.09)	-0.01* (0.07)	-0.01** (0.02)	0.01 (0.43)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.17*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.10*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Power Distance	0.02** (0.02)	0.02*** (0.00)	-0.02*** (0.00)	0.01* (0.07)	0.00 (0.93)	-0.03*** (0.00)
Log GDP per capita	0.04*** (0.00)	-0.04*** (0.00)	0.01 (0.16)	-0.01* (0.09)	-0.00 (0.63)	0.02* (0.05)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.09*** (0.00)	-0.25*** (0.00)
Power Distance	0.01* (0.07)	0.01* (0.08)	-0.02*** (0.00)	0.01* (0.07)	-0.00 (0.83)	-0.02** (0.02)
Log GDP per capita	0.03*** (0.00)	-0.05*** (0.00)	0.01*** (0.01)	-0.00 (0.44)	-0.00 (0.49)	0.00 (0.69)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Power Distance	-0.01 (0.11)	0.02*** (0.00)	-0.02*** (0.00)	0.01* (0.06)	0.00 (0.87)	-0.00 (0.50)
Log GDP per capita	-0.01 (0.28)	-0.06*** (0.00)	0.03*** (0.00)	-0.01*** (0.00)	-0.01 (0.17)	0.04*** (0.00)
Log Mobile cellular	0.01*** (0.01)	0.01** (0.03)	-0.01*** (0.00)	0.00 (0.10)	-0.00 (0.47)	-0.02*** (0.00)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.21*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Power Distance	0.01 (0.35)	0.00 (0.63)	-0.02** (0.03)	0.00 (0.46)	-0.01** (0.04)	-0.04*** (0.00)
Log GDP per capita	0.00 (0.62)	-0.04*** (0.00)	0.02** (0.03)	-0.00 (0.90)	-0.00 (0.56)	0.03** (0.04)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.10*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.07*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Power Distance	-0.02*** (0.00)	0.00 (0.43)	0.02*** (0.00)	0.01*** (0.00)	0.01** (0.03)	0.01* (0.07)
Log GDP per capita	0.01 (0.78)	-0.21*** (0.00)	0.03 (0.45)	-0.01 (0.62)	-0.04 (0.28)	-0.11* (0.07)
Smartphone penetration	-0.00 (0.91)	0.17*** (0.00)	-0.03 (0.49)	0.01 (0.85)	0.03 (0.36)	0.13** (0.04)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Robustness checks

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

used to explain this variance, including public willingness (Chudik et al., 2020; Ferguson et al., 2020; Maloney and Taskin, 2020), the application of information technology (Dore et al., 2020; Long, 2020), leadership (Van Bavel et al., 2020), political partisanship (Adolph et al., 2020; Allcott et al., 2020; Grossman et al., 2020), fiscal capacity (Bonaccorsi et al., 2020), corruption (Dincer and Gillanders, 2020), social inequality (Chiou and Tucker, 2020) and attitudes to science (Akesson et al., 2020; Brzezinski et al., 2020). National culture is also a closely watched

variable associated with social distancing (Frey et al., 2020; Huynh, 2020; Im and Chen, 2020). Moreover, Maloney and Taskin (2020) and Morita et al. (2020) emphasized the efficiency of government policies on social distancing.

Our first result confirms the findings of Morita et al. (2020) that policy implementation influences behaviors during the COVID-19 pandemic. This reflects anecdotal evidence from economies that were exposed early to the virus. The Chinese government implemented strict

Table 5
Country-level OLS regression results of Government stringency and Individualism on social distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.31*** (0.00)
Individualism	-0.03*** (0.00)	-0.04*** (0.00)	0.03*** (0.00)	-0.01 (0.13)	0.00 (0.94)	0.04*** (0.00)
Log GDP per capita	0.06*** (0.00)	-0.05*** (0.00)	-0.00 (0.66)	-0.01* (0.09)	-0.01** (0.04)	0.02** (0.05)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.18*** (0.00)	-0.30*** (0.00)	-0.03*** (0.00)	-0.10*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Individualism	-0.03*** (0.00)	-0.03*** (0.00)	0.03*** (0.00)	-0.00 (0.21)	0.00 (0.53)	0.03*** (0.00)
Log GDP per capita	0.05*** (0.00)	-0.04*** (0.00)	0.01 (0.21)	-0.01** (0.04)	-0.00 (0.42)	0.02* (0.05)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.09*** (0.00)	-0.25*** (0.00)
Individualism	-0.03*** (0.00)	-0.01* (0.08)	0.03*** (0.00)	-0.00 (0.43)	0.01 (0.20)	0.04*** (0.00)
Log GDP per capita	0.05*** (0.00)	-0.05*** (0.00)	0.01* (0.06)	-0.00 (0.19)	-0.01 (0.20)	-0.01 (0.52)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Individualism	-0.01*** (0.01)	-0.01** (0.02)	0.03*** (0.00)	0.00 (0.89)	0.00 (0.32)	0.03*** (0.00)
Log GDP per capita	0.01 (0.17)	-0.06*** (0.00)	0.02*** (0.00)	-0.01*** (0.00)	-0.01* (0.06)	0.03*** (0.00)
Log Mobile cellular	0.01* (0.05)	0.01* (0.08)	-0.01* (0.08)	0.00* (0.08)	-0.00 (0.65)	-0.01* (0.05)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Individualism	-0.02*** (0.01)	-0.00 (0.76)	0.01* (0.08)	-0.01 (0.29)	0.02*** (0.00)	0.06*** (0.00)
Log GDP per capita	0.01 (0.11)	-0.04*** (0.00)	0.02** (0.01)	0.00 (0.96)	-0.01 (0.26)	0.02 (0.20)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.10*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.06*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Individualism	-0.01* (0.07)	-0.00 (0.79)	0.00 (0.97)	-0.00 (0.88)	-0.00 (0.22)	0.01** (0.03)
Log GDP per capita	0.05 (0.27)	-0.21*** (0.00)	0.00 (0.92)	-0.03 (0.37)	-0.04 (0.23)	-0.14** (0.02)
Smartphone penetration	-0.04 (0.36)	0.18*** (0.00)	-0.00 (0.99)	0.02 (0.52)	0.04 (0.28)	0.16*** (0.01)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

lockdown and other social distancing policies at the huge economic costs of the economy during the early days of the COVID-19 pandemic. Nowadays, the containment of COVID-19 has drastically reduced the infection rate, and health authorities are mostly targeting imported cases. Chinese people have gotten their ‘normal’ back, including no

longer having to wear masks in daily life, and the reopening of businesses, schools as well as recreations even in Wuhan.⁸ South Korea has a different institutional system from China, though it is also outstanding in its efforts to control the COVID-19 spread controls. This depended on not only a large-scale test-and-tracing approach but also on high

⁸ In China, Where the Pandemic Began, Life Is Starting to Look ... Normal, Last accessed on 2020.09.11 at url:<https://www.nytimes.com/2020/08/23/world/asia/china-coronavirus-normal-life.html>

Table 6
Country-level OLS regression results of Government stringency and Masculinity on social distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.31*** (0.00)
Masculinity	0.02*** (0.01)	0.02** (0.02)	-0.04*** (0.00)	-0.00 (0.37)	-0.02*** (0.00)	-0.02** (0.04)
Log GDP per capita	0.06*** (0.00)	-0.05*** (0.00)	-0.00 (0.47)	-0.01* (0.05)	-0.01** (0.02)	0.02** (0.03)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.17*** (0.00)	-0.30*** (0.00)	-0.03*** (0.00)	-0.10*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Masculinity	0.01* (0.07)	0.02*** (0.00)	-0.03*** (0.00)	-0.00 (0.26)	-0.01*** (0.00)	-0.01 (0.17)
Log GDP per capita	0.03*** (0.00)	-0.06*** (0.00)	0.02*** (0.00)	-0.01*** (0.01)	-0.00 (0.65)	0.03*** (0.00)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.09*** (0.00)	-0.24*** (0.00)
Masculinity	0.01** (0.03)	0.02** (0.01)	-0.03*** (0.00)	-0.00 (0.12)	-0.01*** (0.01)	-0.02** (0.04)
Log GDP per capita	0.03*** (0.00)	-0.06*** (0.00)	0.03*** (0.00)	-0.01** (0.03)	-0.00 (0.47)	0.02** (0.04)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.14*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Masculinity	0.01** (0.04)	0.01** (0.02)	-0.02*** (0.00)	-0.00 (0.47)	-0.01*** (0.00)	-0.01 (0.18)
Log GDP per capita	-0.00 (0.62)	-0.07*** (0.00)	0.04*** (0.00)	-0.01*** (0.00)	-0.00 (0.16)	0.05*** (0.00)
Log Mobile cellular	0.01*** (0.01)	0.01** (0.02)	-0.01*** (0.00)	0.00* (0.08)	-0.00 (0.46)	-0.02*** (0.00)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.21*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Masculinity	0.01* (0.06)	0.02** (0.04)	-0.04*** (0.00)	-0.00 (0.26)	-0.02*** (0.00)	-0.02 (0.10)
Log GDP per capita	0.00 (0.96)	-0.04*** (0.00)	0.03*** (0.00)	-0.00 (0.41)	0.00 (0.55)	0.05*** (0.00)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.10*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.06*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Masculinity	0.01 (0.14)	0.01 (0.26)	-0.01** (0.02)	0.00 (0.92)	-0.00 (0.44)	0.00 (0.88)
Log GDP per capita	0.03 (0.44)	-0.22*** (0.00)	0.01 (0.84)	-0.03 (0.35)	-0.05 (0.17)	-0.13** (0.04)
Smartphone penetration	-0.03 (0.52)	0.18*** (0.00)	-0.00 (0.94)	0.02 (0.51)	0.04 (0.22)	0.14** (0.02)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

government stringency. ‘For high-risk groups the policy is stricter, taking the form of mandatory isolation’.⁹ The South Korean government

raised the country’s crisis alert level to the highest (Level 4) on February 23, 2020,¹⁰ and active cases have ever been in single digits since May. However, clusters of infection in religious cults, community gatherings, door-to-door sales began to recur when the government loosened its policies in May. The spread rebounded particularly strongly in late

⁹ Inkyo Cheong. The experience of South Korea with COVID-19. *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes*, Last accessed on 2020.09.11 at URL: <https://voxeu.org/content/mitigating-covid-economic-crisis-act-fast-and-do-whatever-it-takes>.

¹⁰ COVID-19 Response, Last accessed on 2020.09.11 at URL: <http://ncov.moh.w.go.kr/en/baroView.do?brdId=11&brdGubun=111>

Table 7
Country-level OLS regression results of Government stringency and Uncertainty Avoidance on social distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.32*** (0.00)
Uncertainty Avoidance	-0.00 (0.67)	-0.01 (0.25)	-0.02** (0.03)	-0.00 (0.75)	-0.02*** (0.00)	-0.06*** (0.00)
Log GDP per capita	0.06*** (0.00)	-0.06*** (0.00)	-0.01 (0.30)	-0.01* (0.07)	-0.02*** (0.00)	-0.00 (0.85)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.18*** (0.00)	-0.30*** (0.00)	-0.03*** (0.00)	-0.10*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Uncertainty Avoidance	-0.02*** (0.00)	0.00 (0.60)	-0.01 (0.26)	0.01 (0.17)	-0.01* (0.09)	-0.03** (0.01)
Log GDP per capita	0.02*** (0.00)	-0.05*** (0.00)	0.01** (0.02)	-0.01 (0.10)	-0.01 (0.15)	0.02* (0.09)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.25*** (0.00)
Uncertainty Avoidance	-0.02*** (0.00)	0.00 (0.84)	-0.00 (0.41)	0.01** (0.03)	-0.01** (0.03)	-0.03*** (0.00)
Log GDP per capita	0.02*** (0.00)	-0.06*** (0.00)	0.02*** (0.00)	-0.00 (0.34)	-0.01 (0.12)	0.00 (0.57)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.08*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Uncertainty Avoidance	-0.02*** (0.00)	0.00 (0.91)	-0.01* (0.05)	0.00* (0.05)	-0.01** (0.04)	-0.02*** (0.00)
Log GDP per capita	-0.00 (0.64)	-0.07*** (0.00)	0.04*** (0.00)	-0.01*** (0.00)	-0.01* (0.09)	0.05*** (0.00)
Log Mobile cellular	0.01*** (0.01)	0.01** (0.02)	-0.01*** (0.00)	0.00* (0.08)	-0.00 (0.51)	-0.02*** (0.00)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.21*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Uncertainty Avoidance	0.01 (0.23)	0.01 (0.20)	-0.03*** (0.00)	0.00 (0.60)	-0.01** (0.02)	-0.04*** (0.00)
Log GDP per capita	0.00 (0.61)	-0.04*** (0.00)	0.01** (0.05)	-0.00 (0.70)	-0.00 (0.67)	0.03*** (0.00)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.11*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.07*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Uncertainty Avoidance	-0.02*** (0.00)	-0.00 (0.66)	0.01** (0.01)	0.01** (0.02)	-0.00 (0.88)	-0.01 (0.23)
Log GDP per capita	0.07* (0.09)	-0.21*** (0.00)	-0.01 (0.80)	-0.04 (0.21)	-0.05 (0.17)	-0.11* (0.06)
Smartphone penetration	-0.06 (0.13)	0.18*** (0.00)	0.01 (0.75)	0.03 (0.33)	0.04 (0.22)	0.13** (0.03)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Notes: We report standardized beta coefficients and p -values in parentheses (* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$). Due to limited space, we only report results on the main variables.

August. South Korea's government had to once again raise the country's crisis alert level to 2.5 and require people to comply with social distancing guidelines.¹¹ This appears to have helped to control the infection once again in a short period.

The extant research shows economies in less 'Individualism' culture

¹¹ S. Korea To Implement 'Level 2.5' Virus Measures for Capital Region, Last accessed on 2020.09.11 at URL: http://tbs.seoul.kr/eFm/newsView.do?typ_800=N&idx_800=3402567&seq_800=.

(Frey et al., 2020) or high 'Uncertainty Avoidance' (Huynh, 2020) show less effective social distancing. Our findings show no significance for either 'Individualism' or 'Uncertainty Avoidance'. Dheer et al. (2020) found economies leaning toward 'Restraint' display more effective efforts to mitigate the spread of COVID-19. It may be difficult for people in economies which value indulgence more to enforce social distancing guidelines. On the surface, this is contrary to our second result; however, they are not in contradiction. Rather, the results are likely explained by the basic principle of economics that 'People face tradeoffs' (Mankiw,

Table 8
Country-level OLS Regression Results of Government stringency and Long-term Orientation on Social Distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.29*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.31*** (0.00)
Long-term Orientation	-0.01** (0.04)	0.02** (0.03)	0.01 (0.11)	0.02** (0.00)	-0.00 (0.55)	0.05*** (0.00)
Log GDP per capita	0.06*** (0.00)	-0.05*** (0.00)	-0.00 (1.00)	-0.01** (0.05)	-0.01** (0.04)	0.03** (0.02)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.18*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.11*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Long-term Orientation	-0.04*** (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.03*** (0.00)	0.01*** (0.01)	0.06*** (0.00)
Log GDP per capita	0.04*** (0.00)	-0.06*** (0.00)	0.02*** (0.00)	-0.01*** (0.00)	-0.00 (0.37)	0.03*** (0.00)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.02*** (0.00)	-0.10*** (0.00)	-0.09*** (0.00)	-0.24*** (0.00)
Long-term Orientation	-0.04*** (0.00)	0.02** (0.01)	0.02*** (0.00)	0.03*** (0.00)	0.01** (0.03)	0.05*** (0.00)
Log GDP per capita	0.04*** (0.00)	-0.06*** (0.00)	0.02*** (0.00)	-0.01*** (0.00)	-0.00 (0.22)	0.00 (0.63)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.15*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.22*** (0.00)
Long-term Orientation	-0.04*** (0.00)	0.02*** (0.00)	0.03*** (0.00)	0.03*** (0.00)	0.01*** (0.00)	0.05*** (0.00)
Log GDP per capita	0.01*** (0.01)	-0.08*** (0.00)	0.03*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	0.03*** (0.00)
Log Mobile cellular	0.02*** (0.00)	0.01* (0.07)	-0.02*** (0.00)	0.00 (0.86)	-0.00 (0.16)	-0.03*** (0.00)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.13*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Long-term Orientation	-0.04*** (0.00)	0.03*** (0.00)	0.02** (0.01)	0.02*** (0.00)	0.01* (0.10)	0.05*** (0.00)
Log GDP per capita	0.01 (0.29)	-0.05*** (0.00)	0.03*** (0.00)	-0.01* (0.06)	0.00 (0.59)	0.04*** (0.00)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.10*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.07*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Long-term Orientation	-0.03*** (0.00)	0.01* (0.08)	0.03*** (0.00)	0.03*** (0.00)	0.01*** (0.00)	0.03*** (0.00)
Log GDP per capita	0.06 (0.19)	-0.22*** (0.00)	-0.01 (0.78)	-0.05 (0.11)	-0.06* (0.10)	-0.15** (0.02)
Smartphone penetration	-0.04 (0.37)	0.18*** (0.00)	0.00 (0.94)	0.03 (0.35)	0.05 (0.17)	0.15** (0.01)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

2020). Staying safe during COVID-19 is at the cost of following social distancing (Broniec et al.,2020; Ferguson et al., 2020; Greenstone and Nigam, 2020). The opportunity costs of something vary among people. The opportunity cost of the same one-hour practicing social distancing for the Indulgent and the Short-term Oriented is different from the Restrained and the Long-term Oriented. Morita et al. (2020) find that developed economies are more burdened with the losses of convenience and economic opportunities owing to the behavior changes than other countries. Likewise, people in ‘Short-term Orientation’ and ‘Indulgence’

culture are less likely to give up social distancing when facing a larger opportunity cost. South Korea is recognized as a successful example of controlling COVID-19 spread. However, as an economy with a ‘Long-term Orientation’ value of 100 and an ‘Indulgence’ value of 29, South Korea also experienced continuous rebounding outbreaks of the virus due to religious and social gatherings.

Table 9
Country-level OLS Regression Results of Government stringency and Indulgence on Social Distancing.

	Residential areas	Workplaces	Parks	Transit Stations	Retail and Recreation	Grocery and Pharmacy
Panel A. Economies with at least 60% Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.30*** (0.00)	-0.02*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.31*** (0.00)
Indulgence	0.01 (0.49)	-0.02*** (0.01)	0.00 (1.00)	-0.03*** (0.00)	-0.00 (0.91)	-0.04*** (0.00)
Log GDP per capita	0.06*** (0.00)	-0.04*** (0.00)	-0.00 (0.99)	0.00 (0.81)	-0.01* (0.06)	0.04*** (0.00)
Number of observations	4814	4818	4818	4818	4818	4808
Number of economies	38	38	38	38	38	38
Panel B. Economies with at least 50% Smartphone penetration						
Government stringency	0.18*** (0.00)	-0.30*** (0.00)	-0.03*** (0.00)	-0.11*** (0.00)	-0.11*** (0.00)	-0.29*** (0.00)
Indulgence	0.04*** (0.00)	-0.03*** (0.00)	-0.01*** (0.01)	-0.03*** (0.00)	-0.01*** (0.00)	-0.05*** (0.00)
Log GDP per capita	0.02*** (0.00)	-0.05*** (0.00)	0.02*** (0.00)	-0.00 (0.55)	0.00 (0.65)	0.05*** (0.00)
Number of observations	6712	6716	6716	6716	6716	6706
Number of economies	46	46	46	46	46	46
Panel C. Economies with at least 40% Smartphone penetration						
Government stringency	0.16*** (0.00)	-0.27*** (0.00)	-0.03*** (0.00)	-0.10*** (0.00)	-0.10*** (0.00)	-0.25*** (0.00)
Indulgence	0.04*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.05*** (0.00)
Log GDP per capita	0.02*** (0.00)	-0.05*** (0.00)	0.03*** (0.00)	-0.00 (0.27)	-0.00 (0.94)	0.02*** (0.00)
Number of observations	8026	8030	8030	8030	8030	8020
Number of economies	55	55	55	55	55	55
Panel D. All Economies with mobile cellular subscription						
Government stringency	0.16*** (0.00)	-0.24*** (0.00)	-0.03*** (0.00)	-0.09*** (0.00)	-0.10*** (0.00)	-0.23*** (0.00)
Indulgence	0.04*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.04*** (0.00)
Log GDP per capita	-0.01** (0.02)	-0.07*** (0.00)	0.04*** (0.00)	-0.01*** (0.00)	-0.00 (0.31)	0.05*** (0.00)
Log Mobile cellular	0.02*** (0.00)	0.01* (0.07)	-0.02*** (0.00)	0.00 (0.52)	-0.00 (0.19)	-0.03*** (0.00)
Number of observations	11,637	11,680	11,680	11,680	11,680	11,670
Number of economies	80	80	80	80	80	80
Panel E. OECD economies with all levels of Smartphone penetration						
Government stringency	0.22*** (0.00)	-0.31*** (0.00)	-0.02*** (0.00)	-0.13*** (0.00)	-0.12*** (0.00)	-0.28*** (0.00)
Indulgence	0.05*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.03*** (0.00)	-0.01*** (0.00)	-0.05*** (0.00)
Log GDP per capita	-0.00 (0.48)	-0.04*** (0.00)	0.03*** (0.00)	-0.00 (0.78)	0.01 (0.27)	0.06*** (0.00)
Smartphone penetration	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)	0.00 (.)
Number of observations	5106	5110	5110	5110	5110	5100
Number of economies	35	35	35	35	35	35
Panel F. Non-OECD economies with all levels of Smartphone penetration						
Government stringency	0.11*** (0.00)	-0.19*** (0.00)	-0.03*** (0.00)	-0.07*** (0.00)	-0.08*** (0.00)	-0.15*** (0.00)
Indulgence	0.04*** (0.00)	-0.02*** (0.01)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.03*** (0.00)
Log GDP per capita	0.11*** (0.01)	-0.25*** (0.00)	-0.04 (0.28)	-0.06** (0.03)	-0.07** (0.05)	-0.19*** (0.00)
Smartphone penetration	-0.10** (0.01)	0.21*** (0.00)	0.04 (0.26)	0.05* (0.07)	0.06* (0.07)	0.21*** (0.00)
Number of observations	6531	6570	6570	6570	6570	6570
Number of economies	45	45	45	45	45	45

Notes: We report standardized beta coefficients and *p*-values in parentheses (* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01). Due to limited space, we only report results on the main variables.

6. Conclusion and limitation

We combine government policies and national culture to explain variations in social distancing across economies and time. We do so because existing studies suffer from the misspecification bias: studies that scrutinize the impact of government policies tend to overlook national culture variables, while research that investigates the impact of national culture does not include government policy-related variables like government stringency index. Combining these two factors in the

same model allows for comparison of the relative impact of these two important factors. Our results show that government stringency and only two cultural dimensions ('Long-term Orientation' and 'Indulgence') significantly affect social distancing. We infer national culture does not have that many impacts on social distancing during COVID-19 since it is novel. Moreover, government stringency has more impacts on social distancing than national culture. People may drop their guard due to exhaustion with social distancing rules after a long time living under the COVID-19 pandemic. Normal life, such as eating out, going on holiday,

getting back to school, watching a film at the cinema, are desirable to the public. Unfortunately, the spread of COVID-19 far exceeds public expectation and imaginations. In such an urgent time, our findings verify it is the government that plays a key role in determining the success of social distancing. People in economies with strict government policies are more likely to practice effective social distancing. We, therefore, have a strong message for policymakers: act decisively, rather than blaming the culture.

However, as a proxy of social distancing, the Google mobility index is not perfect due to its data collection method. We have addressed this problem by accounting for smartphone penetration and using mobile cellular subscriptions as substitutes to check the robustness of our model. However, due to gaps in the availability of data for smartphone penetration, this limitation can only partially be overcome. Our study covers the first wave of the COVID-19 pandemic. Conditions will, of course, change over time. Therefore, more research is required comparing the determinants of social distancing over the different waves of COVID-19 in further research. Additionally, more attention needs to be drawn to the representativeness of variables.

Declaration of Competing Interest

The author declares no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssci.2020.105138>.

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