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5 October 2022

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Received 11 January 2022
Revised 22 April 2022
15 August 2022
Accepted 22 September 2022

Abstract

Purpose – The authors analyze the effects of political freedom and personal freedom on the spread of COVID-19 in a cross-country study. The authors also investigate how income inequality, urbanization and previous experience with a similar respiratory epidemic/pandemic, such as SARS and MERS, affect the spread of COVID-19.
Design/methodology/approach – The authors employ data from 102 countries to examine the relationship of countries' economic and sociopolitical factors, such as political freedom and personal freedom and their COVID-19 infection cases per million population at 120 days, 150 days and 180 days after the reported 10th infection case. The authors also include the log term of real GDP per capita to control for counties' economic development and regional dummies to control for regional-specific effects.
Findings – Results of this study show that personal freedom, rather than democracy, has a significant positive effect on countries' COVID-19 infection cases. On the contrary, democracy has a negative impact on the infection rate. The authors also find that socioeconomic factors such as higher income inequality and urbanization rate adversely affect the COVID-19 infection cases. A larger older population is associated with fewer infection cases, holding everything else equal. Previous experiences with the coronavirus crisis affect countries only at the 120 days mark. Real GDP per capita has no significant effect.
Originality/value – The main contribution of this paper is to jointly explore personal freedom, which implies a social framework with more emphasis on self-value and self-realization and political freedom, that is, democracy. The authors show that it is personal freedom, rather than democracy, that contributes to higher COVID-19 infection cases. Democracy, on the other hand, reduces the number of infection cases.
Peer review – The peer review history for this article is available at: https://publons.com/publon/10.1108/IJSE-12-2021-0769

Keywords COVID-19, Pandemic, Personal freedom, Democracy, Regional effects
Paper type Research paper

1. Introduction

When COVID-19 was declared a pandemic by the World Health Organization in early 2020, countries adopted different approaches in controlling the spread of COVID-19 with various levels of success. Due to the long incubation period of the virus, it is crucial that individuals curb unnecessary travel, wear a mask, quarantine if infected and limit close interactions with others by social distancing (Viswanath and Monga, 2020).

Current literature shows how countries' socioeconomic factors contribute to their responses to COVID-19. For instance, imposing containment measures can be politically

JEL Classification — I14, H12, F50

International Journal of Social Economics
© Emerald Publishing Limited
0306-8293
DOI 10.1108/IJSE-12-2021-0769

unpalatable for certain policymakers. While movement restrictions are one of the effective means of mitigating the spread of COVID-19 (Alfano and Ercolano, 2020), it does run against the personal freedom that many countries espouse. Higher personal freedom is found to have a strong relationship with higher infection cases (DeFranza *et al.*, 2021; Frey *et al.*, 2020). For political freedom, more democratic systems are considered strong contributing factors to higher COVID-19 infection cases (Karabulut *et al.*, 2021; Shaw *et al.*, 2020). Other findings show that higher infection cases are affected by higher urbanization rate (Acuto, 2020; Ang *et al.*, 2021; Carozzi *et al.*, 2020; Liu *et al.*, 2021), lack of previous experience with a similar health crisis (Frey *et al.*, 2020) and higher income inequality (Papageorge *et al.*, 2021).

This paper examines how personal freedom, democracy, income inequality, urbanization and previous experience with a similar respiratory epidemic/pandemic, such as SARS/MERS, affect the spread of COVID-19 in a cross-country study. We employ data from 102 countries to examine the relationship between countries' economic and sociopolitical factors and their COVID-19 infection cases per million population at 120 days, 150 days and 180 days after the reported 10th infection case. The main contribution of this paper is disentangling the impacts of personal freedom, which implies a social framework with more emphasis on self-value and self-realization and political freedom, that is, democracy, on countries' COVID-19 infection cases in the early stage of the pandemic. Our paper also contributes to the literature on the sociopolitical determinants of COVID-19.

Our study results show that personal freedom, rather than democracy, contributes to higher infection cases. Democracy, on the other hand, reduces the number of infection cases. Results of this study also show that income inequality and urbanization rate have strong positive effects on the countries' infection rates. An older population is associated with lower infection cases per million population. Previous experiences with SARS/MERS outbreaks only have a small positive impact on infection cases in the early stage. Real GDP per capita has an insignificant effect on infection cases.

The rest of this paper proceeds as follows. The next section reviews related literature on the effect of personal freedom, democracy, income inequality, urbanization rate and previous experience with SARS/MERS on countries' approaches in controlling and containing COVID-19. Sections 3 and 4 describe the data and methodology, respectively. Section 5 presents the results. Section 6 discusses the policy implications. Section 7 concludes.

2. Literature review

2.1 Personal freedom

Personal freedom plays a central role in our analysis because the political will of leaders to take preventative measures is based on the desires of a country's population. The more people value their personal freedom, the less likely they are to call for or abide by social distancing and mask-wearing mandates issued by their governments (Chang *et al.*, 2021; Kemmelmeier and Jami, 2021). With fewer mandates being issued or obeyed by a population that values personal freedom over contributing to the common goal of limiting the spread of COVID-19, we expect there to be a positive relationship between personal freedom and infection cases.

DeFranza *et al.* (2021) study preventative measures taken in 53 large metropolitan areas of the United States and observe a significant negative relationship between religious individuals and shelter-in-place directives intended to limit the spread of COVID-19. This relationship remains true even when controlling for other factors such as political affiliation. They do not find any significant differences in mobility between religious and non-religious groups until the government issues a shelter-in-place mandate, indicating that non-compliance of shelter-in-place orders by religious individuals is precisely a reaction to what they perceive as efforts to curtail the personal freedom to practice their religion.

Another important consideration is that impingement of personal freedom is not limited to shelter-in-place mandates or mask requirements. Other effective means of combating the spread of COVID-19 are stringent testing, contact tracing policies and vaccination uptake. For example, Frey *et al.* (2020) find that countries with liberal values and a strong sense of a right to privacy are hesitant to implement contact tracing measures. With more contact tracing, they find that countries do not end up needing to implement travel restrictions in many cases.

2.2 Democracy

Democracy depicts the political freedom a country has. It may or may not have a direct impact on a country's COVID-19 infection rate. Shaw *et al.* (2020) probe the relationship between governance, technology and participation or solidarity among the public and how those features impact the spread of the coronavirus. They focus on the early stages of the pandemic when quarantine measures are one of the few options available to stop the spread. By running a time-series analysis of governance decisions of China, Japan and South Korea against the spread of the virus in these countries, they determine that the Chinese government is able to avoid panic behavior by suppressing the spread of fake news and mandating its citizens to cooperate with testing and contact tracing with advanced tracking technology. In fact, China implemented one of the first travel-restriction measures in response to COVID-19 in January 2020 and was among the early countries that contained the spread of COVID-19. On the other hand, South Korea contained the spread of COVID-19 while maintaining its democracy. The government made information transparent and solicited a strong voluntary response from its citizenry to prevent the spread of the virus. The local government in South Korea was also willing to force the temporary closure of churches associated with a spike in COVID-19 cases. Tisdell (2020) finds that the impact of democracy on the spread of COVID-19 is indicated by alternating demands in democratic nations to loosen restrictions as death rates decrease, only to see a new wave of infections result from the loosened restrictions.

2.3 Income inequality

As measured by the Gini coefficient, income inequality is an important economic factor to consider, given the relationship between poverty and health outcomes (Benfer *et al.*, 2020; Patel *et al.*, 2020; Wagstaff, 2000). Besides having limited access to healthcare facilities and quality preventative healthcare, low-income individuals face more substantial economic impacts due to little job flexibility. They also lack the financial means to endure the pandemic, making them more likely to continue working regardless of potential health hazards. Using data of 6,000 individuals from 6 countries, including 1,000 individuals from four major states of the United States, Papageorge *et al.* (2021) find that income is strongly associated with self-preventative actions. Brown and Ravallion (2020) also argue that poorer individuals are much less able to practice social distancing or telework.

At the aggregate level, work conditions in countries with considerable income inequality may not compare to those with more evenly distributed income. Moreover, the preventative measures needed in halting the spread of COVID-19, such as stay-at-home orders, can have unequal economic impacts on individuals of different occupations and income groups. For instance, Huang *et al.* (2020) show stay-at-home orders severely impact in-person retail and travel-related industries. In addition, countries with larger income disparities are less likely to have enough of a social safety net for individuals in need. Therefore, we expect a larger income inequality is associated with higher COVID-19 infection rates, as shown by Elgar *et al.* (2020), Oronce *et al.* (2020) and Tan *et al.* (2021).

2.4 Urbanization rate

Urbanization, the interconnectedness of urban centers, facilitates contagion traveling from one high-density area directly to another. Acuto (2020) demonstrates how the high-density nature of cities increases the likelihood of coronaviruses spreading once a city or country has its first case. Additionally, many countries have large, informal settlements that pose a challenge to providing adequate sanitation and the ability to quarantine. In countries with high inequality, evictions add yet another aspect of complexity in managing COVID-19.

Using urban county-level data from the contiguous United States containing 93% of the country's total population, Carozzi *et al.* (2020) find that urban cores and large cities are more likely to be associated with the early arrival of COVID-19 in the first half of the year 2020. They believe the earlier occurrence of COVID-19 in larger cities is due to the nature of interconnection with other locations. Yet, they discover that the spread of the disease since the first case is not faster than the rate of spread in smaller towns or less-densely populated surrounding areas. Similar results are shown by Ang and Dong (2022) using cross-country data, where urbanization is related to increased infection cases.

Liu *et al.* (2021) consider the spread of COVID-19 within cities in China. Their model predicts the spread of COVID-19 based on the laboratory-confirmed cases in cities and their distance from the epicenter of Wuhan using various measurements of urbanization. They find that the distance to the city of Wuhan strongly correlates with the number of confirmed cases. They also discover that the length of metro lines is associated with increases in the rate of infection.

2.5 Past SARS/MERS outbreaks

Recent research shows that a country's previous experience dealing with a similar respiratory epidemic/pandemic impacts the country's response to the current COVID-19 pandemic. For example, Frey *et al.* (2020) use travel and movement data of 111 countries and find that those with previous experience with SARS/MERS outbreaks more readily enact testing protocols that allow for effective containment of the virus in the early stage of the pandemic without much impact to mobility. Shaw *et al.* (2020) also state that a country's previous experience with SARS/MERS generated a proactive mindset in government actions and voluntary preparedness among citizens, which helps contain the spread.

3. Data

We collected cross-sectional data from various sources for our sample consisting of 102 countries, with all data from the most recent year available. We use the number of COVID-19 infection cases per million population at the 120, 150 and 180 days after the reported 10th cases, respectively, as the dependent variables. This data is collected from the European Center for Disease Control (ECDC).

We use the personal freedom index from Cato Institute, with the numbers ranging from 0 (the least freedom) to 10 (the most freedom). The personal freedom index is an equally weighted measure of legal protection and security, including rule of law, security and safety and specific personal freedom, which contains movement, association and assembly, information expression, relationship and identity. A country's democracy level is indicated by its democracy index from the Economist Intelligence Unit (EIU), which is calculated based on five categories, including electoral process and pluralism, civil liberties, the functioning of government, political participation and political culture. This index ranges from 0 to 10, with 0 indicating the least democratic and 10 indicating the most democratic.

We use the Gini coefficients from the World Bank (WB) as the indicator of countries' income inequality level. We use the percentage of the urban population from the United Nations (UN) to indicate countries' urbanization rate. We also obtain countries' average number of years of education received by the population aged 25 and above and the age demographics from the UN. We use real GDP per capita of the year 2019 (in constant 2015 US. dollars) obtained from the WB as indicators of countries' economic development. We use the total number of cases per million population of confirmed SARS cases in 2002–2003 and confirmed MERS cases in 2012–2020 as a measurement of countries' previous experience with a similar health crisis. These data are obtained from the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO).

Tables 1–3 present the countries included in this study, the variable descriptions and sources and the top and bottom ten countries for personal freedom and democracy, respectively. Table 4 presents the summary statistics.

Figures 1, 2 and 3 reports the correlation between personal freedom and COVID-19 infection cases. The three figures show the positive relationship between personal freedom and countries' COVID-19 infection cases per million population at the 120, 150 and 180 days, respectively, after the reported 10th-case for all 102 countries, with the bubbles indicating countries' weighted GDP per capita. Countries with higher indexes of personal freedom also have higher COVID-19 infection cases, which are indicated by the fitted regression line. We perform this analysis across time to determine that personal freedom has a persistent influence on the infection cases.

4. Model

We construct the following OLS regressions, Model (1) and Model (2), to analyze what factors contribute to the severity of countries' COVID-19 infection cases.

$$\begin{aligned} Covidcasesperpop_i = \beta_0 &+ \beta_1 PersonalFreedom_i + \beta_2 IncomeInequality_i + \beta_3 Democracy_i \\ &+ \beta_4 Education_i + \beta_5 UrbanPopulation_i + \beta_6 PasSARSMERS_i \\ &+ \beta_7 Age80_i + \theta_r + \varepsilon_i \end{aligned} \tag{1}$$

$$\begin{aligned} Covidcasesperpop_i = \beta_0 &+ \beta_1 PersonalFreedom_i + \beta_2 IncomeInequality_i + \beta_3 Democracy_i \\ &+ \beta_4 Education_i + \beta_5 UrbanPopulation_i + \beta_6 PasSARSMERS_i \\ &+ \beta_7 Age80_i + \beta_8 \log\ (RealGDPpercapita_i) + \theta_r + \varepsilon_i \end{aligned} \tag{2}$$

The dependent variable *covidcaseperpop* is the number of confirmed COVID-19 infection cases per million population at the 120, 150 and 180 days after the reported 10th case, respectively. The explanatory variable *PersonalFreedom* is measured by the country's personal freedom index. *IncomeInequality* is the Gini coefficient. *Democracy* is the democracy index. *Education* measures the average years of education for the country's population of ages 25 and above. *UrbanPopulation* measures the number of people living in urban areas as defined by the country's national statistical office, which indicates the country's urbanization level. *PastSARSMERS* is the total number of cases for the entire period of the epidemic/pandemic of SARS from 2002 to 2003 and MERS from 2012 to 2020. *Age80* is the percentage of the population of 80 years old and above. We also include θ_r to capture the regional characteristics. The subscript i denotes the country indicator.

Compared to Model (1), Model (2) includes the log term of real GDP per capita. *RealGDPpercapita* captures the country's income level and economic development and indicates the country's tendency for openness to travel and trade, which may influence its COVID-19 infection cases at the early stage of the pandemic.

To address the concern of potential multicollinearity, we run the Variance Inflation Factor (VIF) tests for both models. Our results show there are no concerns of significant multicollinearity [1]. Table 5 reports the VIF test results.

Table 1.
List of countries ($N = 102$)

Albania	El Salvador	Lithuania	S. Korea
Algeria	Estonia	Luxembourg	Senegal
Argentina	Ethiopia	Malawi	Serbia
Armenia	Fiji	Malaysia	Sierra Leone
Australia	Finland	Malta	Singapore
Austria	France	Mexico	Slovakia
Azerbaijan	Germany	Moldova	Slovenia
Bangladesh	Ghana	Montenegro	South Africa
Belarus	Greece	Morocco	Spain
Belgium	Guatemala	Mozambique	Sri Lanka
Bhutan	Honduras	Namibia	Suriname
Bolivia	Hungary	Nepal	Sweden
Bosnia and Herzegovina	Iceland	Netherlands	Switzerland
Brazil	India	New Zealand	Thailand
Bulgaria	Indonesia	Nigeria	Trinidad and Tobago
Burkina Faso	Iraq	North Macedonia	Tunisia
Canada	Ireland	Norway	Turkey
Chile	Israel	Pakistan	UAE
Colombia	Italy	Panama	UK
Costa Rica	Jamaica	Paraguay	Ukraine
Croatia	Japan	Peru	Uruguay
Czechia	Jordan	Philippines	USA
Denmark	Kazakhstan	Poland	Vietnam
Dominican Republic	Kenya	Portugal	Zambia
Ecuador	Latvia	Romania	
Egypt	Lebanon	Russia	

5. Results

Table 6 presents the regression results for Model (1) and Model (2) in Column (1)–(3) and Column (4)–(6), respectively. Our results show that personal freedom positively affects the infection rate across all timeframes. Holding everything else constant, a one-unit increase in the personal freedom index is associated with an increase of 575.466–609.972 infection cases per million population 120 days after the first 10th case in various model specifications with and without the log term of real GDP per capita. These results are statistically significant at the 10% level. These numbers are 921.562–958.768 and 1196.961–1215.986 at the 150 and 180 days mark after the first 10th case, respectively and these coefficients are significant at the 10% level as well.

Democracy, on the other hand, is negatively associated with infection cases. A one-unit increase in the democracy index leads to 4147.413–5267.347 fewer infection cases per million population at the 120 days mark in various model specifications without and with the log term of real GDP per capita, respectively. These results are significant at the 10 and 1% level, respectively. The coefficients are −6389.458 and −7597.028 at the 150 days mark with 5 and 1% significance level, respectively. At the 180 days mark, the coefficients are −7589.236 and −8206.696, both significant at the 5% level.

Income inequality, measured by the Gini coefficient, positively affects the number of infection cases per million population 120, 150 and 180 days after the 10th reported case. One unit increase in the Gini coefficient is associated with 147.093–148.166 and 202.669–203.218 more infection cases per million population at the 150 and 180 days mark after the first 10th case, respectively. These coefficients are all significant at the 1% level.

A country's urbanization rate, measured by its number of urban populations, has a positive effect as well. Per unit increase in the urban population leads to 53.741–64.077 more infection cases per million population 120 days after the first 10th case. These results are significant at the 5 and 1% levels, respectively. These numbers increase to 71.016–82.161 and

Variable	Definition and year	Source
Dependent variables		
Infection after 120 days	Infection cases per million population at the 120th day after the reported 10th cases. Data collected in year 2020	ECDC
Infection after 150 days	Infection cases per million population at the 150th day after the reported 10th cases. Data collected in year 2020	ECDC
Infection after 180 days	Infection cases per million population at the 180th day after the reported 10th cases. Data collected in year 2020	ECDC
Explanatory variables		
Personal Freedom	Personal Freedom Index: Most free = 10 to Least free = 0. Most-recent year available: 2018. This index measures a country's legal protection and security and specific personal freedom using an equally-weighted measure including rule of law, security and safety, freedom of movement, association and assembly, information expression, relationship and identity	Cato Institute
Income Inequality	Gini coefficient. Most-recent data available for each country. Measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution	WB
Democracy	Index: Most democratic = 10 to Least democratic = 0. Most-recent data available. The Democracy Index is based on five categories: electoral process and pluralism, civil liberties, the functioning of government, political participation and political culture	EIU
Years of Education	Average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level. Most-recent year available. Sources: UNESCO Institute for Statistics (2020), Barro and Lee (2018), ICF Macro Demographic and Health Surveys, UNICEF Multiple Indicator Cluster Surveys and OECD (2022)	UN
Urban Population	Most-recent year available. Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by the United Nations Population Division. Sources: United Nations Population Division and World Urbanization Prospects: 2018 Revision	UN[†]
Past SARS/MERS	Total number of cases for the entire period of the epidemic/pandemic. Year: 2002–2003 for SARS; 2012–2020 for MERS.	WHO, FAO
Real GDP per Capita in USD	GDP per capita is the gross domestic product of the year 2019 divided by the mid-year population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant 2015 US. dollars	WB
% Population Aged 80 and over	Population between the ages 80 and over as a percentage of the total population. Population is based on the de facto definition of population. Year: 2019	UN

Table 2. Variable descriptions and sources

86.196–91.895 at the 150 and 180 days mark, respectively, with the significance level ranging from 1 to 5%.

Previous experiences with SARS/MERS outbreaks have a positive impact on the countries' infection cases per million population only at the 120 days mark, with the coefficients being 40.288 and 57.447 in the model specifications with and without the log term of real GDP per capita, respectively. These coefficients are significant at the 10 and 1% levels, respectively. This indicates that countries' previous experiences with similar health crises only affect the countries' infection cases in the very early stage.

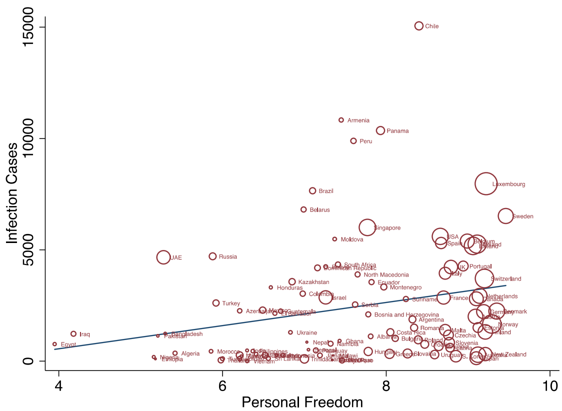
A larger population aged 80 years and above has a large negative effect on infection cases. Holding everything else equal, a one-percent increase in this population leads to 41082.272–43274.991 fewer infection cases per million population 120 days after the first 10th case in various model specifications without and with the log term of real GDP per capita, respectively. These results are statistically significant at the 5% level. Moreover,

Table 3.
The top and bottom ten countries for personal freedom and democracy

Personal freedom				Democracy			
Top	Country	Bottom	Country	Top	Country	Bottom	Country
1	Australia	1	Egypt	1	Switzerland	1	Azerbaijan
2	Netherlands	2	Iraq	2	Australia	2	UAE
3	Germany	3	Nigeria	3	Finland	3	Kazakhstan
4	Switzerland	4	Ethiopia	4	Ireland	4	Russia
5	New Zealand	5	Pakistan	5	Canada	5	Vietnam
6	Finland	6	UAE	6	Denmark	6	Belarus
7	Luxembourg	7	Bangladesh	7	New Zealand	7	Ethiopia
8	Norway	8	Algeria	8	Sweden	8	Egypt
9	Denmark	9	Morocco	9	Iceland	9	Algeria
10	Sweden	10	Russia	10	Norway	10	Mozambique

Table 4.
Summary statistics for all countries ($N = 102$)

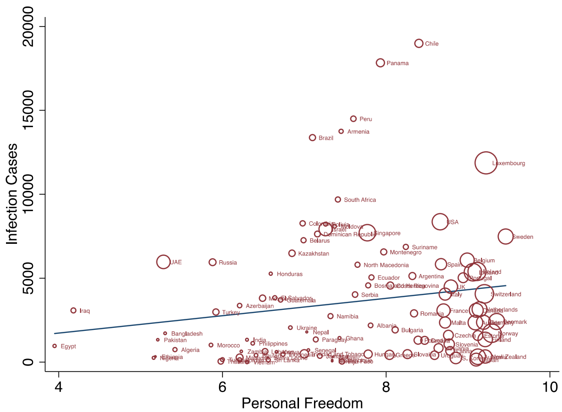
	Mean	Std. Dev
Cases 120 days after the 10th Case	2386.68	2725.51
Cases 150 days after the 10th Case	3553.27	3899.37
Cases 180 days after the 10th Case	4818.38	5081.16
Personal Freedom	7.52	1.27
Income Inequality	37.12	8.08
Democracy	0.65	0.18
Past SARS MERS per Capita	0.68	4.33
Real GDP per Capita in USD (log)	9.13	1.28
Urban Population	65.77	19.67
Years of Education	9.25	2.64
% Population Aged 80 and above	0.03	0.02



Note(s): Size: weighted GDP per capita

Figure 1.
COVID-19 infection cases per million population, 120 days after the reported 10th case

there are 68053.617–70417.919 and 82419.565–83628.491 fewer cases in various model specifications at the 150 and 180 days mark, respectively. All these coefficients are significant at the 1% level.



Note(s): Size: weighted GDP per capita

Figure 2. COVID-19 infection cases per million population, 150 days after the reported 10th case

Note(s): Size: weighted GDP per capita

Figure 3. COVID-19 infection cases per million population, 180 days after the reported 10th case

Variable	No real GDP per capita VIF	No real GDP per capita Tolerance	With real GDP per capita VIF	With real GDP per capita Tolerance
Personal Freedom	4.89	0.204592	4.89	0.204494
Income Inequality	1.49	0.672492	1.54	0.650836
Democracy	3.59	0.278783	4.21	0.237765
Urban Population	1.89	0.528966	2.52	0.396142
Years of Education	2.59	0.385460	3.33	0.300099
Past SARS MERS per Capita	1.11	0.898983	1.21	0.827804
% Population Aged 80 and over	3.50	0.285969	3.59	0.278358
Real GDP per capita (log)			6.57	0.152266
Mean VIF	2.72		3.48	

Table 5. Multicollinearity tests

Table 6. OLS regression on COVID-19 infection cases after the 10th reported case per million population with regional dummies

	(1) 120 days	(2) 150 days	(3) 180 days	(4) 120 days	(5) 150 days	(6) 180 days
Personal Freedom	609.972*	958.768*	1215.986*	575.466*	921.562*	1196.961*
	(323.020)	(485.466)	(637.302)	(327.772)	(492.064)	(651.995)
Democracy	−4147.413*	−6389.458**	−7589.236**	−5267.347***	−7597.028***	−8206.696**
	(2129.021)	(2861.327)	(3568.563)	(1901.511)	(2667.181)	(3461.683)
Income Inequality	50.416	147.093***	202.669***	51.412	148.166***	203.218***
	(34.270)	(54.500)	(73.005)	(35.047)	(55.467)	(73.943)
Urban Population	64.077***	82.161***	91.895***	53.741**	71.016**	86.196**
	(17.177)	(25.882)	(32.775)	(21.056)	(30.376)	(38.066)
Year of Education	73.071	194.926	242.236	1.644	117.910	202.855
	(119.596)	(187.802)	(248.064)	(145.871)	(218.978)	(285.229)
Past SARS MERS per Capita	57.447***	39.594	22.901	40.288*	21.092	13.441
	(20.883)	(33.787)	(51.211)	(23.008)	(39.787)	(58.123)
% Population Aged 80 and above	−41082.272**	−68053.617***	−82419.565***	−43274.991**	−70417.919***	−83628.491***
	(18609.820)	(24974.799)	(30041.077)	(17292.789)	(23690.222)	(29040.789)
Regional Dummies						
North America	−4.986	−201.855	1391.225	−112.195	−317.453	1332.117
	(974.446)	(1505.498)	(3235.985)	(839.359)	(1368.524)	(3172.986)
Latin America	−363.239	92.953	1232.503	−202.824	265.921	1320.946
	(1162.046)	(1675.630)	(2055.069)	(1180.783)	(1717.589)	(2094.734)
Sub-Saharan Africa	−2193.847***	−3362.736***	−4585.987***	−1859.870**	−3002.624***	−4401.853***
	(695.766)	(1044.277)	(1380.534)	(755.439)	(1114.986)	(1469.943)
Middle East and Northern Africa	−2790.761***	−2911.548**	−2471.698	−2830.198***	−2954.071**	−2493.441
	(779.074)	(1276.882)	(1736.010)	(761.372)	(1269.773)	(1743.109)
East Pacific Asia	−3080.986***	−4360.135***	−5333.673***	−3027.315***	−4302.264***	−5304.082***
	(468.474)	(707.168)	(855.860)	(462.949)	(706.343)	(870.665)
Real GDP per capita (log)				537.227	579.266	296.193
				(457.019)	(645.285)	(788.118)
Constant	−4194.868**	−9106.089***	−11750.049***	−6805.181**	−11920.662***	−13189.210**
	(2061.576)	(3233.955)	(4252.425)	(2882.502)	(4478.471)	(5723.045)
Observations	102	102	102	102	102	102
R-squared	0.368	0.428	0.459	0.377	0.433	0.460

Note(s): Robust standard errors in parenthesis. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

We do not find the countries' average education level or income level, measured by the average number of years of education received by people aged 25 and above and the log term of real GDP per capita, respectively, has any significant influence on COVID-19 infection cases. We control for regional effects in Model (1) and Model (2).

6. Discussion and policy implication

We find consistent results with the literature that higher personal freedom leads to more COVID-19 infection cases, as shown in DeFranza *et al.* (2021) and Frey *et al.* (2020). Our results show that the infection cases are affected positively by income inequality corresponding to Papageorge *et al.* (2021) and positively by urbanization, as shown in Acuto (2020), Ang *et al.* (2021), Carozzi *et al.* (2020) and Liu *et al.* (2021). We find a higher percentage of the adult population of 80 years old and above decreases the infection cases, similar to Ang and Murray (2021). Previous experience with SARS and MERS has either a small positive or no effect. Countries' income level and economic development, indicated by the log term of real GDP per capita, have no significant impact on infection cases.

Contrary to previous studies which find that democracy has a positive effect on COVID-19 infection cases, such as Shaw *et al.* (2020), Karabulut *et al.* (2021) and Tisdell (2020), our study results show that democracy has a negative effect on the infection cases. The higher the democracy index, the lower the countries' infection cases on 120 days, 150 days and 180 days after the 10th reported case. Our results highlight that democracy does not impede containing the spread of the virus when accounting for personal freedom.

The impact of democracy in lowering infection rates could result from a few factors. For one, democracy is subject to direct feedback from the citizens during a vote, so prompt action by political leaders to reduce infection rates may be a strong motivator in driving policies. Also, democratic systems are usually associated with more capable leadership. For example, Treisman (2015) argues that less democratic systems lead to fewer turnovers and long-serving leaders are rarely reformers who are capable of keeping up with the ever-changing situations. Additionally, democratic regimes are expected to be transparent with the information and intend actions in response to infections. For example, Moon (2020) attributes South Korea's successful response to COVID-19 to its government's policy transparency and compares that to the country's 2015 failure in dealing with MERS due to lack of transparency. Schwartz (2020) also points out that information transparency is one of the key factors in overcoming the current pandemic through mass vaccination.

As the strong positive relationship between personal freedom and infection rates shows, the political freedom associated with democracy needs to be considered separately from the personal freedom of a populace when considering actions to curb the spread of COVID-19. Personal freedom is increased by factors such as domestic movement, rights to assembly and journalistic freedoms. We argue that largely unfettered journalistic freedoms can mean that a country that fails to curb misinformation could experience higher infection rates if the misinformation leads to inaction among the population. Additionally, the freedom to move within a country and gather with other people may raise the likelihood of spreading the virus among different cities. We argue that countries with high personal freedom would experience a drastic change in their culture or lifestyle when their government imposes containment measures. Those restrictive measures would be harder to accept for those people who are used to the privilege of having higher personal freedom. Hence, policymakers would be more reluctant to impose restrictive measures due to increased resistance from its citizens – the so-called "civil disobedience." For countries with lower personal freedom, we argue that the people may have lower resistance to the restrictive measures imposed by their government to curb the spread because they are used to having lower personal freedom.

7. Concluding remarks

This study distinguishes the opposite effects of political freedom and personal freedom on the spread of COVID-19. Contrary to previous studies, we find that countries' democracy level affects the infection cases negatively. We construct a dataset including 102 countries from various sources, including the numbers of COVID-19 infection cases per million population on the 120, 150 and 180 days, respectively, after the 10th reported case in 2020, countries' personal freedom, democracy, income inequality, urban population, the population's age and education level, real GDP per capita, regional dummies and the numbers of cases of SARS and MERS. The results of our study show that countries' personal freedom positively affects their COVID-19 infection cases, while political freedom, indicated by the democracy level, negatively affects infection cases. Other factors, such as income inequality, urbanization and the population's age, also contribute to infection cases. Previous experience with similar respiratory health crises correlates with COVID-19 infection cases only at a small degree. Real GDP per capita has no effect on the COVID-19 infection cases.

This study provides empirical evidence and actionable advice for policymakers. Although personal freedom and political freedom appear to be two sides of the same coin, these factors should be handled differently. We recommend including countries' personal freedom and democracy into consideration to improve the forecasting accuracy of future global infectious diseases.

Note

1. We adopt the VIF threshold level of 10 based on Glidden *et al.* (2012) and Menard (2002).

References

Acuto, M. (2020), "COVID-19: lessons for an urban (izing) world", *One Earth*, Vol. 2 No. 4, pp. 317-319.

Alfano, V. and Ercolano, S. (2020), "The efficacy of lockdown against COVID-19: a cross-country panel analysis", *Applied Health Economics and Health Policy*, Vol. 18, pp. 509-517.

Ang, J.P. and Dong, F. (2022), "The effects and counter-effects of unemployment and stringency responses to covid-19: an international analysis using simultaneous equations models", *Applied Economics*, Vol. 54 No. 11, pp. 1278-1300.

Ang, J.P. and Murray, T. (2021), "Education in mathematics and the spread of covid-19", *Eastern Economic Journal*, Vol. 47 No. 4, pp. 571-589.

Ang, J.P., Dong, F. and Patalinghug, J. (2021), "COVID-19: effectiveness of socioeconomic factors in containing the spread and mortality", *International Review of Applied Economics*, Vol. 35 No. 2, pp. 164-187.

Barro, R.J. and Lee, J.-W. (2018), "Dataset of educational attainment", available at: http://www.barrolee.com (accessed 7 April 2022).

Benfer, E.A., Mohapatra, S., Wiley, L.F. and Yearby, R. (2020), "Health justice strategies to combat the pandemic: Eliminating discrimination, poverty, and health disparities during and after COVID-19", *Yale Journal of Health Policy, Law, and Ethics*, Vol. 19, pp. 122-171.

Brown, C.S. and Ravallion, M. (2020), "Inequality and the coronavirus: socioeconomic covariates of behavioral responses and viral outcomes across US counties", NBER Working Paper 27549.

Carozzi, F., Provenzano, S. and Roth, S. (2020), "Urban density and COVID-19 (No. 13440)", IZA Discussion Papers.

Chang, H.J., Min, S., Woo, H. and Yurchisin, J. (2021), "Mask-wearing behavior during the COVID-19 pandemic: a cross-cultural comparison between the United States and South Korea", *Family and Consumer Sciences Research Journal*, Vol. 50 No. 1, pp. 5-26.

DeFranza, D., Lindow, M., Harrison, K., Mishra, A. and Mishra, H. (2021), "Religion and reactance to COVID-19 mitigation guidelines", *American Psychologist*, Vol. 76 No. 5, pp. 744-754.

Elgar, F.J., Stefaniak, A. and Wohl, M.J. (2020), "The trouble with trust: time-series analysis of social capital, income inequality and COVID-19 deaths in 84 countries", *Social Science and Medicine*, Vol. 263, 113365.

Frey, C.B., Chen, C. and Presidente, G. (2020), "Democracy, culture and contagion: political regimes and countries responsiveness to Covid-19", *Covid Economics*, Vol. 18, pp. 1-20.

Glidden, D.V., Shiboski, S.C. and McCulloch, C.E. (2012), *Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models*, Springer, New York.

Huang, A., Makridis, C., Baker, M., Medeiros, M. and Guo, Z. (2020), "Understanding the impact of COVID-19 intervention policies on the hospitality labor market", *International Journal of Hospitality Management*, Vol. 91, 102660.

Karabulut, G., Zimmermann, K.F., Bilgin, M.H. and Doker, A.C. (2021), "Democracy and COVID-19 outcomes", *Economics Letters*, Vol. 203, 19084.

Kemmelmeier, M. and Jami, W.A. (2021), "Mask wearing as cultural behavior: an investigation across 45 US states during the COVID-19 pandemic", *Frontiers in Psychology*, Vol. 12, 648692.

Liu, J., Zhou, Y., Ye, C., Zhang, G., Zhang, F. and Song, C. (2021), "The spatial transmission of SARS-CoV-2 in China under the prevention and control measures at the early outbreak", *Archives of Public Health*, Vol. 79 No. 1, pp. 1-10.

Menard, S. (2002), *Applied Logistic Regression Analysis (No. 106)*, Sage.

Moon, M.J. (2020), "Fighting COVID-19 with agility, transparency and participation: wicked policy problems and new governance challenges", *Public Administration Review*, Vol. 80 No. 4, pp. 651-656.

OECD (Organisation for Economic Co-operation and Development) (2022). *OECD. Stat*, available at: https://stats.oecd.org/ (accessed 7 April 2022).

Oronce, C.I.A., Scannell, C.A., Kawachi, I. and Tsugawa, Y. (2020), "Association between state-level income inequality and COVID-19 cases and mortality in the USA", *Journal of General Internal Medicine*, Vol. 35 No. 9, pp. 2791-2793.

Papageorge, N.W., Zahn, M.V., Belot, M., Van den Broek-Altenburg, E., Choi, S., Jamison, J.C. and Tripodi, E. (2021), "Socio-demographic factors associated with self-protecting behavior during the Covid-19 pandemic", *Journal of Population Economics*, Vol. 34 No. 2, pp. 691-738.

Patel, J.A., Nielsen, F.B.H., Badiani, A.A., Assi, S., Unadkat, V.A., Patel, B., Ravindrane, R. and Wardle, H. (2020), "Poverty, inequality and COVID-19: the forgotten vulnerable", *Public Health*, Vol. 183, p. 110.

Schwartz, J.L. (2020), "Evaluating and deploying COVID-19 vaccines—the importance of transparency, scientific integrity and public trust", *New England Journal of Medicine*, Vol. 383 No. 18, pp. 1703-1705.

Shaw, R., Kim, Y.K. and Hua, J. (2020), "Governance, technology and citizen behavior in pandemic: lessons from COVID-19 in East Asia", *Progress in Disaster Science*, Vol. 6, 100090.

Tan, A.X., Hinman, J.A., Magid, H.S.A., Nelson, L.M. and Odden, M.C. (2021), "Association between income inequality and county-level COVID-19 cases and deaths in the US", *JAMA Network Open*, Vol. 4 No. 5, p. e218799.

Tisdell, C.A. (2020), "Economic, social and political issues raised by the COVID-19 pandemic", *Economic Analysis and Policy*, Vol. 68, pp. 17-28.

Treisman, D. (2015), "Income, democracy and leader turnover", *American Journal of Political Science*, Vol. 59 No. 4, pp. 927-942.

UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute for Statistics (2022), "UIS developer portal, bulk data download service", available at: https://apiportal.uis.unesco.org/bdds (accessed 28 April 2022).

UNICEF (United Nations Children's Fund) (Various years) *Multiple Indicator Cluster Surveys*, New York, available at: http://mics.unicef.org (accessed 11 March 2022).

Viswanath, A. and Monga, P. (2020), “Working through the COVID-19 outbreak: rapid review and recommendations for MSK and allied health personnel”, *Journal of Clinical Orthopaedics and Trauma*, Vol. 11 No. 3, pp. 500-503.

Wagstaff, A. (2000), “Research on equity, poverty, and health outcomes: lessons for the developing world”, World Bank, Washington, DC.

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