Crisis and Resilience

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Research Article

COVID-19 Crisis and Resilience: Cross-country Evidence

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ABSTRACT

This paper examines the institutional and socioeconomic factors that hindered the resilience of the COVID-19 crisis. An empirical model includes democracy and openness measures that were potential determinants of slow recovery from the pandemic. Other socio-economic factors such as tourism, CO2, and Monkeypox were also included as control variables. The sample includes 110 countries. One salient feature of the findings is that the recovery pattern from COVID-19 is significantly different, depending on the level of democracy. Many democratic nations, especially in Europe, that were very open to world trade experienced a relatively slow recovery from the pandemic; however, democracy played an insignificant role in authoritarian regimes, including those in Africa, that showed a rapid recovery from the pandemic. The faster recovery observed in authoritarian regimes, however, should not be read as a purely causal effect of democratic backsliding, since it likely reflects the influence of other institutional and structural factors as well.

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1. Introduction

The coronavirus outbreak (COVID-19) has swept the entire world since December 2019. Most countries have been seriously affected by this new infectious virus, and the cumulative number of confirmed cases in the world as of April 2023 has reached approximately 763 million according to the data from the World Health Organization [1]. Although vaccines were first developed in December 2020, one year after the outbreak of the pandemic, the number of confirmed cases were rarely decreased. It was not until January–February 2022 that most people around the world had been vaccinated. Vaccination was widely known as the most effective way to control COVID-19 [2], but it took another one-and-a-half years until the WHO officially announced the termination of the pandemic in May 2023.

There might have been a number of peculiar reasons in each country as to why the recovery was so slow; however, common factors of late recovery across countries should be identified to adequately deal with worldwide pandemics that may arise again in the future. This paper thus aims to investigate the determinants of slow recovery from the pandemic using cross-country regressions. Since the recovery pattern may differ in different countries, we divide the sample countries into sub-groups of nations based on the level of democracy and the degree of trade openness. In order to refine our results, we further employ instrumental variable (IV) estimation, using a gender gap in primary schooling as an instrument for democracy [3].

In the COVID-19 literature, several causative factors have been investigated during the rising period of the pandemic. Democracy was one of the key factors affecting the initial spread of the virus [4-8]. Democratic nations are, by their nature, likely to react slowly to a pandemic and less likely to impose stringent public health policies; hence, the dissemination of the virus was not effectively controlled at the beginning of the outbreak. Some democratic countries were also cautious of imposing restrictions on their social interactions, as politicians were concerned about how such policies might affect their future electoral outcomes [9]. In addition, widespread globalization, from the early 1990s to the present, has frequently created inter-country interactions through various channels, including international trade, tourism, and migration; these phenomena were also found to accelerate the pandemic during the rising period of the pandemic [10-12]. From the scientific point of view, most pollutants, such as CO2 emissions and greenhouse gases, were caused by human to human interactions, such that pollutants also affected the diffusion of the virus [13-17].[1]

Although many studies in the literature examined the causal factors of COVID-19 for the rising period of the pandemic, no studies have investigated the underlying factors that slowed the pandemic during the recent recovery period. Our first objective is thus to focus on the recovery period of the pandemic. Second, earlier studies in the literature utilized the cumulative total of new confirmed cases on a daily basis. The daily data, however, greatly fluctuated. To smooth out the daily variations, this paper employs the weekly average growth rate of new confirmed cases for each country. Third, the whole sample countries have been divided into sub-groups of nations based on the levels of democracy and trade openness. In this way, the recovery pattern that may differ in different political and socioeconomic institutions can be identified. Fourth, cross-country regression cannot avoid the endogeneity problem of the regressor, democracy. Thus, IV estimation has been further employed to examine the causal effects of democracy on slow recovery of the pandemic.

[1] The role of experts in epidemics was known to be another important factor to deal with the global health crisis, as politically neutral and professionally qualified advice from unbiased experts was more effective in the context of global crisis [18-20] It was also suggested that educated people are more cautious and more careful about hygiene because these people are familiar with scientific reasoning about wearing face masks and maintaining social distancing [21-23].

Section 2 describes how we computed the weekly average growth rates of COVID-19. An empirical model has been specified, followed by the discussion of the measurement of model variables. Section 3 shows the baseline regression results. Section 4 divides the full sample into sub-groups of nations based on the levels of democracy and trade openness. Section 5 further employs the IV estimation for the sub-groups of nations to examine the causal effect of democracy on the recovery of the COVID-19 pandemic. Section 6 provides discussions based on estimation results. Section 7 concludes with policy implications.

2. Methods

2.1. Weekly Average Growth Rates of COVID-19 for Recovery Periods

Figure 1 shows the weekly average growth rate of new confirmed cases in 110 countries, each identified as a line over time. For each country, the weekly confirmed cases were computed using the daily data retrieved from the WHO

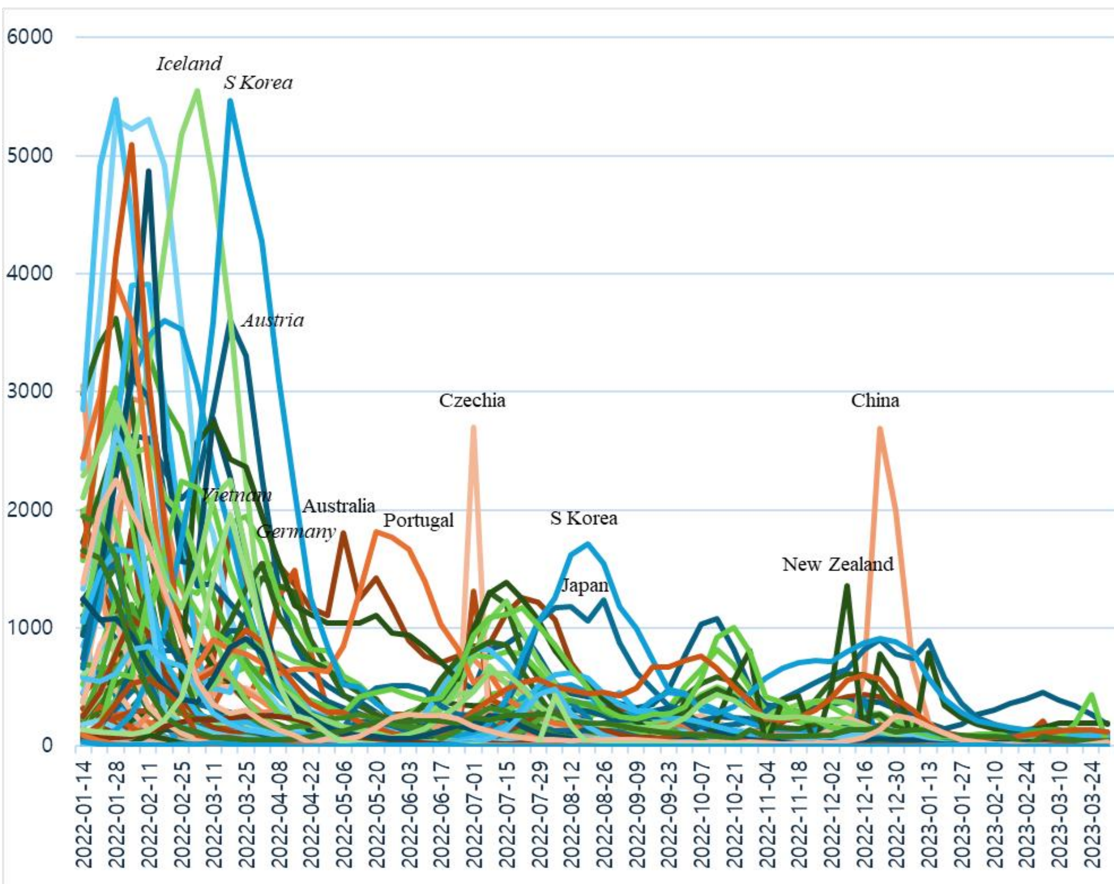

Figure 1. Weekly Confirmed Cases of COVID-19 per 100,000 Population: 2022.1.14 – 2023.3.31

Data Sources: The daily time series were obtained from WHO [1], and their weekly series were computed by the authors.

Notes: The horizontal axis displays weekly dates for the entire sample period (January 14, 2022 – March 31, 2023), but only bi-weekly dates are displayed here due to the limit of the space. The vertical axis represents the number of new confirmed cases weekly. Each line shows one country's weekly new confirmed cases of COVID-19 per 100,000 people over time. Total 110 countries are included in the sample. Most countries reached a peak before February 18, 2022. The peak came late for five countries (in italics): Austria, Germany, Iceland, South Korea, and Vietnam. Seven other countries were severely hit by a later variant, Omicron. Excluding these countries, the number of new cases typically declines over time, so we used this recovery period for estimation.

[1]. Since the size of the population varies from country to country, the weekly time series was deflated by its population to show the weekly confirmed cases per 100,000 people over time. February 18, 2022 was used as the first week of the recovery since most countries reached a peak before that week. Five exceptions were identified—Austria, Germany, Iceland, South Korea, and Vietnam—where the pandemic continued to grow until March 2022, finally beginning to slow down in April 2022. For these countries, a dummy variable (March) has been used to isolate their peculiar effect. In addition, several eruptions of new confirmed cases were found to occur in the middle of the recovery period, mainly due to emergence of new strains, such as Omicron. Seven countries were severely hit by such a variant: Australia, China, Czechia, Japan, New Zealand, Portugal, and South Korea. Despite such eruptions, it is recognized in the graph that the epidemic gradually cooled down over time.

For the purpose of cross-country analysis, the mean value was calculated for each country in order to observe the average weekly growth rates of new confirmed cases. In this way, we could reduce the daily fluctuations over time that may have adversely affected the consistency of parameter estimates. More specifically, the total number of confirmed cases in each country continues to rise over time; but each country's weekly growth rate of new confirmed cases, in general, falls over the recovery period. For each country, we have further computed the average weekly growth rate of new confirmed cases over the recovery period, which appears to be greater for more democratic and more open economies. In other words, new confirmed cases decrease over time, but its reduction rate tends to slow down if nations are more open and more democratic, so that these countries recover the pandemic slowly.

2.2. Model Specification

For the recovery period of the pandemic, an empirical model is specified as:

$$\ln COVID_i = b1 + b2 \ln Democracy_i + b3 \ln Openness_i + b4 \ln Tourism_i + b5 \ln CO2_i + b6\, Monkeypox_i + b7\, March_i + b8\, Eruption_i + u_i, \quad (1)$$

where i = 1, 2, …, 110 countries. For each country, the dependent variable "COVID" represents the average weekly growth rate of COVID-19, measuring the number of newly confirmed cases per 100,000 people over the period from February 18, 2022 to March 31, 2023 [1]; "Democracy" stands for the average of democracy index (from 0 to 10) over the past 10-year period from 2010–2019, right before the pandemic, based on the data obtained from the Economist Intelligence Units [24]; "Openness" also refers to the 10-year average of total trade as a percent of GDP over the period from 2010 – 2019, based on the data obtained from the World Bank [25]; "Tourism" is the 10-year average of international tourist arrivals in million over the period from 2010 – 2019 [25]; "CO2" refers to the 10-year average of CO2 emissions measured in megatons over the period from 2010 – 2019 [25]; "Monkeypox" = 1 if countries have reported cases of Monkeypox, 0 otherwise [1]; "March" = 1 for the five countries that experienced a late COVID-19 peak (Austria, Germany, Iceland, South Korea, and Vietnam), 0 for all other countries [1]; "Eruption" = 1 for those countries that were severely hit by new variants, including Omicron (Australia, China, Czechia, Japan, New Zealand, Portugal, and South Korea), and 0 for all other countries [1]. Our sample includes 110 countries.

Table 1 shows summary statistics for model variables. The average weekly growth rate of COVID-19 across countries appeared to be 0.88%, and a high standard deviation suggests that the COVID-19 growth rate greatly fluctuated from country to country: the lowest infected country was identified as Nepal (0.05%), while China was the highest (14.46%). The average democracy index was about 6.0 out of 10.0, where Norway was identified as the most democratic nation (9.9) and Chad the least (1.5). The trade/GDP ratio, which is used as a proxy for economic openness, was 87.4% on average; Singapore was the most open economy (344.3%) and Brazil the least open (25.5%). Other socio-economic variables, such as tourist arrivals and CO2 emissions, also significantly varied across countries.

Table 1. Summary Statistics

	COVID	Democracy	Openness	Tourism	CO2	Monkeypox	March	Eruption
Mean	0.885	6.001	87.444	15.117	273.526	0.518	0.045	0.064
Median	0.413	6.363	77.561	4.080	27.786	1	0	0
S.D.	1.883	2.098	50.302	32.469	1074.428	0.501	0.209	0.245
Min	0.050	1.548	25.543	0.041	0.280	0	0	0
Max	14.458	9.886	344.289	203.844	9833.250	1	1	1
Countries	110	110	110	110	110	110	110	110

Notes: COVID represents the average weekly growth rate of new COVID-19 confirmed cases per 100,000 people over the period from February 18, 2022 to March 31, 2023 [WHO]; Democracy stands for the 10-year average of democracy index (from 0 to 10) over the period 2010-2019 [EIU]; Openness refers to the 10-year average of total trade as a percent of GDP over the period 2010-2019 [WB]; Tourism represents the 10-year average of tourist arrivals in million over the period 2010-2019 [WB]; CO2 refers to the 10-year average of the CO2 emissions measured in megatons over the period 2010-2019 [WB]; Monkeypox = 1 if countries are reported to have confirmed cases of the Monkeypox, 0 otherwise [WHO]; March = 1 for Austria, Germany, Iceland, South Korea, and Vietnam, all of which reached a peak of confirmed cases in March, 0 otherwise [WHO]; Eruption = 1 for Australia, China, Czechia, Japan, New Zealand, Portugal, and South Korea, all of which reached a peak after March due to Omicron, 0 otherwise [WHO]. Our sample includes 110 countries.

3. Baseline Regression Results

A cross-country regression model was estimated using least squares. Logarithm was taken for all variables, except for the qualitative and dummy variables, to reduce the measurement scale of the variables. Therefore, parameter estimates stand for the elasticity of the growth rate of COVID-19 with respect to changes in explanatory variables. To avoid any potential problems of multicollinearity, highly correlated explanatory variables (tourism, CO2, and Monkeypox) were separately included in each model.

Table 2. Baseline Regression Results

Dependent variable: Average weekly growth rate of new confirmed cases (COVID)

Independent variables	(1)	(2)	(3)	(4)
Intercept	-4.104 (0.769)	-3.955 (0.740)	-4.936 (0.764)	-3.879 (0.754)
Democracy	0.788 (0.198)***	0.596 (0.200)***	0.690 (0.189)***	0.525 (0.218)**
Openness	0.380 (0.170)**	0.379 (0.164)**	0.506 (0.165)***	0.379 (0.166)**
Tourism		0.149 (0.047)***		
CO2			0.140 (0.039)***	
Monkeypox				0.471 (0.183)**
March	1.317 (0.391)***	1.224 (0.377)***	1.162 (0.373)***	1.267 (0.382)***
Eruption	2.026 (0.337)***	1.862 (0.328)***	1.740 (0.329)***	1.862 (0.334)***
Adj R^2	0.44	0.48	0.50	0.47
SE	0.83	0.80	0.79	0.81
Obs.	110	110	110	110

Notes: For variable definitions, see Table 1. The values in parentheses represent standard errors. ***, **, and * stand for being significant at the 1%, 5%, and 10% levels, respectively.

Table 2 shows estimation results. Model (1) presents that the democracy index is positively associated with the average weekly growth rate of new confirmed cases of COVID-19. The significant positive effect is robust across models. The trade/GDP ratio, which shows how much an economy is open to world trade [26], is also positively and significantly associated with the growth rate of new confirmed cases. The significant positive effect is robust across models. Model (2) additionally includes the number of tourist arrivals that is found to be positively associated with the growth rate of new confirmed cases. Model (3) adds CO2 that also has a positive impact on the growth rate of new confirmed cases. Model (4) separately includes Monkeypox that is positively associated with the growth rate of new confirmed cases. In each model, the effects of the March and Eruption dummies turn out to be positive and significant; these dummy variables are used to isolate the effect of such influential outliers.

4. Sub-groups of Nations

The baseline regression results have been observed using a full sample size of 110 countries, regardless of democracy and openness levels. The findings in Table 2 are thus a general conclusion for most countries as a whole. However, individual countries may have different socio-economic characteristics, as well as peculiar political features, so that the decreasing pattern of COVID-19 may differ in different groups of nations.

Table 3 estimates the model using the sub-groups of nations based on the level of democracy. Model (1) includes "fully and flawed democratic nations" (those with a democracy index greater than 6.0). The level of democracy in this group of nations has a positive and significant effect on the growth of new confirmed cases. The result is consistent with our earlier findings in Table 2. Model (2), which includes "hybrid and authoritarian regimes" (those with a democracy index less than 6.0), shows that the size of the democracy effect substantially falls and becomes insignificant. The two results in (1) and (2) are in stark contrast.

Table 3. Sub-groups of Nations by the Level of Democracy
Dependent variable: Average weekly growth rate of new confirmed cases (COVID)

Independent variables	(1)	(2)
Intercept	-6.265 (1.713)	-4.190 (1.426)

Democracy	2.089 (0.782)***	0.510 (0.362)
Openness	0.303 (0.181)*	0.461 (0.324)
March	0.935 (0.399)**	2.287 (0.911)**
Eruption	1.408 (0.333)***	4.563 (0.874)***
Adj R^2	0.43	0.40
SE	0.74	0.85
Obs	60	50

Notes: For variable definitions, see Table 1. Model (1) includes the countries of full democracy and flawed democracy (i.e., democracy index greater than 6.0). Model (2) includes the countries of hybrid regime and authoritarian regime (i.e., democracy index less than 6.0). The values in parentheses represent standard errors. ***, **, and * stand for being significant at the 1%, 5%, and 10% significance levels, respectively.

Table 4 again divides the whole sample into two sub-groups of nations based on the degree of economic openness. Model (1) includes 58 "more open" economies (trade/GDP ratio greater than 0.75), where openness has a positive and significant effect on the growth of the pandemic, similar to the baseline regression results. Model (2) includes the remaining 52 "less open" economies (trade/GDP ratio less than 0.75). For these countries, the growth rate of the pandemic is less attributable to economic openness. The two results are also in stark contrast.

Table 4. Sub-groups of Nations by the Degree of Openness

Dependent variable: Average weekly growth rate of new confirmed cases (COVID)

Independent variables	(1)	(2)
Intercept	-6.609 (1.549)	-5.554 (1.856)
Democracy	0.900 (0.304)***	0.747 (0.236)***
Openness	0.862 (0.324)**	0.769 (0.452)
March	1.642 (0.375)***	N/A
Eruption	0.637 (0.480)	3.101 (0.421)***
Adj R^2	0.43	0.58
SE	0.78	0.78
Obs	58	52

Notes: For variable definitions, see Table 1. Model (1) includes more open economies (i.e., trade/GDP ratio greater than 0.75). Model (2) includes less open economies (i.e., trade/GDP ratio less than 0.75). The values in parentheses represent standard errors. ***, **, and * stand for being significant at the 1%, 5%, and 10% significance levels, respectively.

5. IV Estimation for Sub-groups

Our regression results showed that the growth rate of COVID-19 confirmed cases was affected positively by the level of democracy. The cross-country regression, however, cannot avoid the endogeneity problem of the regressor, Democracy. For example, if dependent and independent variables are switched, Democracy may also be influenced by COVID-19 cases, which is insensible and hardly intelligible. The potential problem is that regression analysis does not show definite causal directions between the two variables.

To refine our empirical findings, we employ an instrumental variable (IV) estimation. To be a ‘valid’ instrument, the following two conditions should be satisfied [27]. First, democracy is regressed on an instrumental variable, ‘gender gap’, that stands for the difference between male and female enrollment rates in primary schooling [3]. Typically, women are less educated in discriminating societies. This often happens in less democratic nations. In contrast, if the gender gap is smaller, it is usually a sign that the country is more respectful of women’s rights. Thus, the gender gap and democracy are inversely related to each other. Indeed, our data shows a negative relationship between gender gap and democracy (r = -0.38), and the negative effect of gender gap on democracy appears to be significant at the 1% level. The F-statistic is also greater than 8.0 a rule of thumb.[2]

The second condition involves the exclusion restriction (exogeneity of the IV). That is, the instrumental variable, gender gap, should not be directly related to the dependent variable, COVID-19 cases. Gender gap must affect COVID-19 only through changes in Democracy. In other words, Gender gap determines Democracy, which, in turn, causes COVID-19. While it is almost impossible to empirically verify the exclusion restriction perfectly, it is hardly believable that the gender gap in primary schooling is directly related to the COVID-19 pandemic. If, by accident, the two happen simultaneously, it must be a measurement error. It is thus necessary for Gender gap to be statistically unrelated to the residuals of the COVID growth model. Indeed, our data shows that the association of the IV with the residuals of the COVID appears to be relatively small (r = – 0.13). Although not perfect, the gender gap is a reasonable instrument to use.

Table 5 shows the results of IV estimation for the sub-group of fully and flawed democratic nations. The left panel indicates that the gender gap in primary schooling has a negative and significant effect on the level of democracy. The result is, in general, consistent with the findings in Barro [3], in which the gender gap determines the level of democracy. Then, the predicted level of democracy that is obtained from the first-stage regression has a positive causal effect on the growth of COVID-19 cases under the IV assumptions mentioned above. That is, the more democratic the country is, the higher the growth rate of new cases, suggesting that the growth rate of new confirmed cases is still greater than in less democratic nations. In other words, the decline of COVID-19 during the recovery period is slower than that of less democratic nations. The results thus support the proposition that democracy is likely to slow the recovery of the pandemic.

Table 5. IV Estimation for Sub-group of Full and Flawed Democracies

First stage		*Second stage*	
Dep variable: Democracy		Dep variable: Covid	
Constant	2.048 (0.017)	Constant	-9.886 (3.992)
Gender gap	- 0.023 (0.007)***	Democracy hat	3.895 (1.987)**
		Openness	0.289 (0.187)
		March	1.141 (0.398)***
		Eruption	1.564 (0.334)***
Adj R^2	0.13	Adj R^2	0.40
S.E.	0.12	S.E.	0.75

[2] See Table 5 below. For IV estimation, the sample includes 108 countries, as no relevant data on the IV, gender gap, are available in Haiti and Lebanon [28].

F stat	9.97	F stat	10.81
Obs	60	Obs	60

Notes: See Table 1 for variable definitions. 'Democracy hat' is the predicted value of Democracy obtained from the first stage regression. Standard errors are in parenthesis. ***, **, and * stand for being significant at the 1%, 5%, and 10% significance levels, respectively.

However, the story is different in another sub-group of nations. Table 6 shows estimation results for hybrid and authoritarian regimes.[3] The instrumental variable, Gender gap, is no longer significant in this case, and the F-value is too small to satisfy the strength of IV. The parameter estimates of democracy predicted by gender gap also appears to be insignificant. That is, the role of democracy is mitigated in this group of authoritarian regimes. Therefore, it cannot be said that undemocratic is the main cause of the rapid recovery of authoritarian regimes. Perhaps, the speed of recovery from the pandemic may depend on other political and institutional factors as well.[4]

Table 6. IV Estimation for Sub-group of Hybrid and Authoritarian Regimes

First stage Dep variable: Democracy		*Second stage* Dep variable: Covid	
Constant	1.370 (0.054)	Constant	-9.337 (3.093)
Gender gap	- 0.011 (0.009)	Democracy hat	3.041 (2.001)
		Openness	0.555 (0.327)*
		March	2.014 (0.903)**
		Eruption	4.329 (0.870)***
Adj R^2	0.01	Adj R^2	0.43
S.E.	0.34	S.E.	0.84
F stat	1.53	F stat	10.00
Obs	48	Obs	48

Notes: See Table 1 for variable definitions. 'Democracy hat' is the predicted value of Democracy obtained from the first stage regression. Standard errors are in parenthesis. ***, **, and * stand for being significant at the 1%, 5%, and 10% significance levels, respectively. Also note that two countries, Haiti and Lebanon, are not included because the data for Gender gap are not available to the public (World Bank, 2025).

6. Discussion

People in democracies are accustomed to enjoying civil liberties, making it difficult to restrict their freedom of everyday life even in the middle of a pandemic. In practice, many democratic governments hesitated imposing strict public health policies, such as shut-down or stay-at-home orders. Many people in democratic nations also refrained from using non-pharmaceutical methods, such as face masking and social distancing, although the pandemic was in full swing. Therefore, it may not be an exaggeration to say that the spread of the pandemic was

[3] As discussed earlier in footnote 2, the gender gap data are not available in the following two countries: Haiti and Lebanon [28]; and hence the number of observations used are 48 nations out of 50 in this category.
[4] More details are discussed in the following Discussion section (Section 6).

mainly due to the degree of democracy. Using the average weekly growth rates of COVID-19 cases for the recovery period, we have found that the more democratic a country is, the higher the growth rate of new confirmed cases. Since the growth rate is found to be higher in more democratic nations, their decline of the pandemic is even slower than in non-democratic countries. This suggests that democracy slows the speed of the recovery. The result is generally consistent with the findings in Karabulut et al. [8], although their sample period focused on the rising period of the pandemic which was different from our use of the recovery period.

In addition, person-to-person contact would be unavoidable if economies were more open to the world. That is, open economies were exposed more to the pandemic, making it difficult to reduce new cases. Despite the recent trend in overseas online transactions (e.g., outsourcing), the COVID-19 pandemic was prolonged, and the recovery was significantly delayed. Therefore, openness would be another reason for slow recovery. Using a trade openness measure for the recovery period, we have found that economic openness has a positive and significant effect on the growth rate of new confirmed cases. The growth rate of the pandemic during the recovery period is found to be higher in more open economies, which means that the decline of the pandemic is slower than in less open economies. This suggests that economic openness also slows the speed of the pandemic recovery. The result is, in general, consistent with the findings in Zimmermann et al. [11], in which openness made the pandemic more serious during the rising period of the pandemic.

The two results thus far suggest that democratic countries that are usually very open to international trade make a slower recovery from the pandemic. Many European countries are in this category. Finland, Luxembourg, and the Netherlands are, for example, small open economies and highly democratic nations. Despite the availability of vaccines and other factors which led to a slowdown in new confirmed cases throughout the world, the growth rate of new confirmed cases in these countries still appeared to be relatively high. That is, their recovery was slower than in less open and less democratic countries.

Similarly, those countries with world-famous tourist destinations, such as France and Italy, experienced an uprising of the epidemic during the recovery period. In contrast, those countries with less incoming tourists experienced fewer infections. Such a positive association of tourism with COVID-19 is closely related to the positive effect of economic openness on the slow recovery. For example, if the economies open up to the world, more people will visit as tourists, as well as for business purposes. In this case, those international visitors, as well as domestic tourists, will have more chances to contact infected areas. Therefore, the increased contact between people from different parts of the world increases the spread of the virus. The result is, in general, consistent with the findings in Nunkoo et al. [32], in which even domestic tourism has made the pandemic worse in the early stages of COVID-19.

It is also not surprising to find that the effect of CO2 on the growth rate of COVID-19 appears to be positive. The parameter estimates of 0.14 suggest that if CO2 emission were to increase, more practically, by 10 percent, the weekly growth rate of new confirmed cases would increase by 1.4 percentage points, on average. In other words, urbanization, leading to high population density and industrialization, which encourages the high mobility of citizens, would also slow down the speed of recovery. The result is, in general, consistent with the findings in Verma and Prakash [14], Cepaluni [16], and Nath et al. [17] although their sample periods differ from ours.

Monkeypox is positively and significantly related to the growth rate of COVID-19. Although it was a newly developed infectious disease, the 2022 Monkeypox outbreak was found to disrupt the recovery from the pandemic. In addition, the March dummy was included to account for the five countries that experienced delayed recovery as compared to the rest of the world, and the Eruption dummy accounted for the seven countries which experienced a significant eruption of the pandemic due to the emergence of the later variant, Omicron [33]. Both occurred unexpectedly at the time, while most other countries were gradually recovering thanks to global vaccinations.

So far, we've looked at the various factors that have delayed recovery from the pandemic. Among them, democracy has been found to be one of the key factors that slowed the speed of the recovery, but the pattern of recovery may differ in different political regimes. For the robustness of the results, the whole sample has been divided into sub-groups of nations based on the level of democracy. For more democratic nations (those with a democracy index greater than 6.0), we have found that the more democratic a country is, the higher the weekly growth rate of new cases. That is, the decreasing speed of new cases during the recovery period was found to be slower in more democratic nations.

In contrast, estimating a model that includes hybrid and authoritarian regimes only (those with a democracy index less than 6.0) leads to quite different results. The effect of democracy substantially falls and becomes insignificant. The openness measure is also ineffective in slowing down the epidemic. Estimating a model that includes only less open economies (trade/GDP ratio of less than 0.75) also results in modest effects of openness. This ineffectiveness of democracy and openness is in stark contrast to our baseline regression results.

While the results using a whole sample of 110 countries are, in general, consistent with the findings in the existing literature, the differentiated results based on different levels of democracy and openness appear to be at odds with the findings in Karabulut et al. [8] and Zimmermann et al. [11], among others; both studies found that democracy and openness, respectively, made the pandemic more difficult to control, regardless of democracy and openness levels during the rising period of the pandemic. Their findings were uniformly applied to all countries in the sample. However, the recovery pattern we have found here varies depending on political and economic institutions. For the sub-groups of more democratic and more open economies, slower recovery is attributed to democracy and openness; but it is difficult to say so for other sub-groups of nations that are less democratic and less open to international trade. Our finding of the differentiated effects on the COVID-19 pandemic is one of our major contributions to the literature.

The IV estimation was further employed for the sub-groups of nations to reaffirm the causal effects of democracy on the slow recovery of COVID-19. First, democracy was found to be inversely associated with the gap between male and female schooling, and the negative effect was significant at the 1% level. One interpretation of this finding is that the smaller the educational gap between men and women, the higher the participation of women and the better the social structures that adapt to democracy. Second, the level of democracy that has been predicted by gender gap was found to have a positive and significant effect on the growth rate of COVID-19. The positive causal relation suggests that if a country is more democratic, the growth rate of new confirmed cases is relatively high. In other words, the recovery from the pandemic is slower and thus delayed in more democratic nations. The results are supportive of our proposition that democracy is more likely to slow the pace of recovery.

However, such a finding cannot be generalized to another sub-group of nations. Typically, authoritarian regimes may have incomprehensible reasons that are difficult to measure for estimation. For instance, politically suppressed countries can easily restrict the liberties of their populations within a short period of time [29][8]. Many autocratic regimes often forced infected cities to immediately shut down to quickly control the pandemic. The lack of sufficient international trade may also allow the growth rate of new confirmed cases to decrease faster, seemingly leading to quicker recoveries from the pandemic. It is, however, widely accepted that politically repressed countries may have downgraded their reports of new cases to the WHO [30]; the lack of medical facilities would also have impeded the ability to test the entire population of those nations [31]. Hence, the observed acceleration of faster recovery in authoritarian regimes should not be interpreted as a direct causal consequence of undemocratization alone, as other institutional and structural factors are likely at play. Again, the differentiated recovery patterns we have found between democratic and undemocratic countries are one of our major contributions to the literature.

7. Concluding Remarks

We have empirically investigated the socio-economic and institutional determinants of recovery from the COVID-19 pandemic, with a particular focus on the role of democracy and globalization. Using data from 110 countries, we estimated an empirical model to assess how these factors shaped the trajectory of recovery. The regression results indicate that slower recovery was primarily associated with higher levels of democracy and greater economic openness. To test robustness, the sample has been divided into sub-groups of nations, revealing that many European democracies, especially those highly integrated into global trade networks, experienced relatively slow recoveries. Instrumental variable estimation further suggested that the democracy index—instrumented by the gender gap in primary schooling—causally contributed to delayed recovery from COVID-19. By contrast, the causal effect was insignificant in authoritarian regimes that quickly recovered from the pandemic. However, the rapid recovery observed in authoritarian regimes should not be interpreted as a purely causal effect of democratic retreat, as it is likely to reflect the impact of other institutional and structural factors as well.

We conclude with some policy implications. First, in the event of a recurrence of a pandemic like COVID-19, democratic governments should seek to impose strict public health policies, even if these policies limit an individual freedom. Second, the pandemic is a natural disaster, so that individuals should also be able to pay for the opportunity costs that may arise during the epidemic. While these two policy implications may sound coercive, it will be difficult to overcome the pandemic if the government and the public do not cooperate with each other. Third, it is also important that each country cooperates especially with its neighboring countries. Because of the globalization that has been prevalent since the early 1990s, all nations are interrelated, so that international trade and overseas tourism make it difficult to maintain control over the spread of the virus. Fourth, during the COVID-19 pandemic, we have experienced that vaccinating only a small number of high-income countries could not immediately stop a global epidemic. Lower-income countries should also be able to secure the sufficient supply of vaccines. Therefore, international cooperation is urgently needed in the face of a global crisis like an epidemic.

Finally, it should be noted that our paper has limitations in measuring the effectiveness of non-pharmaceutical methods, which are critical in preventing infectious viruses. The estimation of impulse responses that identifies the causal effects over longer horizons is also left for further study.

Author's Contributions

Jang C. Jin: research direction, revision, final version of the paper.
Heejae Han: data collection, estimation, first draft of the paper.

Ethical Approval

Ethical approval for this type of study is not required because the dataset used is open to the public.

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Data Availability

The data underlying this article will be shared upon request to the corresponding author.

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