Growth or Virus?

Anti-Virus Policy, Fiscal Stimulus, and Democratic Advantages in the COVID-19 Pandemic*

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Abstract

Under the COVID-19 pandemic, one of the most difficult decisions in policy making has been on how to strike a balance between growth and virus: Strictly containing the coronavirus negatively impacts economic activities, while easing restrictions increases infection cases. Under what conditions can governments mitigate the trade-off between health and wealth? This paper argues that advanced democracies are better at controlling the spread of the virus by tightening anti-virus policies while mitigating the negative economic impact of such policy by deploying large financial measures. Governments of matured liberal democracies need to be accountable to voters. Democracies are thus more likely to strengthen anti-virus policies in response to the virus but also try to minimize the subsequent economic declines by adopting a large scale of economic compensation. Using a country-month data set of nighttime light intensity, anti-virus policy stringency, and political regimes covering 188 countries (January 2020–May 2022), our statistical analysis offers preliminary evidence supporting our theoretical expectations.

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1 Introduction

Since the outbreak of the COVID-19 pandemic, governments worldwide have been facing difficult choices in their policy making to deal with this most serious threat to human lives over the past decades. Among many important issues, one of the lingering debates has been over which tasks government should prioritize – containing the spread of the virus or invigorating economic activities. By strengthening anti-virus policies such as school and workplace closures, gathering restrictions, limiting human mobility, and regulating business activities, governments are able to effectively control the spread of COVID-19. Such stringent measures, however, are likely to significantly suppress economic activities due to reductions in labor supply and individual consumption. Conversely, if governments are afraid of negative economic performance and thus decide to loosen anti-virus policies, then infection cases and death tolls are likely to increase, risking human lives. In other words, as theoretical literature expects, governments have been facing a sharp trade-off between growth and virus under the pandemic and thus made efforts in striking a balance between the two (Acemoglu et al. 2020; Andersson et al. 2020; Eichenbaum, Rebelo, and Trabandt 2020). Under what conditions are governments able to (and willing to) mitigate this dilemma between wealth and health?

Consistent with this insight, a large literature on the relationship between COVID-19 policies and economic output empirically demonstrated the robust presence of the trade-off between the virus and growth. For instance, using a data set of Nitrogen Dioxide (NO_2) emissions as a proxy of economic activities (36 OECD countries), Deb et al. (2022) find that easing of containment measures leads to an increase in economic activity, but the effect is lower in the case of tightening. Likewise, Keola and Hayakawa (2021) also use similar NO_2 data from 173 countries and investigate the relationship between lockdown and economic activities. They find that lockdown policies significantly decreased NO_2 emissions particularly in low income countries. Ashraf and Goodell (2022)'s statistical analysis of 46 OECD countries shows that social distancing policies have a short-run adverse effect on economic growth (measured by quarterly

GDP growth rate) while in the long run such a negative effect of social distancing policies disappears and economies tend to recover. Apergis and Apergis (2021) is another study using OECD data (industrial output and COVID infection cases/dealth tolls) to find that the magnitude of COVID-19 pandemic shocks measured by the numbers of infections and death tolls is positively associated with declines in industrial output.

Although these studies contributed to advancing our understanding on the relationship between the pandemic and economic performance, we need further research to address at least the following two issues. First, although the previous studies offered rich evidence on the presence of the virus-growth trade-off, we know less about how and under what conditions governments are able to mitigate this dilemma to make virus prevention and economic output more or less compatible. Deb et al. (2022) is thus far one of the few studies suggesting that fiscal stimulus measures may work as a moderator mitigating the trade-off between virus and growth. However, their studies does not necessarily illuminate why and what governments are more likely to take such costly policies in the first place. Second, except for a few studies such as Keola and Hayakawa (2021), previous studies focused largely on OECD countries, most of which are democratic countries. Although limiting samples to advanced democracies are likely to increase the credibility of data which often becomes an important issue in quantitative studies of COVID-19 (Annaka 2021), censoring samples in such a way makes it difficult to empirically evaluate the relationship between virus and growth globally. This particularly holds when one wants to focus on variables that significantly differ across developed and developing countries, such as political regimes and economic growth.

Against this backdrop, this paper sheds light on a pertinent factor that is likely to serve as a relevant moderator mitigating the trade-off between virus and growth – political regimes. In democratic regimes, governments have more incentives to incorporate diverse interests to win competitive elections than those in autocratic regimes wherein both horizontal and vertical accountability is weak or does not exist. Because of the necessity to be accountable to diverse interests of voters and social groups, democratic

governments are encouraged to make efforts in striking a better balance between public health and economic well-being: Adopting strict anti-virus policies to combat the virus while minimizing economic cost by simultaneously adopting economic relief policies. Conversely, as governments become more autocratic, political leaders can stay in power with a smaller size of winning coalitions. Therefore, when facing the trade-off between virus and growth, they are more incentivized to trade virus for economic activities and vice versa by minimizing the size of economic stimulus packages which are financially costly for governments.

To empirically assess our theoretical expectations, we conduct cross-national statistical analysis which comprises 188 countries (January 2020 - May 2022) globally including both developing and developed countries across a wide spectrum of political regimes. To measure the degree of economic activities while minimizing possible biases introduced by political regimes (i.e., possible data manipulation by autocrats), we employ nighttime light intensity which provides systematic, fine-grained data both over time and across space (Magee and Doces 2015; Martinez 2021; Beyer, Franco-Bedoya, and Galdo 2021). We regress growth in night illumination on the stringency index of anti-virus policies and political regimes. We first find that strict anti-virus policies are negatively correlated with nighttime light intensity, consistent with the growth-virus trade-off. At the same time, however, resonating with Deb et al. (2022), our analysis also shows that a larger scale of economic relief policies is likely to mitigate the negative impact of strict anti-virus policies on economic growth. Intriguingly, such relief policies are more likely to be adopted in matured, liberal democracies, compared to emerging democracies, electoral autocracies and closed autocracies. Lastly, contrary to the conventional findings reported from earlier studies on the pandemic, our preliminary analysis suggests that strict anti-virus policies are more likely to be adopted by governments in response to increasing numbers of infection cases in advanced democracies. Together, a series of our cross-national analysis demonstrates that democratic governments try to overcome the virus-growth dilemma by systematically mobilizing economic stimulus packages. In contrast, autocratic governments tend to take either

virus or growth without resorting to economic relief programs.

This paper makes two important contributions. First, this research contributes to the literature on the relationship between COVID-19 and economic growth (e.g., Acemoglu et al. 2020; Deb et al. 2022). By highlighting the role of political regimes and deployment of economic relief policies under democratic governments, we offer an answer to how to mitigate the trade-off between the virus and growth: how much accountable governments are to their electorates will be crucial in overcoming the virus-growth dilemma. Second, our research also speaks to the debate on authoritarian advantages in dealing with the pandemic. At earlier stages of the pandemic, some scholars suggested that authoritarian governments performed better in containing the virus (e.g., Cheibub, Hong, and Przeworski 2020*a*; Narita and Sudo 2021; Cepaluni, Dorsch, and Branyiczki 2022). By focusing on democratic governments' strong incentives to compensate economic difficulties among citizens during the pandemic, we suggest that democracies may have advantages in dealing with the pandemic. In so doing, we suggest that democracies have big advantages in scoring better performance, as they are for various socio-economic outcomes (e.g., Gerring, Knutsen, and Berge 2022; Colagrossi, Rossignoli, and Maggioni 2020) as well as other dimensions of public health (e.g., Gerring et al. 2021; Annaka and Higashijima 2021).

2 Political Regimes, Economic Support, and Containment Measures

In advanced democracies, governments are constrained by vertical and horizontal accountability. For vertical accountability, democratic countries periodically hold free and fair elections and guarantee civil liberties and political rights, all of which work as institutional mechanisms to make politicians respond to what voters prefer and throw the rascals out when politicians are not accountable to voters. For horizontal accountability, democracies develop checks and balances between authorities through rule of law and judicial as well as legislative constraints on the executive. Conversely,

autocracies significantly lack these two dimensions of political accountability: authoritarian leaders does not hold free and fair elections, infringe personal liberties, and less constrained by the institutional balance of powers.

Due to the robust presence of horizontal and vertical accountability, democratic governments need to consider a broad range of interests, which significantly influences the breadth of their policy engagement (Bueno de Mesquita et al. 2003). By contrast, autocratic governments do not need to care much about interests of a majority of electorates and therefore can be selective in buying off political support through public policy making. Put differently, in democracies political leaders need to broadly incorporate heterogeneous interests among a variety of voters and social groups to win competitive elections, whereas in autocracies political leaders can stay in power as long as they are accountable to members of smaller winning coalitions and thus incorporate a limited range of interests.

These differences in democracies and autocracies crucially affect the manners in which governments deal with the growth-virus dilemma in the pandemic. A study shows that voters may generally prioritize saving human lives by public health rather than saving the economy but such preferences easily change depending upon various factors like voter characteristics and dissimilar economic costs across the generalizations (Lesschaeve, Glaurdić, and Mochtak 2021). Since democratic governments need to seek a broader range of voter support, they have strong incentives to minimize threats to both health and economic prosperity simultaneously, even if doing so incurs large financial costs on governments in the short run. On the contrary, in authoritarian regimes, political leaders are not exposed to strong popular pressures to be accountable to voters and thus are less incentivized to mitigate the virus-growth trade-off by mobilizing additional financial resources for citizens. In other words, when autocrats combat the virus, they are more likely to do so by adopting strict anti-virus policies without deploying measures to save the economy. Otherwise, autocrats may be more willing to exclusively emphasize the benefits of invigorating the economy by drastically loosening virus prevention measures.

Hypothesis 1 (Virus-Growth Trade-off and Political Regimes): Democracies are better able to mitigate the trade-off between anti-virus policies and economic activities than autocracies do.

The discussion thus far derives two additional theoretical expectations. First, democracies should take additional measures to strike a better balance between virus and growth than autocracies. Governments may have a variety of measures to mitigate the trade-off between virus and growth. For example, large proportions of populations with high quality vaccines and meditation should enable governments to prioritize economic activities over lockdown policies. Closely tracking infected individuals and their close contact people might also make the trade-off more moderate by not completely blocking human mobility via strict lockdowns. Among others, we focus on the role of economic reliefs that aim to alleviate the trade-off between the two. By loosening fiscal policies and deploying a large scale of economic relief programs, governments are able to offer financial support to a variety of citizens and groups who suffer financial difficulties in running firms and households in the form of individual cash allowances, business subsidies, and unemployment benefits. In so doing, governments can help citizens maintain their purchasing power and assist firms in producing services and goods, which contributes to maintaining economic activities under the pandemic.

Hypothesis 2 (Economic Compensation and Political Regimes): Democracies are more likely to adopt extensive economic support programs during the pandemic than autocracies do.

The second theoretical expectation is that democracies are more likely to adopt stringent containment policies against the coronavirus. Without first adopting strict anti-virus policies, expansionary fiscal policies work less as effective counter-cyclical measures. The necessity to mobilize financial relief programs should be thus significantly reduced. In order to respond to voters who demand governments to thoroughly react to the spread of COVID-19, democratic governments adopt strong virus prevention policies in tandem with extensive economic support packages against the virus.

This theoretical prediction may differ from what some studies on earlier stages of the pandemic expected: authoritarian governments are better at swiftly tacking the threat of the virus than democratic ones (e.g., Cheibub, Hong, and Przeworski 2020*b*; Narita and Sudo 2021). Our argument here emphasizes the possibility that the mechanisms of democratic accountability lead governments to accurately find issues pertinent to voters and deal with possible threats accordingly. Given that a majority of voters in democracies have been concerned with losing human lives influenced by virus infection (Lesschaeve, Glaurdić, and Mochtak 2021), we expect that democratic governments are better able to effectively set the level of anti-virus policies depending upon changing preferences of voters than autocratic governments.

> Hypothesis 3 (Anti-Virus Policies and Political Regimes): Democracies are more likely to adopt stringent anti-virus policies against the spread of the virus than autocracies do.

3 Cross-National Data Analysis

3.1 Data

To test our hypotheses, we conduct cross-national statistical analysis. Our data set is country-month panel data, which covers 188 countries from January 2020 until May 2022.

A main variable of interest is economic growth. As discussed, using standard measurements of economic growth like growth in GDP per capita is problematic for the purpose of our research, because (1) they are not taken monthly and (2) they are likely to be manipulated by autocrats. Therefore, we use a well-known proxy for economic growth, namely the estimation through the Visible Infrared Imaging Radiometer Suite (VIIRS) developed by the NASA/NOAA (Magee and Doces 2015; Beyer, Franco-Bedoya, and Galdo 2021). The nighttime intensity is measured on a daily basis. Furthermore, it is known that the data are unlikely to be manipulated by autocratic regimes because nightlight is a clear manifestation of economic activities captured by artificial satellites

from the space. Specifically, we calculated the growth rates of the median values of monthly cloud-free average radiance grids of respective countries by overlaying country boundaries on the monthly raster files of VIIRS Nighttime Light images.

Other core variables are the stringency of anti-virus policies and the magnitude of economic support. For these variables, we use the data of stringency index and economic support index, taken from the Oxford COVID-19 Government Response Tracker (Hale et al. 2021). The data set is updated on a daily basis. We aggregated these measures and use the monthly mean values for our analysis. The stringency index is a composite measure of nine government responses indicators. The nine metrics used to calculate the index are (1) school closures, (2) workplace closures, (3) cancellation of public events, (4) restrictions on public gatherings, (5) closures of public transport, (6) stay-at-home requirements, (7) public information campaigns, (8) restrictions on internal movements, and (9) international travel controls. A higher score indicates a stricter response. On the other hand, The economic support index aggregates the following components of economic relief policies: Whether the government provides (1) income support and (2) debt or contract relief as policies to support households and the economy. Higher value indicates more generous economic relief policies in the face of the pandemic.

For Hypothesis 3, we use the situation of infections as an explanatory variable. The number of new COVID-19 cases and the number of COVID-related deaths per million are taken from Our World in Data COVID-19 dataset (Ritchie et al. 2020). We take their natural logs after adding one to avoid omitting observations with the value of zero.

3.2 Trade-off Between Growth and Anti-COVID-19 Measures

Facing the COVID-19 pandemic, the government in each country had to make a series of difficult decisions. Some countries implemented strict policies restricting people's activities to contain the disease. While they managed to control the spread of the disease and had fewer infected cases or deaths, they had to accept the sluggish economies. In contrast, other countries promised people free economic activities to avoid an economic

downturn during the pandemic. In exchange, they took more patients and deaths than the other countries. In short, there had a trade-off between a good economy and a COVID-free society.

To understand the trade-off, we regress economic growth on policy stringency. The economy is measured by nighttime light data of VIIRS, and we use monthly growth of it as our variable of economic growth. We use the stringency index of the COVID-19 Government Response Tracker (Hale et al. 2021) and scale it to a value between 0 and 1. To test Hypothesis 1, we let stringency interact with the regime type, a categorical variable taking one of four values – closed autocracy, electoral autocracy, electoral democracy, and liberal democracy – taken from V-Dem (v2x_regime) (Coppedge et al. 2022). We include country fixed-effects and calculate the standard errors clustered by country.

Figure 1 shows the estimated effect of stringency on growth.[1] As expected, the point estimates tend to be negative, meaning stricter anti-COVID policies deteriorate economic growth. The effects are statistically significant in all regimes but liberal democracy. Among closed autocracies, electoral autocracies, or electoral democracies, increasing stringency by 0.25 lowers economic growth by two percentage points. The result implies that the government would need to tolerate an economic slump if it tried to contain the pandemic by restricting people's activities.The results are in support of our Hypothesis 1.

Why are democracies are better at mitigating the trade-off? As discussed in the previous section, the government can compensate for the restriction with economic support. Such financial support might have mitigated the negative impact of stringency on economic growth. To examine this possibility, we regress economic growth on stringency and the economic support index, taken from the COVID-19 Government Response Tracker (Hale et al. 2021) and scaled to a value between 0 and 1, where two explanatory variables are allowed to interact.[2]

Figure 2 presents the marginal effect of stringency on growth conditional on the

[1] Table A1 in Appendix shows the detailed results of the regression.
[2] Table A2 shows the details of the regression results.

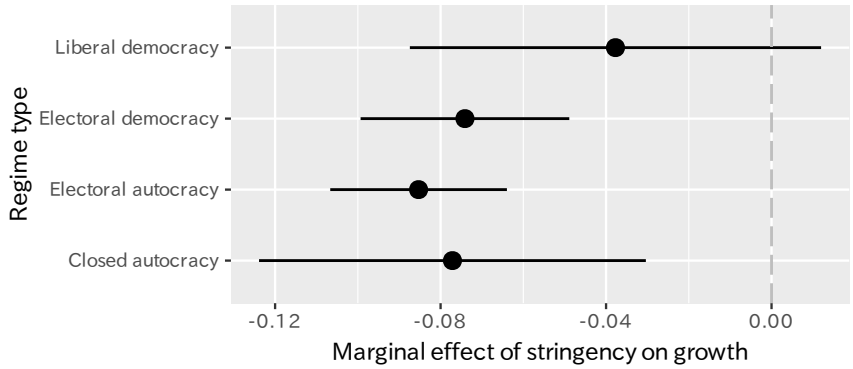

Figure 1: Estimated marginal effects of stringency on growth by regime type. *Closed circles show point estimates, and horizontal line segments represent the 95% confidence intervals.*

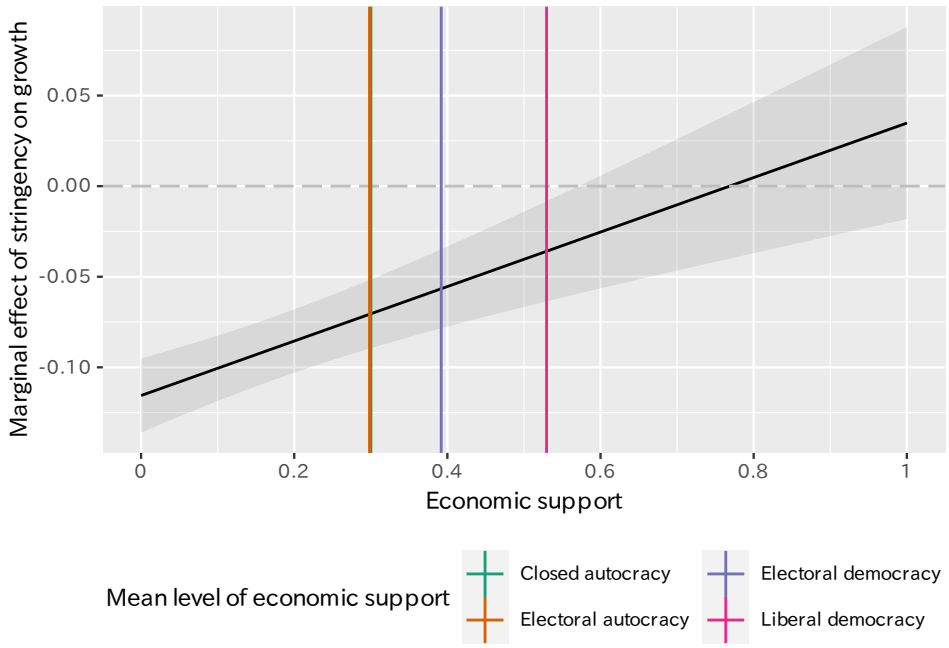

Figure 2: Estimated marginal effect of stringency on growth by regime type, conditional on the level of economic support. *The solid black line shows point estimates. The shaded area around the line represents the 95% confidence interval. The average level of economic support in each regime type is marked by a vertical line.*

government's economic support level. As can be seen in the figure, stringency damages the economy when the level of economic support is low. However, as the economic support enlarges, the negative effect of stringency diminishes. When the economic support is above 0.6, the impact of stringency on growth is not statistically different from zero. Thus, the government could absorb the drawback of restrictive policies by providing financial support.

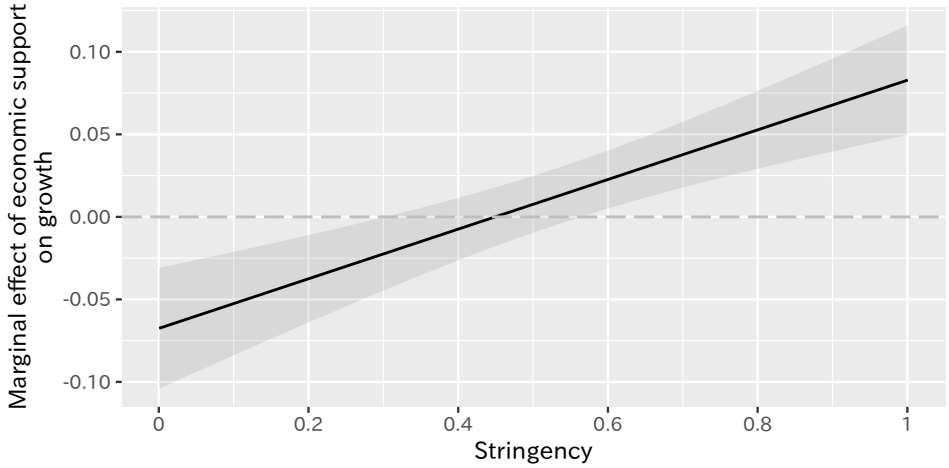

Figure 3: Estimated marginal effect of economic support on growth, conditional on the level of stringency. *The solid black line shows point estimates. The shaded area around the line represents the 95% confidence interval.*

In Figure 2, vertical lines show each regime type's mean level of economic support. The means are 0.30 for both types of autocracy and 0.39 for electoral democracy. Because the average degree of economic support is not high enough, the stringency negatively affects growth in these regimes, as we saw in Figure 1. By contrast, the mean of economic support is 0.53 for liberal democracy, which is relatively high and close to the threshold above which the negative effect is canceled out. Therefore, we did not find a statistically significant effect of stringency on growth among liberal democracies in Figure 1. These analyses render supporting evidence for Hypothesis 2.

If the government's economic support enhances economic growth, why does it not always distribute a large amount of financial aid? In fact, it does not always help the economy. Figure 3 displays the marginal effect of economic support on economic growth conditional on the level of policy stringency. While economic support boosts the economy together with the high level of restriction, it slows down the economy if there is no restriction on people's activity. This could be because the government's economic intervention distorts the functioning of the free market when there are no restrictions on economic activities. This result suggests that economic support is an effective means to stimulate the economy only with relatively strict restrictions on people's behavior under the pandemic.

In sum, these results conform to our Hypotheses 1 and 2; democracies can better mitigate the trade-off between anti-virus policies and economic activities than autocracies (H1). More specifically, liberal democracies managed to alleviate the negative effect of stringent anti-COVID-19 policies on the economy by distributing a relatively large amount of financial support (H2). Then, what determines the degree of the strictness of anti-virus measures, which could harm the country's economy? Who compensates for an economic downturn caused by restrictive policies with financial aid? We now turn to these questions related to Hypothesis 3.

3.3 Determinants of Restrictive Policies

Before uncovering its determinants, let us examine how policy stringency has evolved since the pandemic's beginning. Figure 4 displays the change in the stringency index over time by regime type. Each black line represents a country; the red lines show the mean in each regime. As we can see in the figure, the stringency went up in many countries regardless of regime type soon after the pandemic was recognized. Stringency reached its peak around mid-2020 in all regimes. On average, it has gradually been loosened, with some up-and-down waves. However, after mid-2020, the trajectories widely vary within each regime. Some countries have kept restrictive policies, others have switched to much less strict guidelines, and yet others have shuttled between them.

When does the government implement a stricter policy? A simple answer should be that the government tighten anti-virus policies when the disease is rapidly spreading across a country. Then, putting aside its negative effect on the economy, the government should choose a restrictive policy when they have more COVID-19 patients. To examine if this is the case, we regress the stringency index on the number of new COVID-19 cases and the number of COVID-related deaths. Because the stringency index takes a value between 0 and 1, this regression's response variable is the index's logit.[3] The numbers of cases and deaths are variables observed in the previous period, and we

[3] In other words, the response variable is $\log\left(\frac{\text{stringency}}{1-\text{stringency}}\right)$.

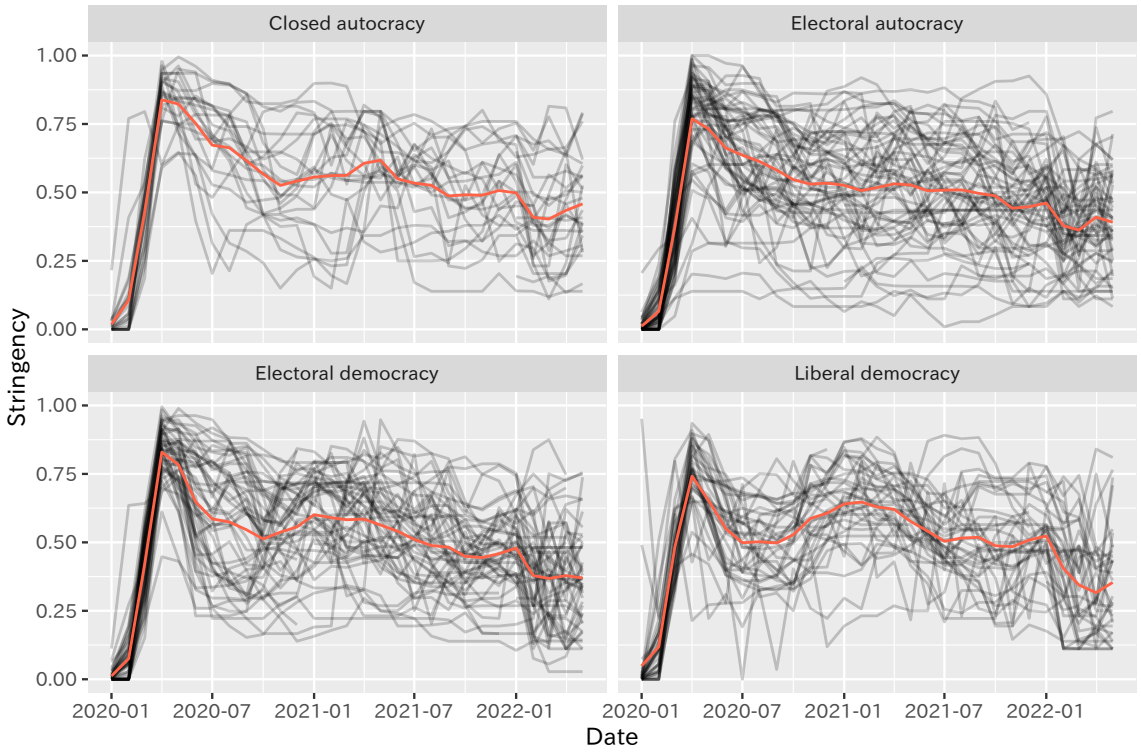

Figure 4: Policy stringency over time. *Each line represents a country. Red lines are the means within a regime type.*

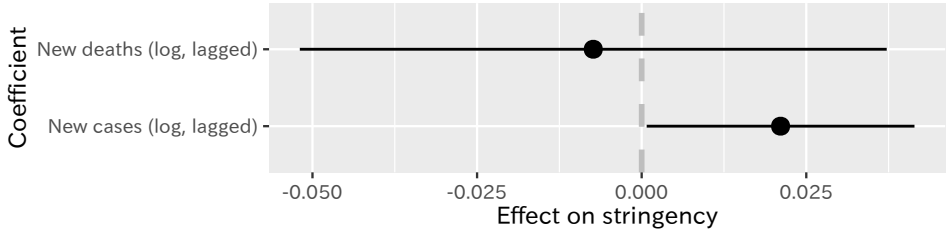

Figure 5: Estimated effect of the numbers of new cases and new deaths of COVID-19 on policy stringency. *Closed circles show point estimates. Line segments present the 95% confidence intervals.*

use their natural logs. Furthermore, we control for the response variable's lag, add country and time fixed-effects, and calculate standard errors clustered by country.

Figure 5 presents the estimation results.[4] The 95-percent confidence interval for the effect of new cases resides in the positive area, while the interval for the new deaths crosses the vertical line of zero. It shows that the government introduces stricter policies responding to the spread of the disease.

[4]Table A3 in Appendix shows the detailed results.

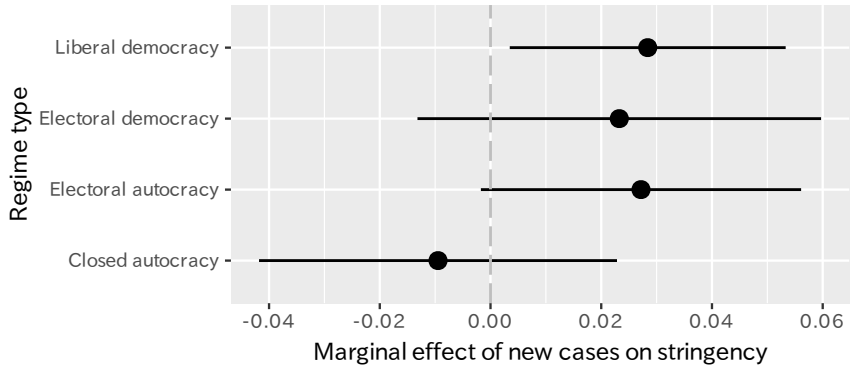

Figure 6: Estimated effect of the numbers of new cases on policy stringency by regime type. *Closed circles show point estimates. Line segments present the 95% confidence intervals.*

However, the effect of the new cases is not constant across regime types. Figure 6 shows the result obtained by adding the variable of regime type to the previous regression and letting it interact with the variable of new cases.[5] The figure reveals that the effect is statistically significant only among liberal democracies. In other words, only liberal democracies change their policy stringency in responding to the spread of the disease. Although the effect is not statistically distinguishable from zero, the point estimates for electoral democracy and electoral autocracy are similar to that for liberal democracy. The point estimate for closed autocracy is negative, and it seems that closed autocracies set their stringency by their unique calculus.

As Figure 4 displays, the mean level of policy stringency does not differ much across political regimes. However, the spread of the disease – measured by the numbers of new COVID-19 cases and COVID-19 related deaths – affects the strictness of government policies only in liberal democracies. It implies that autocracies – and possibly electoral democracies as well – could choose the level of policy strictness during the pandemic regardless of the objectively observed indices of the pandemic. These results support our Hypothesis 3; democracies are more likely to adopt anti-COVID-19 measures against the spread of the disease than autocracies do.

[5]Table A4 in Appendix shows the detailed results.

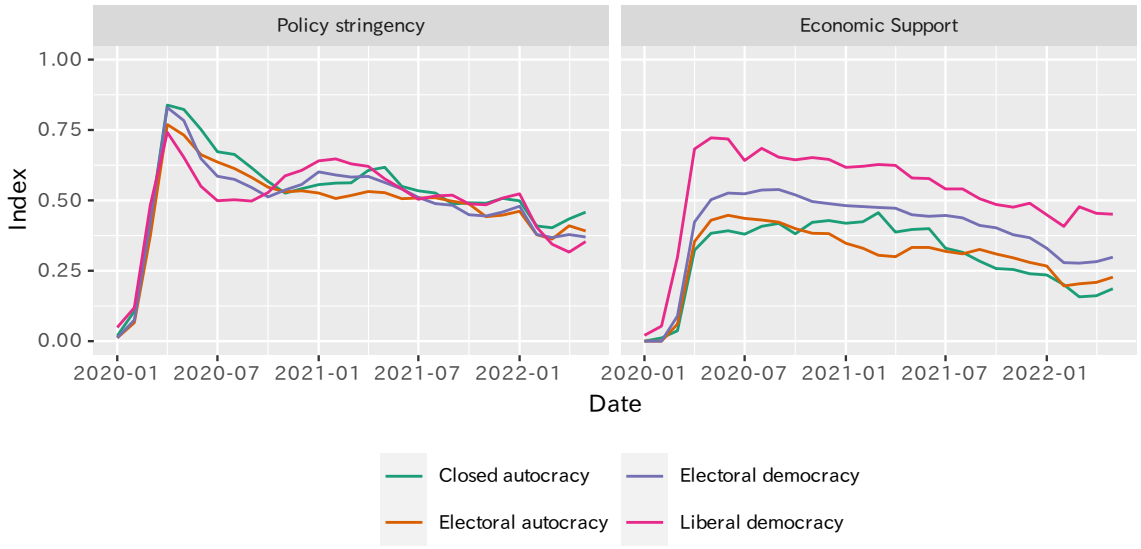

Figure 7: Changes in the stringency and economic support indices by regime type. *Each line represents the mean value of an index within each regime.*

3.4 When Do Governments Expand Economic Support?

Lastly, let us examine the determinants of the level of governments' economic support. As our Hypothesis 2 suggests, we expect that democracies tend to provide more financial aid than autocracies. In fact, the mean level of economic support is higher among democracies. Figure 7 presents the changes in stringency and economic support for four regime types during the pandemic. The left panel of the figure shows that the mean level of policy stringency does not differ much across political regimes, as we have already seen in Figure 4. However, as can be seen in the right panel, the level of economic support differs across regimes. Liberal democracies have provided the highest economic support among the four regime types. Autocracies, closed or electoral, have implemented less generous economic support than democracies. Electoral democracies' economic aid has been in between those of liberal democracies and autocracies.

Table 1 displays the mean and standard deviation of the indices of policy stringency and economic support by regime type over the period covered in the data set. Again, the mean of the stringency index does not vary much across the four regimes. The standard deviation of the index is also constant across the regimes. In contrast, the

Table 1: Observed level of stringency and economic support by regime type

	Stringency		Economic Support		
Regime type	Mean	Std. Dev.	Mean	Std. Dev.	*N*
Closed autocracy	0.53	0.17	0.30	0.13	27
Electoral autocracy	0.49	0.16	0.30	0.12	62
Electoral democracy	0.49	0.17	0.39	0.15	59
Liberal democracy	0.50	0.15	0.53	0.17	40

economic support index's mean seems to differ across regime types; it is merely 0.30 in both kinds of autocracies, a slightly higher value of 0.39 in electoral democracies, and an even higher value of 0.53 in liberal democracies.

What makes these differences? We regress the economic support index on policy stringency to answer this question. Like the stringency index, the economic support index takes a value between 0 and 1. Thus, we use the logit of the index as our outcome variable. Because the government should provide economic support to mitigate the damage caused by restrictive anti-virus policies, we expect that policy stringency is one of the most relevant factors determining the level of economic support. We include the categorical variable of regime types and let it interact with stringency to see if the effect differs across distinct regime types. We control for the number of new cases and deaths of COVID-19. We also include the lag of the outcome variable in the right-hand side of the equation, add country and month fixed effects, and calculate standard errors clustered by country.

Figure 8 presents the marginal effect of policy stringency on economic support by regime type.[6] We can see that only the governments in electoral democracies change the level of economic support based on the strictness of anti-COVID-19 measures. It implies that electoral democracies are trying to balance their policies against the pandemic. The governments enlarge financial support when they tighten their policies of containment and closure; the governments shrink the support when they loosen their policies.

We could not find such an effect among liberal democracies. As we saw above, the amount of economic support is the largest in liberal democracy among the four regime types. Thus, there is a smaller room for liberal democracies to increase economic

[6]Table A5 in Appendix shows the detailed results.

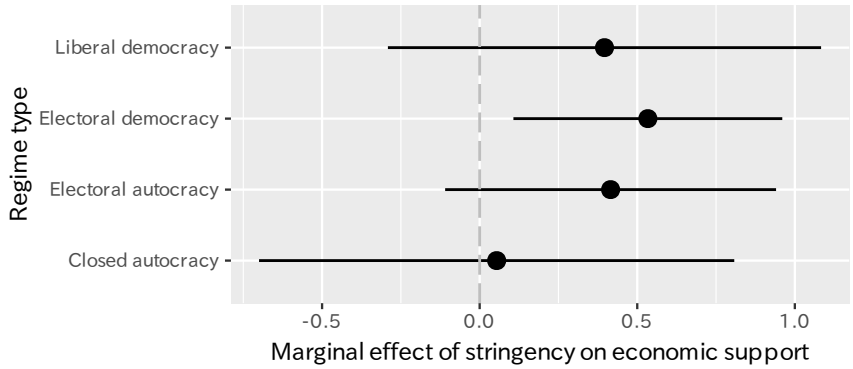

Figure 8: Estimated effect of policy stringency on economic support by regime type. *Closed circles show point estimates. Line segments present the 95% confidence intervals.*

support. In addition, liberal democracy is the only regime type that changes the level of stringency responding to the spread of disease, as we saw in Figure 6. It could mean liberal democracies have not freely decided to tighten or loosen anti-COVID policies. Instead, they might have been forced to change the level of stringency following the spread of the disease. Knowing that they would have to implement stricter policies, the governments in liberal democracies might have provided generous economic support as insurance against an economic downturn due to stringent restrictions.

We could not find evidence that autocrats change how much economic support they provide in response to policy stringency. Unlike liberal democracies, autocracies have not distributed much economic support, as we saw in Figure 7 and Table 1. The result shows that it could be the case that autocratic governments do not compensate for the economic slump caused by stringent policies. Because the level of stringency in autocracies is comparable to that in democracies, as seen in Figures 4 and 7, autocracies seem to choose the levels of stringency and economic support independently of each other.

In sum, autocratic governments do not – or do fail to – balance the trade-off, while democracies try alleviating the destructive effects of stringent policies with distributive financial aid policies. These results lend to our Hypothesis 2 that democracies are more likely to adopt extensive economic support programs than autocracies during the pandemic.

4 Conclusion

This study has examined under what conditions governments are able to mitigate the trade-off between growth and virus in the COVID-19 pandemic. We have argued that advanced democracies manage this dilemma well by combining stringent and economic support policies. We have shown that strict anti-COVID policies have a negative effect on economic growth under closed autocracy, electoral autocracy, and electoral democracy. By contrast, stringent policies have not damaged the economy in liberal democracy, where the government's financial support has mitigated the negative impact of restrictive anti-virus measures on economic growth. The difference between liberal democracy and the other three regime types exists in the amount of economic support. The level of economic support is high in liberal democracies, and hence the government has been successful in managing the dilemma; it is low and insufficient in the other regimes, and the governments cannot mitigate the trade-off.

Our results have shown that autocracies, closed or electoral, emphasize restrictive policies rather than taking a balance between stringent and economic support policies. The strictness of anti-virus policies in autocracies is, on average, comparable to that in democracies.The level of strictness does not correspond to the spread of COVID-19, which suggests that the autocratic governments have made discretionary decisions about anti-virus measures. Even when they tighten the policies, autocracies have not compensated for the economic damage with financial support. It could mean that they did not have to pay attention to the short-run dissatisfaction among the people. After all, they are not vertically accountable to the people. Unlike democracies, autocracies might not have to deal with the dilemma; they could try to contain the virus when they would like without being worried about their popular support.

In contrast, democracies have implemented stringent policies in combination with relatively generous economic support. In liberal democracies, the governments are responsive to the spread of COVID-19; they have restricted people's activities when the number of new COVID-19 cases increases. Because the governments do not know in advance when the number of patients surges, they provide high-level economic

support as an insurance. In electoral democracies, the governments enlarge economic support when they increase the strictness of anti-virus policies. By so doing, they try to alleviate the negative impact of stringent policies on the economy. In both kinds of democracies, the accountability mechanisms make the governments to choose the best balance in the trade-off.

Although we have found preliminary evidence supporting our theoretical expectations, we need further research on this topic. Above all, we need to incorporate the timing of elections. In countries where the election timing is fixed, the governments might have implemented a greater amount of economic support only before the election to boost the vote share of the governing parties. In other countries where the government can set the election schedule, the government might have manipulated election timing rather than balancing the trade-off between two different policies. In fact, some countries called early elections, and others postponed elections during the pandemic. In these countries, the government can choose a policy package from a wide range of combinations of policies, and their strategies should be more complicated. Moreover, because the accountability mechanism is hugely different between autocracies and democracies, their coping methods against an election should be different even during the pandemic. To understand how the governments in different political regimes respond to the COVID-19 pandemic, we need to further examine the impacts of election timing.

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A Appendix

Table A1 shows the regression results corresponding to Figure 1 in the main text.

Table A1: Regression results: Outcome variable is growth

			95% CI	
Variable	Estimate	SE	lower bound	upper bound
(Intercept)	−0.01	0.02	−0.05	0.02
Lag of growth	−0.31	0.06	−0.47	−0.14
Stringency	−0.08	0.02	−0.13	−0.03
Electoral autocracy	−0.00	0.01	−0.02	0.01
Electoral democracy	0.01	0.01	−0.02	0.04
Liberal democracy	0.01	0.02	−0.02	0.05
Stringency × Electoral autocracy	−0.01	0.03	−0.06	0.05
Stringency × Electoral democracy	0.00	0.03	−0.05	0.06
Stringency × Liberal democracy	0.04	0.03	−0.03	0.11
N	4284			
N. of countries	154			

∗ Country fixed-effects are included. SEs are country-clustered standard errors.

Table A2 shows the regression results corresponding to Figures 2 and 3 in the main text.

Table A2: Regression results: Outcome variable is growth

			95% CI	
Variable	Estimate	SE	lower bound	upper bound
(Intercept)	−0.00	0.00	−0.01	0.00
Lag of growth	−0.31	0.06	−0.48	−0.14
Stringency	−0.06	0.01	−0.08	−0.04
Economic support	0.01	0.01	−0.01	0.03
Stringency × Economic Support	0.15	0.03	0.09	0.21
N	4284			
N. of countries	154			

∗ Country fixed-effects are included. SEs are country-clustered standard errors.

Table A3 shows the regression results corresponding to Figure 5 in the main text.

Table A3: Regression results: Outcome variable is the logit of stringency

			95% CI	
Variable	Estimate	SE	lower bound	upper bound
(Intercept)	−1.77	1.10	−15.24	11.71
Logit of lagged stringency	0.65	0.02	0.60	0.70
New cases (log)	0.02	0.01	0.00	0.04
New deaths (log)	−0.01	0.02	−0.05	0.04
N	3811			
N. of countries	153			
N. of time periods	28			

∗ Country and month fixed-effects are included. SEs are country-clustered standard errors.

Table A4 shows the regression results corresponding to Figure 6 in the main text.

Table A4: Regression results: Outcome variable is the logit of stringency

			95% CI	
Variable	Estimate	SE	lower bound	upper bound
(Intercept)	−1.76	1.12	−8.33	4.82
Logit of lagged stringency	0.65	0.02	0.60	0.70
New cases (log)	−0.01	0.02	−0.05	0.03
Electoral autocracy	−0.12	0.08	−0.31	0.08
Electoral democracy	−0.08	0.12	−0.34	0.18
Liberal democracy	−0.01	0.18	−0.40	0.38
New cases × Electoral autocracy	0.04	0.02	−0.01	0.08
New cases × Electoral democracy	0.03	0.02	−0.01	0.08
New cases × Liberal democracy	0.04	0.02	−0.00	0.08
New deaths (log)	−0.01	0.02	−0.06	0.04
N	3811			
N. of countries	153			
N. of time periods	28			

∗ Country and month fixed-effects are included. SEs are country-clustered standard errors.

Table A5 shows the regression results corresponding to Figure 8 in the main text.

Table A5: Regression results: Outcome variable is the logit of economic support

			95% CI	
Variable	Estimate	SE	lower bound	upper bound
(Intercept)	−0.24	0.90	−2.88	2.40
Logit of lagged economic support	0.74	0.02	0.70	0.78
Stringency	−0.10	0.30	−0.72	0.52
Electoral autocracy	−0.09	0.34	−0.99	0.81
Electoral democracy	−0.11	0.38	−0.96	0.75
Liberal democracy	0.07	0.48	−0.95	1.09
New cases (log)	0.03	0.02	−0.01	0.08
New deaths (log)	−0.08	0.05	−0.18	0.02
Stringency × Electoral autocracy	0.47	0.36	−0.27	1.20
Stringency × Electoral democracy	0.67	0.34	−0.03	1.36
Stringency × Liberal democracy	0.47	0.44	−0.42	1.37
N	4065			
N. of countries	163			
N. of time periods	28			

∗ Country and month fixed-effects are included. SEs are country-clustered standard errors.