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Exploring East Asia's Successful Early-Stage Covid-19 Response: An Empirical Investigation

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Abstract

This study examines whether a degree of autocracy and high quality of bureaucracy—two mechanisms often discussed in the context of Covid-19 responses—provide a meaningful explanation for East Asia's relative success compared to the rest of the world at the beginning of the Covid pandemic. Our multiple regression analysis for 111 countries supports our expectation, as East Asia as a region is significantly and negatively associated with confirmed Covid-19 cases and deaths compared to the rest of the world, and its interaction with the quality of bureaucracy further contributes to the negative association. In sum, this research highlights the important role of East Asia's regional characteristics in pandemic responses.

Keywords: East Asia; autocracy; quality of bureaucracy; democracy; Covid-19 responses

Introduction

Although most nations struggled to contain Covid-19 early in the pandemic, East Asian countries seemed to have been more successful than others. Research on East Asia and Covid-19 suggests three factors were critical to this success. First, East Asian countries' prior experience with infectious diseases—severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS), and highly pathogenic avian influenza (HPAI) A viruses—spurred the development of appropriate institutional infrastructure in advance (An and Tang 2020; Chorzempa and Huang 2021; Feitelson et al. 2022; Kim et al. 2020; Lin, Lee, and Lye 2020; Sagara, Stables, and Baehr 2022). Second, interagency and government–business collaboration is critical to pandemic response, and East Asian states have significant legacies of developmental state–facilitated interagency and government–business collaboration (Jang, Han, and Kim 2021; Kumar 2021; Shaw, Kim, and Hua 2020; Yen 2020). Third, East Asia's collectivist culture facilitated cooperation from citizens, enabling East Asian governments to enact stringent and effective policy instruments (An et al. 2021; An and Tang 2020; Porcher 2021).

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While these explanations suggest that East Asia's relative success may hinge on the region's unique characteristics, empirical evidence supporting this idea has been scarce. Specifically, there has been no rigorous empirical investigation of whether East Asian countries outperformed the rest of the world in responding to Covid-19 and, if so, what factors may explain such a difference. The latter issue is especially critical because identifying factors that explain the performance gap between East Asia and other countries could provide meaningful policy lessons for the rest of the world.

This research addresses two interrelated questions. First, did East Asia as a region outperform the rest of the world in responding to the early stage of the Covid-19 pandemic? Second, do the degree of autocracy and quality of bureaucracy hold explanatory power for East Asia's relative success? To explore these factors in detail, we examine differing degrees of autocracy and qualities of bureaucracy across East Asia. These characteristics, common and arguably fundamental to the region's identity, have been at the center of attention and debate surrounding the Covid-19 response (Greer *et al.* 2020; Zhang 2020). Understanding whether the degree of autocracy impacted Covid-19 responses would shape future discussion on promoting democracy and universal values. Discerning the extent to which quality of bureaucracy, one of the most desired national characteristics, contributed to a successful response would provide important policy implications for the rest of the world. More importantly, because these two mechanisms can be interrelated and are often conflated, comparing the role of both mechanisms is especially important to clarify these implications.

The autocracy question is more complex and difficult to predict, and prior studies' findings have yielded no consensus about the effect of autocracy on Covid-19 response. We expect the joint influence between autocracy and East Asia to display an inconclusive effect. In contrast, we expect the quality of bureaucracy and East Asia to complement one another. Although high-quality bureaucracy does not guarantee agile response and interagency (inter-bureaucracy) or government-business collaboration, just as robust *de jure* institutions and policy design do not guarantee robust *de facto* institutions and policy implementation (Helkme and Levitsky 2004; Lindvall and Teorell 2016; Melton and Ginsburg 2014), we expect East Asia's distinguishing characteristics enhanced the environment for collaboration and agile response. In this line of argument, we expect the quality of bureaucracy to explain the difference in early Covid-19 response effectiveness both among East Asian countries and between East Asia and other regions.

This study employed a multiple regression analysis for 111 countries to examine the two questions empirically. For the outcomes of interest, we use the number of cumulative Covid-19 confirmed cases per 100 people and the number of cumulative Covid-19 deaths per 100 people. For the main explanatory variables, we use autocracy scores and government effectiveness as measures for degree of autocracy and quality of bureaucracy.¹ Our empirical results mostly substantiate our expectations, suggesting that East Asia is associated with a lower number of both cumulative confirmed cases per 100 people and cumulative deaths per 100 people compared to the rest of the world. Second, our results show that degree of autocracy is not statistically significant in explaining two dependent variables, and its interaction with East Asian

countries yielded similar results. On the other hand, the quality of bureaucracy's interaction with East Asian countries is statistically significant and negatively associated with the number of cumulative deaths. These results offer partial evidence that the interaction of East Asia's unique characteristics with countries' bureaucracies was a key factor in the region's relatively successful early Covid-19 response, and that the quality of bureaucracy, not the degree of autocracy, best explains the variation in East Asia's relative success.

Theories and Previous Studies

East Asia and Covid-19 responses

Studies have offered various explanations for East Asia's successful early-stage Covid-19 responses. Research has identified three factors characteristic of the region as critical to this success. First, one of the most discussed aspects has been East Asia's experience with prior infectious diseases that spurred the development of effective disaster management mechanisms (Feitelson et al. 2022). East Asia's past experiences with the SARS, MERS, and HPAI-A viruses have given many East Asian countries, including Thailand, Japan, South Korea, Vietnam, Singapore, Hong Kong, and Taiwan, a head start in managing the Covid-19 pandemic (Sagara, Stables, and Lauren 2022). In this view, most East Asian countries with successful early-stage Covid-19 responses were able to utilize stringent policy measures early because they had an established early warning system and the necessary institutional infrastructure before the outbreak (An and Tang 2020; Chorzempa and Huang 2021).

This experience shaped East Asia's institutional infrastructure to be well-postured for early-stage Covid-19 responses. For instance, the South Korean government revised the Infectious Disease Control and Prevention Act in 2015 after the MERS epidemic, increasing the number of experts like field epidemiologists and strengthening their authority while allowing the government to fast-track production of necessary medical supplies, which later enabled rapid production of Covid-19 test kits (Kim et al. 2020). Public infrastructure was also better prepared for containing Covid-19. The 2015 act mandated local governments to maintain a specified number of hospital beds in case of a pandemic. Similarly, Singapore's experience during the 2003 SARS outbreak drove improvements in its public infrastructure, building facilities with more than 300 beds for isolating and containing infections (Lin, Lee, and Lye 2020). Singapore, South Korea, Taiwan, and Hong Kong have established agencies equivalent to the U.S. Centers for Disease Control and Prevention (CDC) with substantial resources—budget, staff, authority, and legislative mandates (Lin, Lee, and Lye 2020).

The establishment and empowerment of such institutions in East Asia should not come as a surprise. During the developmental state era, many East Asian countries utilized a control tower model with central coordination between ministries and command-and-style policymaking to mobilize and use resources efficiently to achieve rapid economic growth, the “East Asian Miracle” (Haggard 2004; Jang, Han, and Kim 2021). Consequently, some studies have attributed East Asia's successful early-stage Covid-19 response to their developmental-state legacies—defined as “well-qualified

personnel, strong centralized control, efficient mobilization of budgetary and other resources, and speedy implementation of decisions” (Jang, Han, and Kim 2021, 151).

Second, although characteristics of the developmental state can vary widely, entrenched government–business collaboration characteristic of several East Asian countries is generally seen to be a critical component of East Asia’s successful early-stage Covid-19 response (Kumar 2021). Studies using various typologies—relation-based governance (Li 2003), government–business network (Amsden 1989; Haggard 2004; Wade 1990), and cohesive capitalist state (Kohli 2004)—have emphasized the importance of government–business collaboration in achieving the East Asian Miracle. These studies contend that the East Asian Miracle states surpassed global competition because of the business–government partnerships that reduced uncertainty for businesses, influencing their investments and operations. When Covid-19 first reached the pandemic stage, securing masks became a high priority. If left to the market, the private sector faced significant uncertainty around whether to invest significant resources for mass production, considering demand could plummet post-Covid-19. In this context, government intervention helped East Asian countries, notably China, South Korea, and Taiwan, reduce transaction costs for production (Kumar 2021; Yen 2020). In the case of South Korea, collaboration between the government and the private sector went beyond mask production to the rapid production of other essential medical equipment such as the Covid-19 test kit (Kumar 2021).

The legacy of such collaboration has also profoundly affected the use of technology in East Asia. Studies have found that combating the Covid-19 pandemic required effective digital governance, which necessitated integrating databases of people’s health records and travel history with accurate contact tracing and active surveillance and, thus, required inter-agency collaboration (Yen 2020). Various studies have found that East Asia has effectively integrated technologies and information held by different ministries (Shaw, Kim, and Hua 2020; Yen 2020). In this way, despite manifesting differing forms of collaboration, East Asian countries demonstrated effective collaborative governance to combat Covid-19 (Mao 2020).

Finally, East Asia’s collectivist cultural orientation has been widely viewed as critical for East Asia’s successful early-stage Covid-19 response. During a pandemic crisis, effective policy measures often require citizens to accept curbs on their freedom. This has especially been true for East Asian countries, which adopted various stringent policy instruments such as mobility restrictions, quarantines, border controls, social distancing, and limits on mass gatherings (An and Tang 2020). The success of these policy instruments largely depended on citizens’ voluntary compliance and public cooperation, along with their willingness to accept burdensome penalties for non-compliance (An and Tang 2020). East Asia’s traditionally collectivist cultures were instrumental in fostering this acceptance; one hallmark of collectivism is that individuals are more willing to sacrifice for the collective good (Porcher 2021). Indeed, collectivism was a strong predictor for the early adoption of stringent, and effective, Covid-19 policy instruments. Countries in the top twentieth percentile of the collectivism culture score (i.e., South Korea, China, Vietnam, Thailand, and Indonesia) adopted nationwide mask mandates early (An *et al.* 2021). Studies attribute the region’s collectivist tendency to a long history of persistent threats from

wars, natural disasters, and financial and political crises, which led to strict standards and norms of social behavior (Gelfand et al. 2011).

Autocracy and Covid-19 Response

Do autocracies have an advantage in combatting pandemics? Existing studies offer two contrasting views. The “autocratic advantage” view (Neumayer and Plümper 2022) suggests that autocratic governments hold several advantages over democratic ones. First, autocratic governments may respond faster and more decisively than democratic governments because they face less pressure from electoral consequences (Karabulut et al. 2021; Stasavage 2020). Second, by exercising centralized power, autocratic governments can respond with greater force and mobilize resources more effectively (Karabulut et al. 2021; Stasavage 2020). Citizens may also follow the political instructions of autocratic governments more closely than those of democratic ones (Karabulut et al. 2021). These advantages may enable autocratic governments to enforce and implement stringent policy instruments such as social distancing and mobility restrictions more easily than democratic governments (Cassan and Van Steenvoort 2021).

However, the advantages of autocratic governments—lack of electoral pressure and centralized power—may also work to their detriment. Due to a lack of checks and balances, autocratic governments may suffer from over-stringent responses and potentially abuse their power (Karabulut et al. 2021). For example, autocratic governments may exacerbate the pandemic situation by withholding information or ignoring problems (Stasavage 2020).

Previous studies have provided empirical evidence that autocracy is a double-edged sword. On one hand, research indicates that autocracies employed more stringent lockdowns but were less effective than democratic governments that employed less stringent measures but were more effective in reducing geographic mobility (Frey, Chen, and Presidente 2020). Another study found democratic countries implemented school closures faster than autocracies (Cronert 2020). Democracies, though reacting more slowly to the pandemic, generally also resorted to strict measures such as school closings, bans on public meetings, compulsory lockdowns, and shutting work—similar to the measures taken by autocracies (Cheibub, Hong, and Przeworski 2020).

Other studies have examined how the degree of autocracy directly affected Covid-19 responses such as the number of confirmed cases, deaths, and tests. Cepaluni, Dorsch, and Dzebo (2021) examined how political institutions affect confirmed deaths per capita and suggested that democracy is significantly and positively associated with the outcome, supporting the view that democracies responded to Covid-19 less effectively. Similarly, Cepaluni, Dorsch, and Branyiczki (2020) examined the relationship between political institutions and deaths per capita at the early stage of Covid-19, defined as the first 100 days of the pandemic. The study found that more democratic countries experienced higher deaths per capita than less democratic countries. Overall, empirical evidence on the relationship between the level of autocracy and the direct and indirect effectiveness of Covid responses has been mixed.

Quality of Bureaucracy and Covid-19 Response

A significant conceptual overlap exists between the quality of bureaucracy and state capacity, and some previous studies have used the terms interchangeably. In policy research, both refer to the ability to implement policy effectively (Rogers and Weller 2014), that is, the strength of the causal relations between the institutional design of policies and the intended outcome (Lindvall and Teorell 2016). Both concepts also involve combinations of various analytical, operational, and political competencies that can affect policy success or failure (Wu, Ramesh, and Howlett 2015). Higher state capacity or quality of bureaucracy also indicates the existence of administrative capacity, which entails efficient and impartial government agencies (Cronert and Hadenius 2021).

There are differences in the two concepts, however. Their key distinction lies in their level of analysis (Hendrix 2010). Quality of bureaucracy concerns the level of bureaucracy, measuring how effectively the bureaucracies of a country function. State capacity not only includes the function of bureaucracy but also concerns the functioning of the state such as interagency collaboration—or how efficiently and effectively bureaucracies collaborate with one another, which has been proven critical for pandemic response.

Perhaps one of the most discussed and well-known concepts of bureaucracy is “Weberian” bureaucracy (Evans and Rauch 1999). Weberian bureaucracy, often associated with high-quality and effective bureaucracy, is characterized by meritocratic recruitment and the offering of predictable and rewarding long-term careers (Evans and Rauch 1999). These bureaucracies are also generally insulated from political influence and effectively deter corruption. These characteristics enable state agencies to recruit talented civil servants and keep them throughout their careers.

Whether these characteristics are adequate for effective Covid-19 response remains a question for several reasons. First, today’s public policy problems, evidenced by the Covid-19 pandemic, transcend the boundaries of a single nation. As a result, the ability to influence outcomes outside of a state’s territory and the capacity to collaborate with other governments and countries are more important than ever (Tevdovski, Jolakoski, and Stojkoski 2022; Van der Wal 2020). Second, effective pandemic response not only requires collaboration and influence outside of a state’s territory but also within the territory; effective and efficient interagency and government–businesses collaboration are critical.

Because these modes of collaboration relate more to state capacity than the quality of bureaucracy, the relationship between the quality of bureaucracy and effective Covid-19 response is difficult to gauge. Indeed, one could even project that a higher quality Weberian bureaucracy would hinder effective Covid-19 response due to the bureaucracies’ strict internal regulation and insulation from political leadership (Evans and Rauch 1999; Merton 1976). This might have been especially evident during the early stage of the Covid-19 pandemic, when fast and effective decision-making and implementation were needed.

Theoretical Expectations

This study examines whether East Asia's regional characteristics and political institutions, namely, degree of autocracy and quality of bureaucracy, can explain East Asia's relatively effective early-stage Covid-19 response. This research uses Covid-19 infection and mortality rates as a country's Covid-19 response or outcome. "East Asia" is defined as members of the East Asian Miracle states (Krugman 1994; Li 2003): Burma, China, Indonesia, Japan, South Korea, Malaysia, Mongolia, Philippines, Singapore, Thailand, and Vietnam.² Due to data limitations, our analysis sample does not include Taiwan and Hong Kong.³

We first posit that East Asian countries experienced lower Covid-19 infection cases and death rates than the rest of the world during the early stages of Covid-19. As discussed in the previous section, we reason that East Asia's regional characteristics: (1) prior experience with infectious diseases, (2) institutional infrastructure and the legacy of the developmental state, and (3) collectivist culture, contributed to this success and hypothesize as follows:

Hypothesis 1: East Asian countries experienced less severe Covid-19 outcomes than other countries during the early pandemic.

Next, we comparatively examine the effects of two political characteristics: the degree of autocracy and the quality of bureaucracy. In the case of autocracy, previous studies have revealed both positive and negative aspects of indirect and direct Covid-19 responses. Stronger autocratic states can take fast policy measures with relatively less electoral pressure; however, swift policy actions do not necessarily lead to positive outcomes, and empirical analysis may not show an overall effect due to autocracies' positive and negative aspects canceling each other out. Therefore, we hypothesize as follows:

Hypothesis 2a: Countries with a higher degree of autocracy exhibited both positive and negative Covid-19 responses, which interact such that the impact of degree of autocracy on Covid-19 outcomes will not be statistically significant.

We expect a similar interaction for the quality of bureaucracy. On one hand, prior studies have overwhelmingly shown that a high quality of bureaucracy is positively associated with various developmental outcomes such as economic development, protection of property rights, and foreign investments since high-quality bureaucracy is generally shielded from political influence, impartial, and meritocratic. Countries with high-quality bureaucracy have capable civil servants who formulate policies based on merit and impartiality. Not surprisingly, these attributes make high-quality bureaucracy desirable for most countries and a sine qua non for development.

Despite these benefits, high-quality bureaucracy may not translate to an effective Covid-19 response. First, as previously discussed, the capacity for various types of collaboration—interagency, government–business, and government–citizen—is critical for pandemic responses. Because the quality of bureaucracy measure captures the

effectiveness of bureaucratic function but not necessarily the function of the state and administration (Hendrix 2010), a high quality of bureaucracy does not guarantee an effective pandemic response through collaborations. Second, as previously noted, a higher quality of Weberian bureaucracy may be more rule-based with strict internal regulation and insulation from political leadership. Such inflexibility may hinder fast and effective decision-making (Fukuyama 2013), which was especially critical during the early stage of the Covid-19 pandemic. Therefore, like the degree of autocracy, we expect the effect of the quality of bureaucracy to be statistically insignificant as follows:

Hypothesis 2b: The high-quality bureaucracy measure does not capture collaborative capacity and flexible responsiveness, so the relationship between high-quality bureaucracy and Covid-19 outcomes will not be statistically significant.

Finally, we examine whether the two political characteristics, in addition to East Asia's unique characteristics, can explain the performance gap between East Asian countries and the rest of the world. Although neither political characteristic is likely to exert a strong generalized effect by itself, we examine whether interacting with East Asia's unique characteristics leads to different results. Regarding the quality of bureaucracy, we hypothesize that the interaction with East Asia's unique characteristics may bring positive results because the two complement one another. As previously discussed, even effective bureaucracies may lack collaboration capacity—both interagency and government–business. East Asia's distinctive characteristics can cover such weaknesses as East Asian countries' prior experience with infectious diseases and their developmental state legacies drove the development of the necessary institutional infrastructure for effective collaboration.

Consequently, the quality of bureaucracy can also complement East Asia's unique characteristics. Sound policy design—*de jure* institution or institutional design—is necessary for an effective policy response like the Covid-19 response; however, it is not a sufficient condition because a robust institutional design does not guarantee a robust policy implementation in practice (Helmke and Levitsky 2004; Melton and Ginsburg 2014). Effective policy response requires both robust policy design and robust implementation.

In this line of argument, the quality of bureaucracy matters a great deal. Even with pre-Covid-19 infectious disease experience, successful implementation of necessary policies was not automatic or assured. Even if necessary legislation were passed, implementing such legislation successfully requires high-quality bureaucracy. Similarly, successfully executing a Covid-19 response required more than cooperation from citizens and businesses but also the ability to execute the plan. Variation likely exists within the East Asian Miracle states in terms of Covid-19 policy implementation; we argue the variation can be explained by the quality of bureaucracy and hypothesize as follows:

Hypothesis 3a: The interaction effect of East Asian countries' experience on high-quality bureaucracy contributed to better Covid-19 outcomes than those experienced by other countries with high-quality bureaucracy.

Unlike the quality of bureaucracy, degree of autocracy is not expected to have an interaction effect with East Asia's unique characteristics. We reason that the conflicting effects of autocracy will not be impacted significantly by interaction with regional characteristics. As previously noted, some countries likely utilized autocratic advantage effectively to respond to Covid-19, but some countries likely misused the advantage. Empirically, the advantages and disadvantages will neutralize each other, resulting in statistical insignificance. Therefore, we hypothesize as follows:

Hypothesis 3b: The interaction effect for a higher degree of autocracy and East Asian countries is not associated with better Covid-19 outcomes than other countries with a higher degree of autocracy.

Data

This research uses aggregated data from a variety of sources. Our sample is 111 countries that were affected by Covid-19. Covid-19 outcome data provided by the Johns Hopkins Coronavirus Resource Center (CRC) was used to formulate the dependent variable. This dataset contains the location and number of confirmed Covid-19 cases, deaths, and recoveries for all affected countries from January 22, 2020, to March 10, 2023 (Dong, Du, and Gardner 2020). Our analysis used the number of confirmed Covid-19 cases and deaths as of 180 days after the first confirmed case in each country. By using each country's population data from World Development Indicators (WDI), we generated two dependent variables, *number of cumulative Covid-19 confirmed cases per 100 people* and *number of cumulative Covid-19 deaths per 100 people* (details and data sources of the variables are in Appendix A). Our study period is from July 20, 2020, to September 29, 2020, the earliest and latest date of 180 days after the first confirmed case in the countries in our sample.⁴

Our main independent variables are autocracy and government effectiveness scores, as well as the East Asian indicator (see Appendix A). For autocracy, we use the 2018 autocracy score provided by the Center for Systemic Peace's Polity5 project. It is an additive eleven-point scale from 0 (less autocratic) to 10 (more autocratic). The autocracy index is based on the coding of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive (Marshall, Gurr, and Jaggers 2020).

Second, to measure quality of bureaucracy, we use the measure of *government effectiveness* (Andersen 2018; Cornell, Knutsen, and Teorell 2020; Jugl 2019; Petrova 2021; Van de Walle 2006). We use the 2020 government effectiveness index from the World Bank's Worldwide Governance Indicators (WGI). It is a continuous variable ranging from -2.5 (less effective) to 2.5 (more effective). This index captures perceptions of the government's effectiveness by measuring the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (Kaufmann, Kraay, and Mastruzzi 2009).

For the East Asia variable, we created an indicator variable using 1 for East Asia and 0 for others. This geographic categorization reflects the distinct regional characteristics of the 11 East Asian countries (Burma, China, Indonesia, Japan, South Korea, Malaysia, Mongolia, Philippines, Singapore, Thailand, and Vietnam) in our sample.

Our control variables consist of government health expenditure, GDP per capita, tax revenue, and geographical region indicators (see Appendix A). For government health expenditure we used 2019 domestic general government health expenditure data (percent of current health expenditure) from WDI. GDP per capita was also taken from 2019 WDI data. Tax revenue as a percentage of GDP was taken from 2015 WDI data.⁵ Geographical region indicators such as *Northern Hemisphere*, *Southern Hemisphere*, and *tropics* are included in our analysis to account for the difference in seasons and weather when the pandemic started and progressed. In particular, the seasonal differences of countries in different latitudes could be associated with the speed of the Covid-19 outbreak in early 2020. The variable of the Northern Hemisphere indicates 1 for country capitals located north of 23.5° north latitude and 0 for others. The variable for Southern Hemisphere indicates 1 for country capitals located further south than 23.5° south latitude and 0 for others. The variable of tropical area is represented as 1 for the country capitals around the Equator, from 23.5° north to 23.5° south latitude, and 0 for others. We used Acemoglu *et al.*'s (2019) supplementary data to generate the geographical indicators.

Table 1 presents the descriptive statistics of all variables for the analysis sample. For the two dependent variables, the average number of cumulative confirmed cases per 100 people in the six months after the first confirmed case is 0.408. Second, the average number of cumulative deaths per 100 people is 0.013. For independent variables, the average autocracy measure was 1.144 on a scale from 0 (less autocratic) to 10 (more autocratic). Government effectiveness ranged from -2.5 (less effective) to 2.5 (more effective) and was 0.146 on average. East Asian countries accounted for 9.9 percent of the sample.⁶

For the control variables, the average governmental health expenditure is 53.80 percent. The average GDP per capita is about \$23,857 (constant 2017 international \$). The percentage of tax revenue out of GDP is 22.76 percent on average. For the geographical characteristics, the percentages of countries in the Northern Hemisphere, the Southern Hemisphere, and the tropics are 48.6 percent, 4.5 percent, and 46.8 percent, respectively. For our OLS analysis, we standardize the continuous variables and report their descriptive statistics in the second column of Table 1. Their means and standard deviations are 0 and 1, respectively.

Empirical Model

To examine the relationship between governance and Covid-19 outcomes, we construct the regression model as follows:

$$y_i = \alpha + \delta_1 E_i + \delta_2 A_i + \delta_3 B_i + \delta_4 E_i \times A_i + \delta_5 E_i \times B_i + \beta X_i + u_i \quad (1)$$

where y_i indicates Covid-19 outcomes, such as the number of cumulative confirmed Covid-19 cases per 100 people and the number of cumulative Covid-19 deaths per

Table 1. Descriptive Statistics (N = 111)

	Original variables	Standardized continuous variables for the OLS analysis
	Mean (Std)	Mean (Std)
Dependent Variables (180 days after the first confirmed case)		
Number of cumulative confirmed cases per 100 people	0.408 (0.561)	0.000 (1.000)
Number of cumulative deaths per 100 people	0.013 (0.019)	0.000 (1.000)
Independent Variables		
Autocracy index (0 to 10)	1.144 (2.169)	0.000 (1.000)
Government effectiveness (−2.5 to 2.5)	0.146 (0.954)	0.000 (1.000)
East Asia (=1)	0.099 (0.300)	
Government health expenditure (% of current health expenditure)	53.799 (20.241)	0.000 (1.000)
GDP per capita, PPP (constant 2017 international \$)	23,857.88 (22,010.06)	0.000 (1.000)
Tax revenue (% of GDP)	22.755 (11.264)	0.000 (1.000)
Northern hemisphere (=1)	0.486 (0.502)	
Southern hemisphere (=1)	0.045 (0.208)	
Tropical rainforest area (=1)	0.468 (0.501)	

Note: The two dependent variables are generated by using population in order to account for the total size of the population. All continuous variables are standardized in this analysis. Please refer to the details and data sources of the variables in Appendix A.

100 people six months after the first confirmed case of each country, i . We standardized these outcome variables for the analysis.

We have three types of variables to account for each country's governance: E_i is 1 for East Asian countries and 0 for others; A_i is the degree of autocracy of each

country; B_i is the government's effectiveness. The interaction terms, such as $E_i \times A_i$ and $E_i \times B_i$, are included to examine whether political institutions represented by autocracy and the quality of bureaucracy presented by government effectiveness, respectively, play different roles between East Asian countries and other countries in their Covid-19 outcomes. X_i is a vector of the control variables, including the government health expenditures, GDP per capita, tax revenue, and geographical region indicators (Northern Hemisphere, Southern Hemisphere, or the tropics), as shown in Table 1. We also standardize all the continuous independent variables for the regression analysis to make practical inferences from the estimated coefficients.

In equation (1), δ_1 indicates whether East Asian countries responded better or worse to Covid-19 than other countries. δ_2 captures the relationship between political institutions and Covid-19 outcomes, while δ_3 examines whether the quality of bureaucracy is associated with Covid-19 outcomes. δ_4 and δ_5 examine whether East Asian countries differed from other countries in terms of political institutions or quality of bureaucracy in responding to Covid-19. To account for any possible heteroscedasticity, we estimated robust standard errors.

To examine whether autocracy and government effectiveness have their own weaker and stronger relationships with the outcome variables with and without controlling for each other, we conducted the three analyses using the regression equation (1). The first analysis focused on E_i , A_i , and their interaction term, $E_i \times A_i$; the second analysis concentrated on E_i , B_i , and their interaction term, $E_i \times B_i$; and the combined third analysis includes all three main explanatory variables and the first and second interaction terms together.

Empirical Results

Tables 2–4 present the empirical results of our three analyses. In the tables, Columns (1) and (2) show analysis results for cumulative Covid-19 confirmed cases and death tolls per 100 people, respectively. We standardized both the outcomes and the continuous independent variables for the analysis. In this table, negative estimates indicate that higher values for the independent variable are associated with lower Covid-19 confirmed cases and deaths, while positive estimates suggest the opposite-direction effect.

Table 2 reports the estimated coefficients of East Asia, the autocracy index, and their interaction term in the analysis. The estimates of being East Asian countries are negative and statistically significant, at least at $p < 0.01$ in columns (1) and (2). They suggest that compared to other countries, East Asian countries' total confirmed cases and death rates were lower by 0.871 standard deviations and 0.725 standard deviations, respectively. The estimated coefficients of the autocracy index and its interaction terms with East Asia in columns (1) and (2) are relatively small and statistically insignificant. Thus, the degree of autocracy seems unrelated to Covid-19 outcomes for all countries, including East Asian countries. Also, GDP per capita positively correlates with confirmed cases and death rates, statistically significant at least at $p < 0.1$. This result may indicate that countries with higher income conducted more widespread and organized Covid-19 testing, had greater transparency in reporting related statistics, and experienced more mobility in travel (Chaudhry *et al.* 2020).

Table 2. Regression analysis results with autocracy (180 days after the first confirmed case)

	(1) Cumulative Covid-19 Confirmed Cases	(2) Cumulative Covid-19 Deaths
East Asia (=1)	-0.871*** (0.171)	-0.725*** (0.154)
Autocracy index	0.199 (0.169)	-0.120 (0.099)
East Asia (=1) × Autocracy index	-0.164 (0.185)	0.086 (0.127)
Government health expenditure	0.238 (0.147)	0.146 (0.126)
GDP per capita	0.406*** (0.123)	0.200* (0.105)
Tax revenue	-0.287* (0.172)	0.091 (0.190)
Northern Hemisphere (=1)	-0.282 (0.319)	-0.164 (0.292)
Southern Hemisphere (=1)	-0.212 (0.581)	-0.667 (0.416)
Constant	0.239 (0.207)	0.178 (0.196)
R-squared	0.239	0.192
N	111	111

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors in parentheses. All continuous variables are standardized in the analysis. Column 1 for the number of cumulative Covid-19 confirmed cases per 100 people; Column 2 for the number of cumulative Covid-19 deaths per 100 people.

There were no considerable differences in confirmed cases and death rates related to Covid-19 between geographic areas.

Table 3 presents the estimated coefficients of East Asia, government effectiveness, and their interaction term in the analysis. East Asian countries, compared to other countries, had lower confirmed cases and death rates, as shown in columns (1) and (2). The estimated coefficients are statistically significant at $p < 0.01$ and smaller than those in Table 2. The estimates of government effectiveness are small and not statistically significant in both columns. The estimate of the interaction term in column (2) is statistically significant at $p < 0.05$, a 0.314 standard deviation decrease in deaths per standard deviation increase in government effectiveness, indicating higher government effectiveness is negatively associated with Covid-19-related deaths among East Asian countries.

Table 3. Regression analysis results with government effectiveness (180 days after the first confirmed case)

	(1) Cumulative Covid-19 Confirmed Cases	(2) Cumulative Covid-19 Deaths
East Asia (=1)	-0.679*** (0.185)	-0.493*** (0.171)
Government effectiveness	-0.255 (0.188)	-0.163 (0.193)
East Asia (=1) × Government effectiveness	-0.132 (0.156)	-0.314** (0.141)
Government health expenditure	0.271* (0.144)	0.149 (0.124)
GDP per capita	0.576*** (0.151)	0.363** (0.179)
Tax revenue	-0.355 (0.251)	0.207 (0.167)
Northern hemisphere (=1)	-0.103 (0.311)	-0.328 (0.249)
Southern hemisphere (=1)	-0.069 (0.555)	-0.695* (0.404)
Constant	0.127 (0.194)	0.255 (0.189)
R-squared	0.233	0.198
N	111	111

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors in parentheses. All continuous variables are standardized in the analysis. Column 1 for the number of cumulative Covid-19 confirmed cases per 100 people; Column 2 for the number of cumulative Covid-19 deaths per 100 people.

Table 4 presents the analysis results that include both interaction terms. The estimates of East Asia are statistically significant at $p < 0.01$ and indicate East Asian countries, compared to other countries, had lower total confirmed cases and death rates related to Covid-19 by 0.693 standard deviations and a 0.495 standard deviation, respectively. Although the estimates of autocracy and government effectiveness are small and statistically insignificant by themselves, and the estimate of East Asia × Autocracy is statistically insignificant, the estimate of East Asia × Government Effectiveness is negative and statistically significant at $p < 0.05$ in column (2). Therefore, when the level of autocracy is constant, one standard deviation increase

Table 4. Regression analysis results with autocracy and government effectiveness (180 days after the first confirmed case)

	(1) Cumulative Covid-19 Confirmed Cases	(2) Cumulative Covid-19 Deaths
East Asia (=1)	-0.693*** (0.180)	-0.495*** (0.175)
Autocracy index	0.179 (0.182)	-0.141 (0.102)
Government effectiveness	-0.193 (0.201)	-0.213 (0.193)
East Asia (=1) × Autocracy index	-0.119 (0.190)	0.143 (0.120)
East Asia (=1) × Government effectiveness	-0.182 (0.172)	-0.284** (0.143)
Government health expenditure	0.254* (0.145)	0.163 (0.125)
GDP per capita	0.556*** (0.137)	0.378** (0.181)
Tax revenue	-0.254 (0.192)	0.126 (0.200)
Northern hemisphere (=1)	-0.289 (0.328)	-0.180 (0.299)
Southern hemisphere (=1)	-0.163 (0.572)	-0.620 (0.407)
Constant	0.229 (0.217)	0.173 (0.200)
R-squared	0.250	0.208
N	111	111

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors in parentheses. All continuous variables are standardized in the analysis. Column 1 for the number of cumulative Covid-19 confirmed cases per 100 people; Column 2 for the number of cumulative Covid-19 deaths per 100 people.

in government effectiveness is associated with a 0.284 standard deviation decrease in Covid-19 confirmed deaths among East Asian countries.

To better capture the contrasting levels of confirmed cases and deaths in East Asia and the rest of the world, we graphically show the predicted outcomes for the two groups using the estimated results from Table 4. Panel A in Figure 1 shows that

for both East Asia and non-East Asian countries, the predicted Covid-19 confirmed cases per 100 people marginally increase for higher levels of autocracy. However, non-East Asian countries have a slightly steeper slope of marginal increase. The 95 percent confidence interval for non-East Asian countries includes zero (average level in standardized value of autocracy and government effectiveness), suggesting that the predicted cases are not statistically different from zero at all levels of autocracy. Furthermore, according to Panel A, the confirmed cases in East Asian and non-East Asian countries are not significantly different when the autocracy value is above 1.5, as the 95 percent confidence intervals of the two groups overlap. Because of the insufficient statistical power resulting from limited variation in the data, it is challenging to discern a significant distinction in Covid-19 confirmed cases between East Asian and non-East Asian nations. As a result, there is very little that we can learn from this analysis.

Panel B, displaying predicted marginal relations between autocracy and Covid-19-related deaths, shows that when the level of autocracy increases, the predicted deaths per 100 people marginally decrease for non-East Asian countries. In contrast, the predicted deaths per 100 people hardly change for East Asia. The 95 percent confidence interval for non-East Asian countries includes zero across all levels of autocracy. In comparison, the 95 percent confidence interval for East Asia does not include zero across all levels of autocracy. The 95 percent confidence intervals of non-East Asian countries and East Asia overlap as autocracy increases. Therefore, similar to Panel A, the limited data variation restricts the meaningful information that we can learn from this analysis.

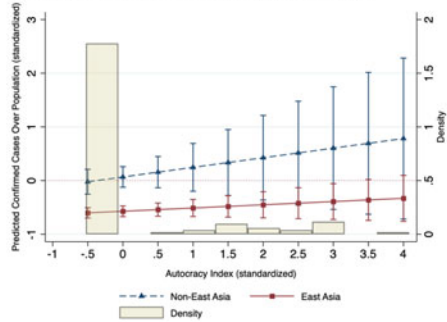
Panels C and D show the predicted marginal relations between government effectiveness and Covid-19 outcomes. Panel C shows that when the level of government effectiveness increases, the predicted confirmed cases per 100 people for both East Asia and non-East Asian countries marginally decrease. While the 95 percent confidence intervals for non-East Asian countries include zero at all levels of autocracy, those for East Asia do not include zero at values above zero for government effectiveness, indicating predicted confirmed cases for East Asia are statistically lower than zero when government effectiveness is higher than zero. The 95 percent confidence intervals for the two groups overlap at all levels of government effectiveness, indicating no statistical difference in confirmed cases at all levels of government effectiveness between the two groups.

Similarly, in Panel D, the 95 percent confidence interval for the predicted marginal relations between government effectiveness and Covid-19-related deaths for non-East Asian countries and East Asia overlap at all levels of government effectiveness. The confidence intervals of the confirmed deaths in East Asia are statistically less than zero when government effectiveness is higher than zero, while the confidence intervals of the confirmed deaths in non-East Asian countries are not statistically different from zero at all levels of government effectiveness.

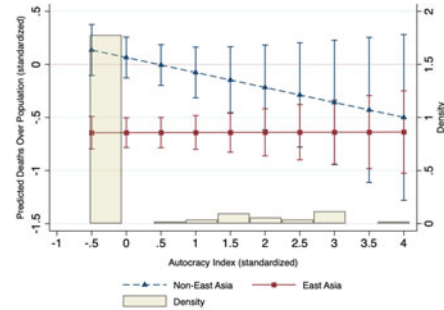
Discussion

This study examined whether East Asian countries outperformed other countries regarding early-stage Covid-19 outcomes—cumulative confirmed cases and deaths

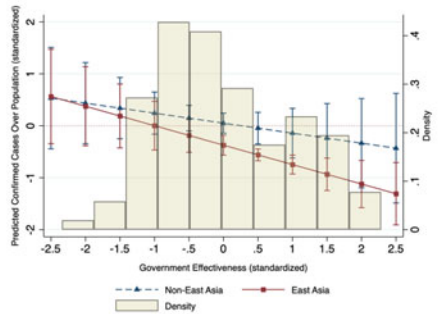
Panel A. Predicted marginal relationship between autocracy and COVID-19 confirmed cases



Panel B. Predicted marginal relationship between autocracy and COVID-19 related deaths



Panel C. Predicted marginal relationship between government effectiveness and COVID-19 confirmed cases



Panel D. Predicted marginal relationship between government effectiveness and COVID-19 related deaths

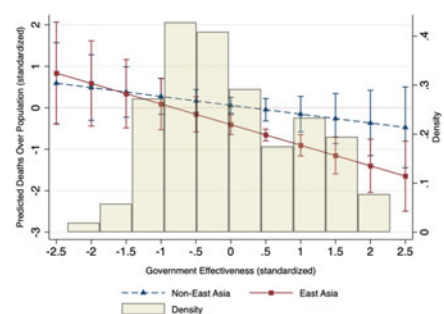


Figure 1. Predicted marginal relationship using estimates in Table 4.

Note: 95 percent confidence intervals are presented over the predicted marginal relationship.

in the six months after the first confirmed case. We examined whether the degree of autocracy and quality of bureaucracy⁷ can explain the performance gap between East Asian countries and other countries. To this end, we have tested a series of hypotheses, and our analysis mostly confirms our expectations.

First, consistent with our first hypothesis, East Asian countries had lower confirmed cases and deaths by about a half standard deviation compared to the rest of the world, suggesting the possibility that East Asia's unique characteristics—prior experience with infectious diseases, institutional infrastructure and the legacy of the developmental state, and collectivist cultural values—may have played an important role in reducing Covid-19 confirmed cases and death rates in East Asia at the early stage of pandemic.

Second, we initially hypothesized that both degrees of autocracy and the quality of bureaucracy would yield statistically insignificant results. Our analysis showed mixed results. First, as expected, the relationship between autocracy and confirmed cases is not statistically significant. The lack of a strong relationship is also observed in the autocracies in East Asian countries. These results suggest a higher degree of autocracy has no major bearing on the performance gap between East Asian countries and the rest of the world. Perhaps this should not come as a surprise; East Asian countries, through their unique characteristics, realized the gravity of the situation, obtained policy support from their citizens, and had an advantage in pandemic-preparedness ahead of Covid-19. One can even argue that such readiness may further exacerbate the “autocratic disadvantage.” Specifically, such readiness may allow more room for abuse of their centralized power. Therefore, the degree of autocracy yields statistical insignificance for both East Asian and other countries, and the interaction with East Asian countries is unsurprising.

On the other hand, our analysis offers partial evidence that the quality of bureaucracy can provide explanatory power for the performance gap between East Asia and the rest of the world. Quality of bureaucracy is not only statistically significant and negatively associated with Covid-19 confirmed cases, but it is also associated with lower deaths among East Asian countries, by at least about 1/3 standard deviation lower in deaths per standard deviation increase in quality of bureaucracy. This implies that the quality of bureaucracy matters for the rest of the world but matters even more when joined with East Asia's unique characteristics. As discussed earlier, the quality of bureaucracy and East Asia's unique characteristics may complement one another, enhancing collaborative capacity and flexible response. In essence, bureaucratic learning may occur due to East Asia's unique characteristics (Dekker and Hansén 2004).

To further confirm the combined influence between East Asia's unique characteristics and the two political institutions, we examined the predicted outcomes for East Asia and the rest of the world. Results for the degree of autocracy are consistent with our expectations. For the predicted relationship between autocracy and Covid-19 outcomes, we observe that both confirmed cases and deaths in East Asia and the rest of the world converge, and their confidence intervals overlap as the level of autocracy increases. The predicted outcomes and their confidence intervals in East Asia are lower than the average across most levels of autocracy. In contrast, for the rest of the world, the predicted confirmed cases increase and are higher than the average as the level of autocracy increases. The predicted deaths decrease and become

lower than the average as the level of autocracy increases. The 95 percent confidence intervals across all levels of autocracy include the average of both confirmed cases and deaths.

For the predicted results between the quality of bureaucracy and Covid-19 outcomes, the results are more nuanced. For both East Asia and the rest of the world, Covid-19 outcomes improve as the quality of bureaucracy increases. Their confidence intervals overlap across all the levels of quality of bureaucracy, although East Asia generally shows better (lower) outcome values than the rest of the world. The predicted confirmed cases and deaths for East Asia and the rest of the world are higher than the average outcomes at lower levels of quality of bureaucracy, and they become lower than the average outcomes as the quality of bureaucracy increases. These results suggest that the greater explanatory power we have observed for East Asia's quality of bureaucracy compared to the rest of the world warrants careful consideration and further future research.

Overall, these results confirm that the quality of bureaucracy is a significant predictor for Covid-19 outcomes for both East Asian countries and the rest of the world and that the quality of bureaucracy plays a more significant and positive role than the degree of autocracy.

Conclusion

This research empirically examines two interrelated questions. First, does empirical analysis support prior findings that East Asia outperformed the rest of the world in the early stages of the Covid-19 pandemic? Second, if so, does degree of autocracy or quality of bureaucracy explain East Asia's relative success? To empirically examine these questions, we analyzed two outcomes of interest: confirmed cases and deaths. Our empirical findings first confirm that, consistent with prior findings, East Asia as a region relatively outperformed the rest of the world for both outcomes of interest. Such findings support the possibility that East Asia's legacy of developmental states, prior experience with infectious diseases, and collectivist cultural values may have contributed to effective pandemic response.

Second, our research suggests that the quality of bureaucracy matters. Not only is a high quality of bureaucracy significantly and negatively associated with Covid-19 confirmed cases, but its joint influence with East Asian countries demonstrated a statistically significant and negative effect on Covid-19 deaths. Our results indicate that the quality of bureaucracy matters more than the degree of autocracy to effective early-stage Covid-19 responses. These results suggest East Asia's regional characteristics and quality of bureaucracy may have contributed to East Asia's relative success in the early stage of the pandemic. This research complements prior studies focusing on the longer-term time frame by explaining the early performance gap in Covid-19 responses between East Asia and the rest of the world through the quality of bureaucracy.

However, this research is not without limitations and caveats, which we hope to address in the future. Most importantly, there is the data issue. This research assumes that the East Asia dummy variable has three unique characteristics; however, the East Asia dummy variable may include other explanatory factors. In the future, we hope to

devise a strategy to measure these characteristics more parsimoniously. Second, not all countries' data were available; thus, we could only analyze 111 countries and could not include Hong Kong and Taiwan as East Asian countries in our analysis.

Third, it is possible that the reported information, such as the death rate and infection rate, may be less reliable for some countries, as some studies have suggested (Adiguzel, Cansunar, and Corekcioglu 2020; Annaka 2021). We note especially the Covid-19 data manipulation problem, which we view as one of the critical limitations of this research and hope to address in the future. Fourth, we hope that future research addresses endogeneity issues, such as the omitted variable bias and simultaneity that may lead to under- or over-estimating our results. Finally, this research used two Covid-19 outcomes: Covid-19 infection and death rates. Although the two outcomes may hold different theoretical implications, this research has treated the two homogeneously as Covid-19 outcomes. In the future, we hope to theoretically differentiate the two outcomes, enabling the articulation of far more useful policy implications. Despite these limitations, we believe this study provides a valuable contribution to understanding the contributors to effective pandemic response.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/jea.2023.26>.

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Conflicts of interest. The authors declare none.

Notes

1. Throughout the paper, we interchangeably use the terms quality of bureaucracy and government effectiveness.
2. We consider Vietnam and China as the next generation of East Asian Miracle states.
3. Taiwan is not included in the World Development Indicator (WDI) data used to create dependent and control variables. Similarly, there is no data on Hong Kong in the Polity IV for autocracy index, which is our main independent variable.
4. The study period is based on the earliest and the latest dates of 180 days after the first confirmed case in our sample, which is July 20, 2020 and September 29, 2020, respectively. Please note that because the Covid-19 Data Repository by the Center for Systems Science and Engineering (CSSE) of the CRC provides data starting from January 22, 2020, we were unable to obtain the exact date of 180 days after the first confirmed case for 5 countries: China, Japan, South Korea, Thailand, and the United States, as the dates of their first confirmed cases were before January 22, 2020. To address this, we considered the first confirmed case for these 5 countries as January 22, 2020, which is the earliest date available in our data, and calculated the date of 180 days from that point. For the rest of the countries, we have their precise dates of the first confirmed case as recorded in our dataset.
5. Due to limited availability of country data for the most recent tax year, using the most recent year of tax revenue data would have resulted in a significant decrease in the sample size, offering a lower statistical power. However, we have found that our results are generally consistent with those using more recent tax revenue data from 2019, which implies using 2015 tax revenue may not significantly impact the results within the context of our analysis. For more information, please refer to Appendices B1, B2, and B3.
6. In Appendices C1 and C2, we show the distribution of our two independent variables, *autocracy* and *government effectiveness*, by East Asian and non-East Asian countries. As shown in Appendix C1, 7 out of 11 East Asian countries have a score of 0 in the autocracy index (63.64% of all East Asian countries), similar to 64 non-East Asian countries (64% of all non-East Asian countries). This suggests that the asymmetric distribution with zero skewness in autocracy is not unique to East Asian countries. As

shown in Appendix C2, East Asian countries lack values below -0.5 in government effectiveness, while non-East Asian countries show a relatively even distribution across the range. However, among East Asian countries, the skewness in government effectiveness is not prominent at the higher end of the index range. Only 18.18 percent of East Asian countries fall within the range of 1.5 to 2.5, the higher values in the index range, which was not significantly different from 11 percent among East Asian countries.

7. Measured as government effectiveness of Worldwide Governance Indicators (WGI).

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