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## ARTICLE

# Pandemic vulnerability, policy feedback and support for immigration: Evidence from Asia

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## Abstract

Past studies have shown that disease threat increases people's hostility towards immigrants. However, in our survey ( $N = 9571$ ) conducted in five advanced Asian economies during the outbreak of COVID-19, we found that COVID-19 vulnerability was positively associated with support for immigration. Drawing on insight from policy feedback theories, we propose that the positive association is caused by the presence of widespread border crossing restrictions, which have changed the meaning and cost implications of COVID-19. As the outbreak expands, the pandemic has become not just a threat to people's health but also a barrier to globalization. Consequently, people who are worried about the disease may see globalization processes, including migration, as signs of pandemic relief. We find supportive evidence in our analysis. First, the positive association between COVID-19 vulnerability and support for immigration is more salient among respondents who considered restrictions on international travel to be stringent. Second, the positive association between COVID-19 vulnerability and immigration attitude was mediated by perceived economic threat from the pandemic and contribution by immigrants towards the containment of the pandemic. These findings

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suggest that disease control measures adopted at the global level may alter certain widely accepted effects of disease threat on immigration attitudes.

#### KEYWORDS

attitudes, COVID-19, disease threat, globalization, immigration, policy feedback

## BACKGROUND

The threat of contagious disease has long been a source of intergroup tension. The Chinese Exclusion Act of 1882 in the United States, for example, was steeped in the prejudice that the Chinese immigrant community was the cause of outbreaks of smallpox and bubonic plague (Markel & Stern, 2002; Trauner, 1978). More recently, between 1987 and 2010, people who were HIV-positive were banned from immigration into the United States. Similarly, in Europe, the spread of infectious diseases has often been cited by politicians as a reason for reducing immigration (Berry et al., 2016; The Prague Post, 2015). In the literature, studies have shown a persistent link between disease threat and hostility towards immigrants, particularly if the immigrants are unfamiliar. Whereas evolutionary psychologists attribute anti-immigrant sentiments to evolved disease avoidance mechanisms deeply rooted in the human psyche (Faulkner et al., 2004; Oaten et al., 2009), others attribute the link to emotions, political manipulation of the threat of disease, ideological belief or pre-existing prejudice (Aaroe et al., 2017; Adida et al., 2020; Green et al., 2010).

What is the relationship between the threat of COVID-19 and attitudes towards immigration? In just a few months after the first confirmed case was reported, global mobility came to a standstill, with more than 80,000 COVID-19-related travel restrictions issued by countries all over the world (International Organization for Migration, 2020). Many countries also witnessed heightened hate crimes against Asians (Ren & Feagin, 2021). In line with existing knowledge of the relationship between disease and attitudes towards immigration, many observers warned of a surge in anti-immigrant sentiment, caused by economic downturn, border closures and fear of “other” as carriers of germs (e.g., Chugh, 2020; OECD, 2020; The Economist, 2020; Yayboke, 2020).

Based in Asia, our research team fielded a cross-national survey between 11 May and 26 May 2020, covering the region's five most advanced economies: Japan, South Korea, Taiwan, Hong Kong and Singapore. The survey measured respondents' perceived vulnerability to COVID-19, and a wide range of attitudes of socio-economic significance, including attitudes towards immigration, political trust, compliance with public health measures and perceptions of international travel restrictions. Guided by existing theories concerning disease threat and out-group attitudes, we had expected that people who felt vulnerable to COVID-19 would show more negative attitudes towards immigration. Strikingly, however, findings from the survey suggested the opposite: the threat of COVID-19 was positively associated with support for immigration. This positive association was robust to country variations and a battery of robustness checks. We also found no coding and translation error.

Intrigued by the unexpected results, we moved beyond the literature of traditional disease threat to insight from the policy feedback theory, which emphasizes that public policies have the capacity to shape political behaviour and attitudes through resource and interpretative mechanisms (Campbell, 2012; Pierson, 1993). The theory offers promise in understanding the puzzling association observed because the COVID-19 outbreak was not just a threat to individual health but was also an episode of rapid policy change. Due in part to the ability of the virus to transmit asymptotically, governments across the world rushed to impose stringent international travel restrictions in 2020. Such unprecedented restrictions threatened the jobs and economic security of people working in a wide range of sectors and

thus may have generated support for globalization, thereby countering the negative effects of the threat of disease. The restrictions also made attributing blame to immigrants spreading disease less convincing and may have allowed people to see the positive contribution of immigrants.

This article tests predictions derived from the policy feedback theory. Specifically, we examined whether respondents' perceived stringency of international travel measures moderated the association between COVID-19 vulnerability and attitudes towards immigration. We also tested whether the positive association was mediated by perceptions of the economic costs of the pandemic and the contribution of foreigners towards disease containment. To the extent that pandemic-driven border control measures changed the cost implications of the disease and made blame attribution to immigrants more difficult, we would expect the mediating effects to be positive. In the conclusion, we call for a research agenda that further theorizes and tests the complex interaction between public policy and disease threat in the formulation of attitudes towards immigration.

## Disease vulnerability, policy feedback and attitudes towards immigration

Disease can impact human society in many ways, but recent research has emphasized two mechanisms through which disease vulnerability develops into anti-immigrant sentiments among citizens: disease avoidance and social representation. The former sees xenophobic attitudes as deeply rooted emotional and cognitive responses that evolved in humans' ancestral environments to avoid disease threats (Aaroe et al., 2017; Faulkner et al., 2004; Green et al., 2010; Schaller & Park, 2011). Vulnerability towards disease can elicit certain affective reactions such as disgust (Oaten et al., 2009). These reactions generate negative sentiments towards potential carriers of disease: insects, animals and, essentially, foreigners (Faulkner et al., 2004; Schiefenhövel, 1997). Another mechanism that explains the negative influence of disease threat on attitudes to immigration is social representation (Washer & Joffe, 2006). Diseases are undesirable probabilistic events in the world that require explanations and solutions (Kirkwood & Brown, 1995). Blaming out-groups or political oppositions for disease offers a convenient means for people to make sense of uncertainty and protect themselves from danger (Adida et al., 2020; Fouratt, 2014). In sum, the existing literature highlights the function of anti-immigrant sentiments in tackling the threats and uncertainty brought by disease.

However, whereas the literature has yielded useful insights, we should be cautious about applying them uncritically to the COVID-19 outbreak. Specifically, no published work on disease threat and immigration to date has considered the role of public policy, and in particular immigration control measures, in the formation of attitudes. Cross-sectional surveys conducted prior to the outbreak of COVID-19 sampled respondents who had no experience of worldwide border restrictions. Meanwhile, in most laboratory and survey experiments, participants were randomly exposed to cues of disease without any knowledge of the disease control measures in place. Preferences for immigration policy or restrictions have been seen as an outcome rather than a determinant of attitudes. This could be problematic, because we cannot ascertain whether people reject immigrants simply because they feel insecure in the absence of disease control measures. Protection from infection may reduce people's sensitivity to the threat of disease. For example, in an experiment conducted by Aaroe et al. (2017), participants given information about hand hygiene were less responsive than others to the negative influence of disgust sensitivity on immigration attitudes. In a similar experiment, Huang et al. (2011) found that handwashing eliminated the relationship between germ aversion and negative attitudes towards out-groups. If even simple acts such as handwashing can mitigate the impacts of a disease threat, we should expect a similar effect from worldwide disease control measures. Instead of scapegoating foreigners, people vulnerable to COVID-19 may see them as counterparts in containing the disease, and that perspective may in turn soften their attitude to immigration.

Another consequence of the lack of focus on public policy is that previous studies generally did not take into consideration the costs of pandemic-driven immigration control. Prior to the outbreak of the COVID-19 pandemic, global migration and cross-border activities were deemed unstoppable due

to their paramount economic importance. Even in previous major disease outbreaks, such as severe acute respiratory syndrome (SARS) and swine flu, border control measures were only targeted at a limited number of countries and national borders remained largely permeable. People outside the infected countries hardly felt the economic and social costs associated with border restrictions. Thus, the low visibility and proximity of those restrictions could have undermined their potential role in attitude formation (Soss & Schram, 2007). In contrast, the COVID-19 outbreak infected more than 250 million people and led to a worldwide travel shutdown. Initial estimates suggest that disease control measures for COVID-19 have on average inflicted a loss of approximately 15% in industrial production over a 30-day period following their implementation (Deb et al., 2020). Although to date the COVID-19 outbreak has not fully abated, suffice it to say that the pandemic has fundamentally challenged people's understanding of disease and has upended their cost–benefit evaluations of restrictions on cross-border mobility.

These considerations are in line with the insights of the policy feedback theory. Political scientists have long recognized that policies are not just outcomes of some political processes, they are also part of the process (Lowi, 1964; Schattschneider, 1935). Policies configure the interest and beliefs of political elites and at mass level, build civic capacities and forge norms and adaptive expectations that affect future policy making (Larsen, 2019; Skocpol, 1992). In recent years, interest in policy feedback effects on public attitudes has surged. Working with large data sets, scholars have not only demonstrated the existence of attitudinal policy feedback effects but also distinguished different types of feedback, articulated the conditions for the effects and described the mechanisms that transmit those effects (e.g., Fernandez & Jaime-Castillo, 2013; He et al., 2021; Jacobs & Mettler, 2018; Jacobs et al., 2021). However, as noted by Béland and Schlager (2019), existing work on policy feedback has overwhelmingly focused on welfare policies in the United States, such as the Affordable Care Act. Meanwhile, with a few exceptions (e.g., Schwartz et al., 2021), there is virtually no research on the attitudinal feedback effects of immigration policies, let alone how policies shape the relationships between disease threats and immigration attitudes.

With hindsight, this lack of research is surprising because, as mentioned, the interaction between disease and immigration attitudes does not take place in a policy vacuum. The policy feedback literature has articulated at least two pathways through which public policies influence opinions of ordinary citizens. First, public policies have distributive consequences and thus may alter the cost–benefit calculations of their target groups (Pierson, 1993). Beneficiaries of existing policies have incentives to support the status quo. For example, in the United States, the expansion of Medicaid, a means tested public insurance programme, was found to induce favourable attitudes among low-income individuals towards the Affordable Care Act (Hopkins & Parish, 2019). Also, public policies may make resources available to certain groups, and thus empower them to influence public opinion (Mettler & Welch, 2004). Regarding COVID-19, we may expect that due to the severe economic impact caused by stringent border control measures, people who see themselves as vulnerable to the disease would also worry about their employment and financial security. That sense of economic insecurity may in turn incentivize them to lend stronger support for globalization and, by extension, immigration. In other words, the pandemic-driven border control measures may change the cost implications of the disease. Rejecting immigrants may be a rational protective response to disease only in an experimental setting, in which border control measures are absent.

Policy also exerts interpretive effects by conveying to the public the trends, values and realities of certain issues (Mettler & Soss, 2004; Pacheco, 2013). In response, the public behaves in a way described by Wlezien (1995) as a “thermostat” – developing or adjusting its policy preferences to guide policymakers to introduce more or fewer changes. In the context of immigration, public policy defines the number and mobility of immigrants and thus the types of threats they may pose to a society, and also signals the level of anti-immigrant attitudes in the population. Although rigid restrictions on immigrants rarely soften immigration attitudes through a stronger sense of control over the borders, they may propel individuals to distance themselves from accusations of xenophobia and racism (Flores, 2017; Schwartz et al., 2021). This may explain why anti-immigrant attitudes softened after the Brexit referendum (Schwartz

et al., 2021). Similarly, Gravelle (2018) found that ideological moderates in the United States became less likely to support a US–Mexico border fence when policy proposals to enhance border security featured prominently in the 2016 presidential election. We expect that the stringent border control measures implemented in response to the COVID-19 pandemic would have a similar effect, making negative descriptions about foreigners somewhat less popular. Taken together, in the presence of border control measures, the relationship between disease threat and anti-immigrant attitudes may be very different from what has been widely portrayed in the literature.

## The present study

The policy feedback explanation may help in understanding the positive link observed between COVID-19 vulnerability and support for immigration. Recall that our survey was fielded in Asia between 11 May and 26 May 2020. During that period, border restrictions were widespread and stringent, with nearly 60,000 travel restrictions worldwide, 70% of which were complete travel bans with no time parameters (International Organization for Migration, 2020). Asian countries were among the earliest to be affected by the measures: Japan postponed its Tokyo 2020 Olympic Games and other countries closed their borders to nearly all foreigners in March. Figure 1 shows that during our survey period, travel restrictions were at their peak in the five economies we chose, except for Singapore. In addition to border control measures of their own country, people were also affected by restrictions imposed by other nations. Therefore, we can assume that the border control measures were both visible and proximate to our respondents.

The five economies in this study – Japan, South Korea, Taiwan, Hong Kong and Singapore – were chosen because they are highly attractive immigration destinations in Asia (Abella, 2005; Hugo, 2005). In Hong Kong and Singapore, in particular, immigrants comprise more than 37% of the population (United Nations, 2019). Furthermore, as is the case with many popular immigration destinations in the world, immigration is a highly contentious issue in these five economies. As Figure 2 shows, people in Japan and South Korea tended to welcome immigrants prior to the COVID-19 outbreak, while those in Hong Kong, Taiwan and Singapore preferred a reduction in immigration to their countries (Chang & Welsh, 2016). This variation allowed us to check whether our findings were robust in populations with different levels of pre-existing immigration attitudes. Furthermore, previous studies on immigration attitudes in these five economies reported broadly comparable findings with studies conducted in Europe and America (e.g., Chang, 2019; Lee et al., 2017; Tsai et al., 2019). One such study had been conducted in

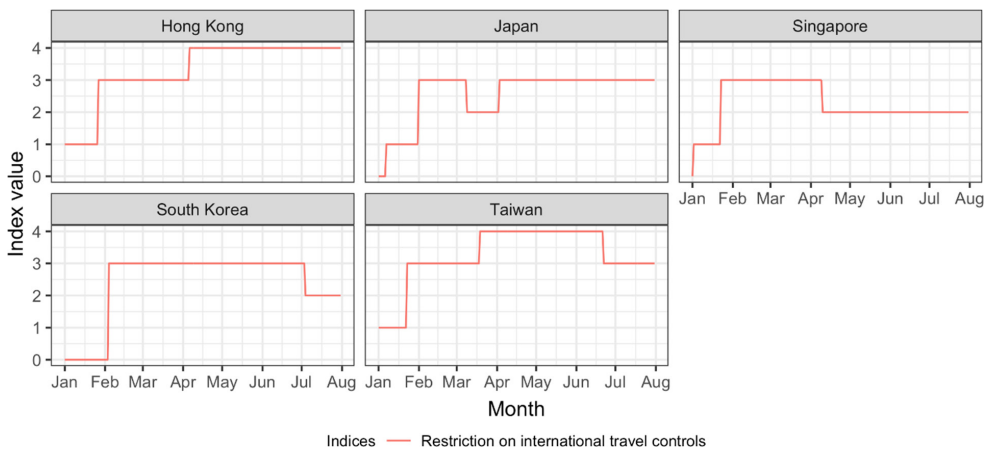
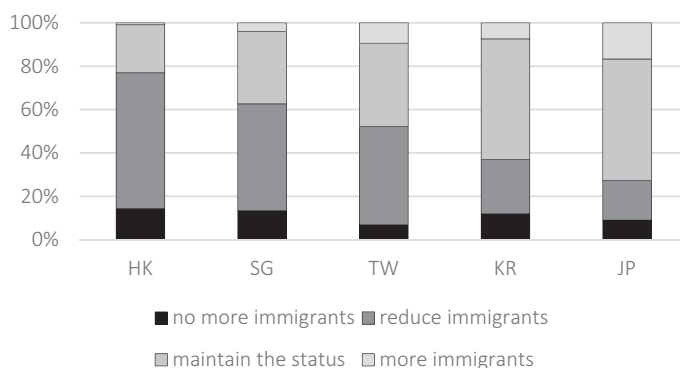


FIGURE 1 Travel restrictions in the selected economies. Source: Oxford COVID-19 Government Response Tracker, 2020





**FIGURE 2** Attitudes towards immigrants in the selected economies prior to the COVID-19 outbreak. Source: Chang & Welsh, 2016

Japan at the beginning of the COVID-19 outbreak, from January to March 2020, 2 months before our survey was fielded (Yamagata et al., 2020). In line with the prevailing view in the literature, the Japanese study reported that the threat of the COVID-19 outbreak was associated with negative attitudes not only towards Chinese people but also towards foreigners in general.

### Hypotheses

There may be many reasons for the positive association between disease threat and immigration attitudes. However, we should have more confidence in the policy feedback explanation if the relationship between disease vulnerability and immigration attitudes varied systematically across people who were differentially exposed to international travel measures. More specifically, given that people who saw those measures as stringent were more aware of their presence and influenced by them, we should expect that:

**Hypothesis 1** *The positive association between COVID-19 vulnerability and support for immigration would be more salient among people who saw international travel restrictions as stringent.*

The policy feedback theory also describes *how* public policies shape attitudes by changing their target groups’ values and cost–benefit calculations. As discussed, under stringent border control measures, attribution of the spread of COVID-19 to out-groups may become less convincing, leaving room for discourse about the positive contributions of foreigners to gain popularity, especially among those who felt vulnerable to COVID-19. Our second hypothesis, therefore, is:

**Hypothesis 2a** *The positive association between COVID-19 vulnerability and immigration attitudes would be mediated by a positive impression towards foreigners.*

Public policy also shapes attitudes through resource redistribution. COVID-19 prompted many countries to shut their borders, causing widespread economic disruption. People who see themselves as being vulnerable to the disease would also worry about their employment and financial security, which may in turn incentivize them to lend stronger support to immigration. If that is the case, we should expect:

**Hypothesis 2b** *The positive association between COVID-19 vulnerability and immigration attitudes would be mediated by the perceived economic impact of COVID-19.*

Of course, the two mediators were by no means exhaustive of the interpretative and distributive effects of international travel restrictions. We focused on them because they allowed us to evaluate the coherence of the policy feedback explanation, and we had relevant measurements in our survey.

Finally, it is crucial to control for political orientation because it may influence both disease threat and immigration attitudes. In Europe and America, those on the political left (liberal) are not only more supportive of immigration but also they are more likely to see COVID-19 as a significant threat to health than those on the right (conservative; Pew Research Center, 2018, 2021). Although the left-right ideology is less prevalent in Asia, political division – often found between pro-establishment and anti-establishment camps – is still visible in many public debates concerning pandemic control and immigration (Dalton & Tanaka, 2007; Institute of Policy Studies, 2021; Jou, 2010; Keum & Campbell, 2018). Since the five selected Asian economies have vastly different politics, we used trust in government as a proxy for political orientation in our core analysis. The two concepts are not the same, but many studies have found a significant relationship between them (e.g., Ma & Yang, 2014; Ruisch et al., 2021; Wang, 2013). This link is likely to be even stronger in the context of COVID-19, because many disease containment measures are large-scale government actions that restrict individual autonomy (Goldstein & Wiedemann, 2021). To cross-check our main findings, in subsequent economy-specific analysis we used party preferences to control for the influence of political orientation.

## METHOD

### Sample

We drew data from our online survey designed to understand public opinion regarding COVID-19 in Asia. The survey was conducted by an internationally reputable survey agency. Following established practices in public opinion polling (e.g., Pew Research Center, 2018, 2021), we targeted to sample 2000 people in each of the five economies. This sample size gave us sufficient statistical power to detect meaningful effects in a diverse population. In total, the survey was fielded to 10,133 panelists who were quota-sampled to match the general population in gender and age. The final sample size was 9571, after removing invalid responses (e.g., respondents who spent less than 5 min or more than 2 h on the survey). Table 1 shows the demographic characteristics of our sample (see Appendix S1 for country breakdowns). Due to the characteristics of online surveys, our respondents tended to be younger than the overall population. Therefore, in our robustness checks we weighted the data to match the age and gender characteristics of the population in the most recent census. The results were substantively similar to the findings reported here.

The English survey administered in Singapore was translated into Chinese, Korean and Japanese. The international survey company that we hired offered a professional, ISO 17100 certified, translation service by experienced native language translators. It also proof-read all translated text against its large database of previously translated sentences to ensure consistency and nuance. As an additional check, we recruited bi-lingual speakers who had no prior knowledge of our research or of the original text of the survey to translate the key questions back into English. No substantial semantic differences were found (see Appendix S1 for the translated text).

### Measures

#### Perceived COVID-19 vulnerability

Following the suggestions from Duncan et al. (2009), our key independent variable, perceived COVID-19 vulnerability, was operationalized into two constructs. The first construct, *Worry*, directly asked the respondents: “How worried are you about contracting the coronavirus disease yourself?” This item



TABLE 1 Demographic characteristics of the sample

Characteristic	Group	%
Education	Primary or below	0.51
	Secondary	17.69
	Tertiary	57.59
	Graduate school or above	24.21
Age	Under 18–29	23.10
	30–39	22.85
	40–49	23.01
	50–54	9.96
	55–69 and above	21.08
Socio-economic group	Upper class	1.51
	Upper middle class	10.06
	Middle class	43.50
	Lower middle class	30.56
	Lower class	14.37
Employment status	In work	77.12
	Unemployed	5.48
	Retired/student/homemaker	17.39
Experienced mental health problems before the pandemic		13.30
Female		50.26
N		9571

was rated on a seven-point scale (1 = not worried at all; 7 = very worried) and has been used in other studies to measure respondents' perceived susceptibility to disease (e.g., Des Jarlais et al., 2006). For the other construct, *Anxiety*, we asked respondents five questions regarding whether they had experienced symptoms of anxiety since the COVID-19 outbreak, including: "Stressed about leaving home"; "Having repeated and disturbing thoughts or dreams about what is happening"; "Having difficulty concentrating"; "Having trouble falling or staying asleep"; "Feeling irritable or having anger outburst" (1 = not at all; 7 = very much). We averaged the scores of the five questions ( $\alpha = .92$ ) so that higher scores meant higher levels of anxiety. This construct allowed us to capture the emotional discomfort of the respondents to COVID-19. According to Duncan et al. (2009), affection rather than perceived susceptibility is responsible for the negative effect of disease vulnerability on attitudes towards out-groups. It was therefore important to distinguish between the two dimensions of the concept of perceived vulnerability to COVID-19 in our hypothesis testing.

### Support for immigration

The dependent variable, support for immigration, was measured by asking respondents to imagine that the pandemic was over, and the extent to which they agreed with the statement: "Thinking generally about immigration – namely people coming to live here from other countries – the benefits of immigration outweigh the costs for your country." Responses were recorded on a seven-point scale (1 = strongly disagree; 7 = strongly agree). This item has been used in international surveys (e.g., YouGov-Cambridge Globalism Project, 2019). We did not ask respondents whether the number of immigrants coming to their economies should be increased or decreased, because immigration restrictions were changing drastically and frequently during the COVID-19 outbreak, and might cause confusion among respondents.

As mentioned, in our primary analysis we found that the two operationalizations of COVID-19 vulnerability, *Worry* and *Anxiety*, were positively associated with attitudes towards immigration. The positive associations prompted us to consider the literature on policy feedback.

## Perceived stringency of international travel measures

The key insight of the policy feedback theory is that public policy can shape attitudes and behaviour through resources and interpretive mechanisms. To estimate the influence of international travel restrictions, we asked respondents to rate the stringency of the international travel restrictions on a seven-point scale (1 = too lenient; 7 = too stringent). The question read: “For the emergency measures implemented by the government in the current coronavirus outbreak, to what extent do you think they are too stringent, about right, or too lenient: Restrictions of international travel.”

## Impression towards foreigners and perceived economic impacts of COVID-19

The first mediator, impression towards foreigners, was measured by the question “How much do you believe people from each of the following groups have made an effort in containing the coronavirus outbreak: People from other countries” (1 = very much do not believe; 7 = very much believe). The second mediator, perceived economic threat, was measured by asking respondents: “To what extent do you think the coronavirus outbreak poses a threat to your job, full-time study or business” (1 = very insignificant; 7 = very significant).

## Political orientation

To control for respondents’ political orientation, our main regression models included an item measuring their trust in the government to handle the COVID-19 outbreak: “How much do you trust the following institutions to handle the coronavirus outbreak right? Your government” (1 = totally do not trust; 7 = totally trust). An alternative measure of political orientation is political party affiliation. Although the five economies included in this study are not all democracies, they all conducted competitive legislative elections prior to 2021 (Oliver & Ostwald, 2020; Wong, 2020). Therefore, in our survey we asked respondents: “If there were a (legislative) election tomorrow, which party would you support?” This variable was included in our economy-specific models (see Appendix S1 for a full list of political parties).

## Demographic variables and country effects

We also controlled for a set of common demographic variables including gender (1 = male; 2 = female), age (in five age brackets), education (1 = primary or below; 2 = secondary; 3 = tertiary; 4 = graduate school or above), self-reported socio-economic status (1 = upper class; 5 = lower class), employment status (1 = in work; 2 = unemployed; 3 = retired/student/homemaker) and whether they had experienced mental health problems during the 12 months before the pandemic (1 = yes; 2 = no).

Finally, we used fixed-effects ordinary least squares (OLS) models to control for the average differences across the five economies in any observable or unobservable predictors. Although OLS analysis does not reflect the parametric structure of ordinal variables, it allows for more straightforward interpretation and comparison of coefficients across different empirical specifications and variables (Mood, 2010; Riedl & Geishecker, 2014). In our robustness check, we used ordinal logistic regression to estimate our main models and we found substantively similar results (Appendix S1).

## RESULTS

Tables 2 and 3 report summary statistics and correlation of the key variables respectively. Respondents in general were worried about contracting COVID-19 ( $M = 5.24, SD = 1.57$ ), with a moderate level of anxiety ( $M = 3.73, SD = 1.59$ ). Meanwhile, respondents overall exhibited a rather positive attitude towards immigration ( $M = 4.46, SD = 1.45$ ), with 42.6% of them agreeing that the benefits of immigration outweighed the costs for their country. This held true even in Hong Kong and Singapore, where previous studies have reported considerable anti-immigrant sentiment (e.g., Chang & Welsh, 2016; Lee & Chou, 2020). In addition, as shown in Table 3, the two operationalizations of COVID-19 vulnerability and perceived border stringency were both positively associated with support for immigration. The two variables that we hypothesized as mediators (economic threat and impression of foreigners) were positively correlated with COVID-19 vulnerability and support for immigration, though the magnitude of association between economic threat and support for immigration is small (07).

Table 4 reports the results from our main fixed-effects OLS models (Models 1 and 3). First, COVID-19 vulnerability, whether operationalized as *Worry* or *Anxiety*, remained positively associated with support for immigration even after the inclusion of control variables. Respondents who were either worried about being infected by the disease or who exhibited symptoms of anxiety reported a more positive attitude towards immigration than did the other respondents. Using the sensitivity measures recommended by Cinelli and Hazlett (2020), we found that these positive associations were robust to confounding three times as strongly as the variable of political trust. Given that immigration attitudes are widely believed to be characterized by people's political orientation, we should consider the positive associations identified here as highly robust (full results of the sensitivity analysis available in the Appendix S1).

In addition, respondents who saw the international travel restrictions as stringent were more supportive of immigration than were their counterparts. The same held true for political trust – respondents who trusted their government to handle the outbreak viewed immigration more positively. These findings lend support to the thesis that actions taken by governments in response to the COVID-19 pandemic play a role in attitude formation.

Regarding our political and demographic controls, in agreement with the findings of previous studies (e.g., Card et al., 2005; Markaki & Longhi, 2013; Strabac & Listhaug, 2008), older respondents were less supportive than others of immigration. Also, people who considered themselves to have higher socio-economic status tended to be less likely to see immigration as positive. The female respondents in our sample were less likely to support immigration than were the males. Finally, education was positively associated with attitude towards immigration, but that association did not reach statistical significance.

In Models 2 and 4, we added the interaction term. Confirming  $H_1$ , the positive associations between the two operationalizations of disease threat and support for immigration was more salient among respondents who saw international travel restriction as stringent. Figure 3 visualizes the magnitude of interaction between *Anxiety* and perceived border stringency. Panel A clearly shows that with increasing levels of perceived border stringency, the magnitude of the coefficient *Anxiety* on immigration attitude also increased. Panel B shows the predicted immigration attitudes

TABLE 2 Summary statistics for key variables

Variable	Mean	Max.	Min.	SD
Worry	5.24	7.00	1.00	1.57
Anxiety	3.73	7.00	1.00	1.59
Immigration attitudes	4.46	7.00	1.00	1.45
Economic threat	5.52	7.00	1.00	1.47
Impression towards foreigners	4.27	7.00	1.00	1.52
Perceived border stringency	3.93	7.00	1.00	1.32

TABLE 3 Bivariate association between key variables

	Worry	Anxiety	Immigration attitudes	Perceived border stringency	Economic threat	Impression towards foreigners
Worry	1.00					
Anxiety	0.36	1.00				
Immigration attitudes	0.10	0.23	1.00			
Perceived border stringency	0.003	0.16	0.27	1.00		
Economic threat	0.35	0.24	0.07	0.02	1.00	
Impression towards foreigners	0.02	0.04	0.15	0.17	0.05	1.00

Notes: The coefficients are almost always statistically significant at the .001 level, except for the associations between impression towards foreigners and worry ( $p < .05$ ), economic threat and perceived border stringency, and perceived border stringency and worry.

for respondents whose perceived levels of border stringency were 1 standard deviation above and below the mean. In line with other findings, the difference in immigration support between the two groups widened as the level of disease threat increased, suggesting that the relationship between COVID-19 vulnerability and attitudes towards immigration was at least partially moderated by the imposition of international travel restrictions.

To gain more insight into the relationship between COVID-19 vulnerability and attitudes towards immigration, we reran our main models in each economy without the country (economy) dummies, using party preferences instead of political trust to control for political orientation. Table 5 reports those results. The associations between COVID-19 vulnerability (*Worry* and *Anxiety*) and attitude towards immigration remained positive and statistically significant in all five of the economies, even after controlling for respondents' political party preferences (Models 5 to 14). Perceived stringency of border control measures continued to predict public support for immigration in all five Asian economies, whereas the demographic control variables worked in different directions. Finally, we tested whether perceived border stringency moderated the association between disease threat and immigration attitudes (Models 15 to 24). Although not all the interaction terms reached the conventional threshold of statistical significance, they were consistently positive.

The policy feedback theory has articulated two mechanisms through which policy may shape attitudes. In the context of this study, border control measures may mediate the relationship between disease threat and immigration attitudes by changing people's impression of foreigners ( $H_{2a}$ ) and by influencing perceived economic threat associated with the disease ( $H_{2b}$ ). We tested those hypotheses using mediation analysis with the R mediation package developed by Imai et al. (2010). Specifically, in each of the mediation models, the independent "treatment" variable was one of the two operationalizations of COVID-19 vulnerability (i.e. worry or anxiety), the mediator was either the perceived contribution of foreigners or the economic threat of COVID-19, and the outcome variable was attitude towards immigration. The control variables were the same as those in the fixed-effects model.

Table 6 summarizes the results. The direct effects of COVID-19 vulnerability on immigration attitudes were positive in all models. Also, consistent with  $H_{2a}$  and  $H_{2b}$ , the mediation effects ran in the same direction. When COVID-19 vulnerability was measured by how worried the respondent was about catching COVID-19 and the mediator was the perceived contribution of foreigners, the average causal mediation effect (ACME) was 0.006; whereas the corresponding figure for the perceived economic threat was 0.014. When COVID-19 vulnerability was operationalized as level of anxiety, the ACMEs of the two mediators were smaller than 0.009. Overall, the sizes of the mediation were extremely small, but this is not uncommon in mediation analysis (Walters, 2019). Also, as mentioned earlier, the relationship between COVID-19 vulnerability and immigration attitude was likely to have been shaped by a complex mechanism that our models and survey could not fully capture.

TABLE 4 Association between COVID-19 vulnerability and attitudes towards immigration, full model

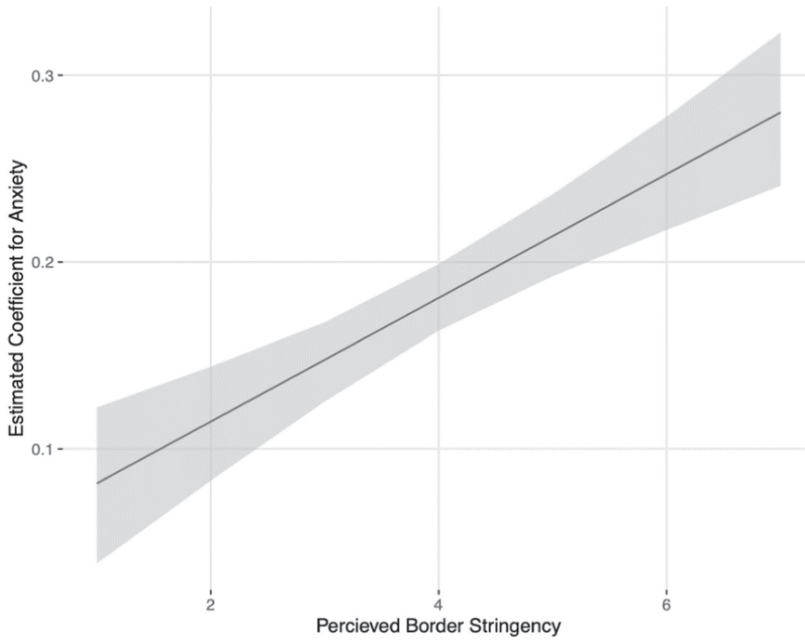
Variable	Support for immigration			
	1	2	3	4
Covid-19 vulnerability – worry	0.10*** (0.01)	0.04 (0.03)	/	/
Covid-19 vulnerability – anxiety	/	/	0.18*** (0.01)	0.05 (0.03)
Perceived border stringency	0.20*** (0.01)	0.11** (0.04)	0.16*** (0.01)	0.02 (0.03)
Worry * Perceived border stringency	/	0.02* (0.01)	/	/
Anxiety * Perceived border stringency	/	/	/	0.03*** (0.01)
Trust in government	0.21*** (0.01)	0.20*** (0.01)	0.21*** (0.01)	0.21*** (0.01)
Age	-0.06*** (0.01)	-0.06*** (0.01)	-0.05*** (0.01)	-0.05*** (0.03)
Female	-0.08** (0.03)	-0.08** (0.03)	-0.07* (0.03)	-0.07* (0.03)
Education level	0.03 (0.03)	0.03 (0.03)	0.02 (0.02)	0.02 (0.02)
Socio-economic group	-0.06** (0.02)	-0.06*** (0.02)	-0.04* (0.02)	-0.04* (0.02)
Mental health issues before the pandemic (ref.: no)	0.09* (0.04)	0.09* (0.04)	-0.06 (0.04)	-0.05 (0.04)
Employment status (ref.: unemployed)				
In work	0.17* (0.07)	0.17* (0.07)	0.17* (0.07)	0.17* (0.07)
Retired/student/homemaker	0.15 (0.08)	0.15 (0.08)	0.17* (0.08)	0.17* (0.07)
Country dummies	✓	✓	✓	✓
Adjusted R Square	0.18	0.18	0.20	0.20
N	8271	8271	8267	8267

Notes: OLS regression coefficients with standard errors in parentheses: \*\*\**p* < .001; \*\**p* < .01; \**p* < .05

## DISCUSSION AND CONCLUSIONS

The results from our survey of five advanced Asian economies complicate a prominent view in the existing literature. Traditional accounts suggest that disease threats are associated with negative attitudes towards immigrants. We found instead that people who exhibit higher levels of COVID-19 vulnerability are also more supportive of immigration. This association was, despite its moderate effect size, robust to two different operationalizations of disease vulnerability, pre-existing immigration attitudes of the five Asian economies, the inclusion of demographic and political controls, and confounding three times as strong as one of the key observed covariates, political trust. To our knowledge, this is the first time that a positive association between disease threat and support for immigration has been found. Whereas previous studies have suggested that the effects of a disease threat on immigration attitudes might be attenuated under certain circumstances (e.g., Adida et al., 2020), they have only reported a statistically non-significant relationship between the two variables.

Panel (a) Estimated coefficient of *Anxiety* on immigration support (with 95% CI)



Panel (b) Predicted support for immigration as a function of *Anxiety* and perceived border stringency

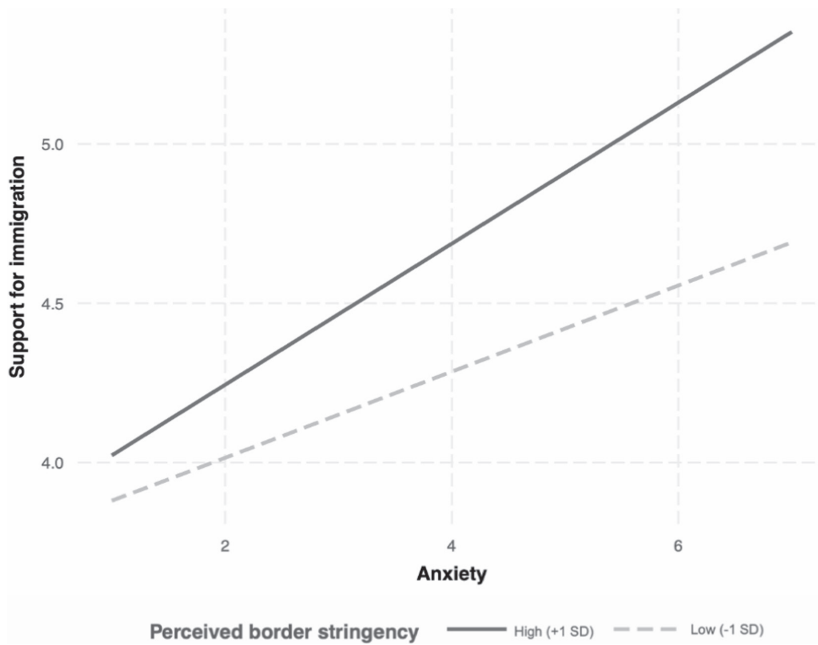


FIGURE 3 Interaction between COVID-19 vulnerability (*Anxiety*) and perceived border stringency on immigration support. Panel A. Estimated coefficient of *Anxiety* on immigration support (with 95% CI). Panel B. Predicted support for immigration as a function of *Anxiety* and perceived border stringency. Notes: visualization based on the results of Model 4; the solid and dotted lines in Panel B are 1 *SD* above and below the mean respectively. The corresponding interaction plots for Worry, which report similar visual evidence, are available in the Appendix S1



TABLE 5 Association between vulnerability to COVID-19 and attitudes towards immigration in five Asian economies

Attitudes towards immigration														
Variable	Hong Kong			Japan			Singapore			South Korea			Taiwan	
	5	6	7	8	9	10	11	12	13	14				
Covid-19 vulnerability – worry	0.16*** (0.02)	/	0.09** (0.03)	/	0.09*** (0.03)	/	0.14*** (0.03)	/	0.07** (0.02)	/				
Covid-19 vulnerability – anxiety	/	0.26*** (0.02)	/	0.14*** (0.03)	/	0.19*** (0.03)	/	0.22*** (0.03)	/	0.17*** (0.02)				
Perceived border stringency	0.31*** (0.03)	0.25*** (0.03)	0.23*** (0.04)	0.21*** (0.04)	0.28*** (0.04)	0.22*** (0.04)	0.17*** (0.03)	0.14*** (0.03)	0.23*** (0.04)	0.20*** (0.04)				
Age	-0.03 (0.03)	-0.01 (0.03)	-0.03 (0.03)	-0.01 (0.03)	-0.13*** (0.03)	-0.09 (0.03)	-0.08** (0.03)	-0.09** (0.03)	-0.09** (0.023)	-0.06* (0.03)				
Gender														
Female	-0.06 (0.08)	-0.08 (0.07)	0.14 (0.10)	0.14 (0.10)	-0.06 (0.09)	-0.03 (0.09)	0.05 (0.08)	0.05 (0.08)	-0.14* (0.08)	-0.11 (0.07)				
Educational level	-0.03 (0.06)	-0.03 (0.06)	0.09 (0.10)	0.09 (0.10)	0.12 <sup>+</sup> (0.07)	0.12 <sup>+</sup> (0.06)	-0.02 (0.08)	-0.05 (0.08)	-0.01 (0.07)	-0.003 (0.07)				
Socio-economic group	-0.15*** (0.04)	-0.11** (0.04)	-0.05 (0.05)	-0.04 (0.05)	-0.07 (0.06)	-0.09 (0.06)	-0.06 (0.05)	-0.05 (0.05)	-0.07 <sup>+</sup> (0.04)	-0.06 (0.04)				
Mental health issues before the pandemic														
Yes	-0.05 (0.09)	-0.18 <sup>+</sup> (0.09)	0.04 (0.15)	-0.13 (0.15)	-0.05 (0.15)	-0.22 (0.15)	0.26* (0.11)	0.11 (0.11)	-0.08 (0.10)	-0.22* (0.11)				
Employment status														
In work	-0.09 (0.25)	0.17 (0.25)	0.12 (0.26)	0.16 (0.26)	0.47* (0.19)	0.48* (0.19)	0.22 (0.15)	0.19 (0.15)	0.11 (0.21)	0.09 (0.21)				
Retired/student/homemaker	0.23 (0.28)	0.33 (0.27)	0.07 (0.27)	0.10 (0.27)	0.36 (0.23)	0.47* (0.23)	0.07 (0.17)	0.05 (0.17)	0.13 (0.24)	0.16 (0.23)				
Party preference	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
N	1223	1224	1009	1010	1121	1121	1185	1183	1144	1142				
	15	16	17	18	19	20	21	22	23	24				
Interaction term	0.03* (0.02)	0.04* (0.03)	0.04 (0.02)	0.04 <sup>+</sup> (0.02)	0.05* (0.02)	0.04 <sup>+</sup> (0.02)	0.06** (0.02)	0.02 (0.02)	0.02 (0.02)	0.03 (0.02)				

N/ote: OLS regression coefficients with standard errors in parentheses; \*\*\*p < .001; \*\*p < .01; \*p < .05; +p < .1; the interaction terms are either Worry \* perceived border stringency or Anxiety \* perceived border stringency; coefficients for party preferences are available in Appendix S1.

The positive association between COVID-19 vulnerability and support for immigration is intriguing. Drawing on insight from policy feedback theory, we propose that worldwide border restrictions have changed the meaning and cost implications of COVID-19, thus countering the negative effect of the threat of disease on immigration attitudes. By bringing international travel to a standstill, the disease became not only just a threat to health but also a barrier to globalization. As a result, instead of scapegoating out-groups and seeing immigration restrictions as costless protective measures, people concerned about COVID-19 are reminded of (1) the importance of cross-border collaboration in combating the disease, and (2) the economic cost of stringent border controls. Globalization processes, including migration, then become signals that the disease is under control. We found supportive evidence for this hypothesis. Respondents who considered international travel restrictions to be stringent had a more positive immigration attitude. More importantly, the positive association between COVID-19 vulnerability and support for immigration was more salient among respondents who considered international travel restrictions to be stringent. Also, in our extended analysis, higher levels of feeling vulnerable to COVID-19 were associated with higher levels of perceived economic threat and stronger recognition for the role that foreigners play in containing COVID-19, and these in turn were linked to more supportive attitudes to immigration. Although disease vulnerability may have generated concerns about personal economic security with or without border control measures, those concerns were unlikely to be positively associated with support for immigration if respondents saw COVID-19 as a threat coming from outside. Similarly, the association between vulnerability to COVID-19 and impression towards foreigners would have been negative if the disease were perceived as a foreign threat. In sum, the results indicate that xenophobic attitudes are not the only protective response developed in the face of a disease threat.

Our findings not only echo a growing body of literature that complicates the relationship between disease threat and intergroup relations (e.g., Cruwys et al., 2020; Huang et al., 2011) but also add a new dimension to the debate on the determinants of anti-immigration hostility. Although scholars have long debated the relative importance of economic and non-materialistic concerns in explaining attitudes towards immigrants, research on the attitudinal effects of public policy is still in its infancy. Existing work has tended to treat public policy as an outcome rather than a determinant of people's immigration attitudes. Regarding the relationship between the threat of disease and attitudes towards immigration, no research to date has empirically tested whether disease control measures such as travel restrictions would deepen or pacify people's hostility towards immigrants. This knowledge gap must be closed. Disease control measures shape the meaning and cost implications of disease and thus are likely to intensify or ameliorate people's pre-existing concerns. In this research, we present initial evidence concerning the attitudinal effects of public policy. Future research may, by means of experiment or panel data analysis, articulate how different types of public policies shape immigration attitudes.

It remains unclear whether stringent immigration policies *in general* will soften attitudes towards immigrants. Policy implementation is important (Jacobs & Mettler, 2018). The immigration and travel restrictions implemented in response to the outbreak of COVID-19 are largely considered to be disease control measures. People worried about the disease may see the removal of those measures and the resumption of global migration as signs of pandemic relief. The same cannot be said for restrictive immigration policies formulated against the backdrop of anti-immigrant mobilization. Those policies may encourage people who are already critical of immigrants to mobilize anti-immigrant sentiments further. In the United States, Arizona SB 1070, a high-profile anti-immigrant law enacted in Arizona in 2010, is a case in point. According to Flores (2017), people who were already critical of immigrants did not soften their attitudes after the passage of the law. Instead, they engaged in even more anti-immigrant mobilization.

For similar reasons, we cannot assume that anti-immigrant sentiments would necessarily soften in the post-COVID-19 world, even though many countries have already developed plans to attract immigrants as a part of their revitalization strategy. The positive association between COVID-19 vulnerability and support for immigration was identified when the threat of COVID-19 was eminent across Asia. Not only did governments impose stringent international travel restrictions but also they halted most political and social activities. This may not hold in the later stages of the pandemic outbreak. Large scale

**TABLE 6** Mediation effects of the perceived contribution of foreigners and of their economic threat on support for immigration

Independent variable	Mediator	Effect	Mean	95% Confidence interval	
Covid-19 vulnerability – worry	Foreigners' contribution	ACME	0.006***	0.003	0.009
		Direct effect	0.097***	0.076	0.119
		Total effect	0.103***	0.081	0.125
	Economic threat	ACME	0.014**	0.006	0.021
		Direct effect	0.090***	0.068	0.111
		Total effect	0.103***	0.082	0.124
Covid-19 vulnerability – anxiety	Foreigners' contribution	ACME	0.009***	0.006	0.012
		Direct effect	0.175***	0.153	0.196
		Total effect	0.183***	0.161	0.204
	Economic threat	ACME	0.007***	0.002	0.012
		Direct effect	0.176***	0.154	0.197
		Total effect	0.183***	0.162	0.203

Notes: The confidence intervals are calculated via non-parametric bootstrap; \*\*\**p* < .001; \*\**p* < .01; results of the sensitivity analysis are available in the Appendix S1.

anti-immigrant mobilization may resurface when politicians exploit uncertainties, (non-)compliance with public health measures, and economic hardships to gain short-term credibility (Elchereth & Drury, 2020; Prosser et al., 2020; Templeton et al., 2020; Van Assche et al., 2020). The increased concentration of the pandemic in developing countries, partly due to unequal access to vaccines, could also breed hostility towards immigrants from those countries. Therefore, the findings of this study should not be seen as definitively refuting the traditional disease threat theories. Given the unprecedented nature of the COVID-19 outbreak, some of the changes it has triggered may come to be seen as an aberration in history.

It would seem imprudent to ignore the attitudinal and psychological effects exerted by the worldwide pandemic control measures, which have been a distinctive feature of the COVID-19 outbreak (Ćepulić et al., 2021). Still, we must note the limitations of our analysis. First, our cross-sectional data did not offer conclusive evidence of the causal effects of border control measures on the relationship between disease vulnerability and immigration attitudes. We cannot, for example, ascertain whether worry about COVID-19 precedes economic concerns. Economic concerns are also shaped by a wide range of factors, not only border control measures. Of course, future studies may collect longitudinal data to determine whether the direction and strength of the association between disease vulnerability and attitudes shift over time in response to the changing stringency of border control measures. However, unlike the early stage of the COVID-19 outbreak when policy changes were rapid and unexpected, future changes are likely to be tied to political activity and mobilization. This would pose a grave challenge to causal inference using longitudinal data. Second, due to the limitations of the data, we could not disentangle the effects of different types of restrictions. Future research could conduct experiments to systematically compare the attitudinal effects of immigration policies that have different levels of stringency and varying types of restrictions. Third, our survey measured immigration attitudes by asking respondents to weigh the costs and benefits of immigration to their countries. This item tends to yield more positive attitudes than do items that ask whether the number of immigrants should be increased or decreased (YouGov-Cambridge Globalism Project, 2020). Future research could use additional measures of immigration preferences to test the robustness of the findings reported here.

How generalizable are our results to developed countries outside Asia? Because the five Asian economies we studied are geographically and, to a certain extent, culturally proximate to China, where the first case of COVID-19 was reported, it is possible that people there are more likely than those in non-Asian countries to support immigration in the face of COVID-19. However, we believe this

possibility to be low for three reasons. First, the virus had already spread across the world when we conducted the survey in May. Second, compared with non-Asian countries, the five economies we selected did not show particularly high levels of support for immigration prior to the outbreak of COVID-19. In Singapore, for example, tension between local people and immigrants was high in October 2019, following the circulation of a video of a man of Indian descent swearing at a local security guard. The video sparked a rare public rally against the government's immigration policies (South China Morning Post, 2019). Similarly, in Hong Kong, large-scale protests broke out in 2019 against tightening controls from mainland China, the biggest source of immigrants for the city. Third, despite reports of xenophobic attacks, some studies conducted in Europe noted a significant increase in positive media coverage and public recognition of the contributions of immigrants during the early outbreak of the pandemic (Fernández-Reino et al., 2020; Hewlett et al., 2020; Schengenvisainfo News, 2020). Certainly, the spread of COVID-19 reveals the danger of global migration, but the control measures it has triggered show how vulnerable human societies may become when their connectedness is impaired. We do not have strong reasons to assume that the positive association between COVID-19 vulnerability and support for immigration is peculiar just to the five Asian economies.

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## CONFLICTS OF INTEREST

All authors declare no conflict of interest.

## AUTHOR CONTRIBUTION

**Siu Yau Lee:** Formal analysis; Visualization; Writing—original draft. **Samson Yuen:** Methodology. **Nick H.K. Or:** Data curation; Funding acquisition. **Edmund W. Cheng:** Funding acquisition; Methodology; Survey implementation; Project administration; Resources. **Ricci P.H. Yue:** Conceptualization.

## DATA AVAILABILITY STATEMENT

Replication materials for this article are available at <https://doi.org/10.7910/DVN/XB540D>.

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