# Impacts of COVID-19 on foreign direct investment

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# Impacts of COVID-19 on Foreign Direct Investment

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**Abstract:** This study empirically examines how COVID-19 damages have impacted foreign direct investment (FDI) using quarterly data of bilateral FDI flows from 173 to 192 countries from the first quarter of 2019 to the second quarter of 2021. We measure the severity of COVID-19 damages using three indicators—the number of confirmed cases, the number of deaths, and the stringency index of government policies that restrict people's activities. We differentiate FDI flows in terms of two different entry modes—greenfield FDI and cross-border mergers & acquisitions (M&A). FDI flows are measured in terms of the number of cases/deals and the US dollar values. We find heterogeneous effects of COVID-19 damages on FDI according to sectors and entry modes. In the manufacturing sector, COVID-19 damages in host countries have had significant negative impacts on both greenfield FDI and cross-border M&A, whereas those in home countries do not show any significant negative impacts on both types of FDI. In the service sector, on the other hand, COVID-19 damages in both the host and home countries are found to have negative impacts on greenfield FDI, whereas the impact of COVID-19 on cross-border M&A appears to be mostly insignificant.

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# Impacts of COVID-19 on Foreign Direct Investment[§]

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*Keywords*: COVID-19; greenfield FDI; cross-border M&A

*JEL Classification*: F21; F23; I15

## 1. Introduction

Coronavirus disease (COVID-19) was first reported in Wuhan, China, in December 2019 and has spread worldwide afterward. To prevent the spread of the disease, many countries have introduced social distancing and lockdown orders and have imposed entry bans on foreigners, severely inflicting economic activity. According to the IMF's World Economic Outlook (July 2021), in 2020, the global economy contracted by 3.2% and global trade by 8.3%.[1] The pandemic caused a more dramatic fall in foreign direct investment (FDI) in 2020. According to UNCTAD's World Investment Report 2021, global FDI flows dropped by 35% to USD 1 trillion in 2020, from USD 1.5 trillion in 2019.[2] Thus, in 2020, the global FDI decreased more considerably than the global GDP or trade.

In the past, FDI suffered various types of shocks. Many studies have found negative effects of financial crises (Dornean et al., 2012; Dornean and Oanea, 2015; Poulsen and Hufbauer, 2011; Stoddard and Noy, 2015) and natural disasters (Anuchitworawong and Thampanishvong, 2015; Escaleras and Register, 2011) on FDIs. Financial crises lead to liquidity constraints for investors, whereas natural disasters destruct physical infrastructures, such as roads and industrial parks. Compared with these shocks, one of the most distinctive features of the COVID-19 pandemic is the forced adoption of infection prevention measures, such as lockdown and social distancing. These measures raise the costs for pre-investment investigation, searching costs for location and workers, and running costs of FDI. Moreover, the COVID-19 pandemic has revealed that FDI and the global value chain are extremely vulnerable to external shocks. When a country in the global value chain suffers a big COVID-19 outbreak and its factories are shut down, the entire production process is severely disrupted. To minimize and diversify the risk of disruptions, many global companies have been tempted to reduce their reliance on production in foreign countries (Lee and Park, 2020).

Against this background, this study empirically examines the impact of COVID-19 on bilateral FDI flows.[3] We use quarterly data on bilateral FDI flows from 173 to 192 countries from the first quarter of 2019 to the second quarter of 2021. We measure the severity of COVID-19 damages using three indicators—the number of confirmed cases, the number of deaths, and the stringency index of government policies that restrict people's activities. We examine the impact of these COVID-19 indicators on greenfield FDI and cross-border mergers & acquisitions (M&A).[4] FDI flows are measured in terms of the number of

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[1] https://www.imf.org/en/Publications/WEO

[2] https://unctad.org/webflyer/world-investment-report-2021

[3] One of the coauthors of this paper has also assessed the impact of COVID-19 on global value chain (Hayakawa and Mukunoki, 2021a), international trade in goods (Hayakawa and Mukunoki, 2021b, c), and international trade in services (Ando and Hayakawa).

[4] Nocke and Yeaple (2007, 2008) and Blonigen et al. (2014) theoretically considered firms' choice between cross-border and greenfield FDIs.

cases/deals and the US dollar values in the manufacturing and service sectors. To control for unobservable factors, we introduce various types of fixed effects. Thus, our study intends to uncover the heterogeneous effects of COVID-19 on FDI at various dimensions.

There have been few studies on the effects of COVID-19 on FDI. Camino-Mogro and Armijos (2020) examined the effect of lockdown policies on FDI inflows in Ecuador using weekly data. They found negative impacts of COVID-19 on FDI flows, especially from North and South American countries. By employing quarterly data on 43 countries from 2009 Q1 to 2020 Q3, Fang et al. (2021) found that COVID-19 confirmed cases have significantly negative effects on the total FDI inflows. They also showed that the negative impact of COVID-19 on FDI is most severe in North–South Americas, followed by Europe.

A study that is most closely related to ours is that of Fu et al. (2021). Using bilateral FDI data from January 2019 to June 2020, they found evidence of the negative impacts of COVID-19 on FDI in host countries. Our study is different from that of Fu et al. (2021) in terms of the following five points. First, as mentioned above, we examine how the impact of COVID-19 differs between two different entry modes of FDI, i.e., greenfield FDI and cross-border M&A. This differentiation is important because greenfield FDI, which requires building new factories and hiring new workers, seems costlier to carry out than M&A FDI when mobility restrictions and infection prevention measures are in place. Second, whereas Fu et al. (2021) used the number of confirmed cases and deaths to measure the COVID-19 situation, we also use the government stringency index. Third, whereas Fu et al. (2021) used only the US dollar value of FDI, we do not only use the dollar value but also use the number of greenfield projects and M&A deals. This is because the dollar values of FDI are often not publicly available (as will be explained in Section 3). Fourth, we extend the data to June 2021 so that our research can explore a longer period of the COVID-19 pandemic. Fifth, unlike Fu et al. (2021), we control fixed effects at a full level based on the dimension of our interest variables to avoid omitted variable bias.

Our findings are summarized as follows. In the manufacturing sector, COVID-19 damages in host countries have significant negative impacts on both greenfield FDI and cross-border M&A, whereas it does not have significant impacts on both types of FDIs in the home countries. This finding is particularly evident when FDI flows are expressed in terms of the number of cases/deals. However, in the service sector, COVID-19 damages in both the host and home countries are found to have negative impacts on greenfield FDI, whereas the impact of COVID-19 on cross-border M&A appears to be mostly insignificant. When a quarter-lag is allowed, COVID-19 damages in the home countries are also found to have a negative impact on M&A FDI.

The rest of this paper is organized as follows. The next section presents our conceptual framework on the effects of COVID-19 damages on FDI. Section 3 provides our empirical framework with a brief overview of the recent global FDI flows. Section 4 presents the estimation results. Section 5 concludes this paper.

## 2. Conceptual Framework

This section discusses possible channels through which the COVID-19 pandemic impacts FDI flows. The magnitude of FDI depends primarily on the supply capacity of the home country (e.g., the number of potential investors or average productivity), the size of demand in the host country, production costs (e.g., wages) in the host country, and fixed costs for FDI (Helpman et al., 2004; Kleinert and Toubal, 2010). The COVID-19 pandemic is deemed to influence these factors and hence FDI flows around the world. We examine the impact of COVID-19 damages on bilateral FDI flows in three dimensions.

The first is the damage caused by COVID-19 to the host country versus the home country. If the host country's damage is severe, FDI flows to this country are likely to decrease because the host country may not only be the investor's actual business place but also a consumption market. The COVID-19 damages will decrease the demand size and make the host country less attractive. The fixed cost of investment (e.g., various search costs of location and workers) will be much higher in countries where COVID-19 damages are severe. Moreover, various types of uncertainties caused by the COVID-19 pandemic discourage FDI (Azzimonti, 2019; Choi et al., 2021; Julio and Yook, 2016; Chen et al., 2019). In summary, FDI inflows decrease in countries with severe damages of COVID-19.

On the other hand, the severity of COVID-19 in the home country can have a negative impact by reducing investment capital. Investors need to minimize the loss of home business and thus may not afford to invest abroad. This reduces the number of investors. In contrast, the damages caused by COVID-19 in the home country may induce outward FDI. One channel of this positive effect is the increase in export-platform FDI to less damaged countries. Firms may switch their export base from home to abroad to continue production activities. The other channel is the rise in transport costs. The mobility restriction induced by the COVID-19 pandemic reduces the handling capacity of freights due to the shortages of truck drivers and port laborers, thereby increasing both domestic and international transport costs. Thus, firms may switch from exporting from home to producing abroad and selling domestically in the host country. The so-called horizontal FDI may increase due to the increase in transport costs.

The second dimension is manufacturing versus services. To contain the spread of COVID-19, many countries imposed various restrictions on business operations. In general, the work-from-home model is more difficult in manufacturing than in services (Dingel and Neiman, 2020). Investors cannot initiate a new business abroad if work-from-home is an infeasible option for their business operations, e.g., production operation in factories. A similar effect may exist in some service sectors (e.g., transportation and warehousing, construction, retail trade, and accommodation and food services).

The third one is cross-border M&A versus greenfield FDI. Whereas the former acquires a foreign company's assets, including buildings and workers, the latter requires the investor to set up a new business from scratch. However, once lockdown is implemented, it would be difficult to hire new workers and build new factories. Thus, the damage from COVID-19 may decrease greenfield FDI more greatly than cross-border M&A. Furthermore, the severe damage in the host country may lower the valuation of acquired firms, enabling investors to acquire local firms with lower prices. Known as "fire-sale FDI" (Stoddard and Noy, 2015), cross-border M&A may increase in countries severely hit by the COVID-19 pandemic. Another difference is that M&A can typically be implemented much more quickly as it does not entail a time-consuming permitting stage (Stoddard and Noy, 2015). Thus, COVID-19 damages may have different effects on the two types of FDI.

## 3. Empirical Framework

This section outlines our empirical framework for examining the impact of COVID-19 damages on FDI flows. As summarized in the previous section, there can be various effects on FDI, including not only negative but also positive effects. Thus, the overall impact of COVID-19 damages on FDI flows needs to be analyzed empirically. To empirically investigate the impact, we employ quarterly bilateral FDI data from the first quarter of 2019 to the second quarter of 2021. In our study, there are 173 investing (i.e., home) countries and 192 host countries.

Specifically, we estimate the following equation:

$$FDI_{ijyq} = \exp\{\alpha_1 COVID_{iyq} + \beta_1 COVID_{jyq} + \delta_{ijy} + \delta_{ijq} + \delta_{yq}\} + \epsilon_{ijyq} \qquad (1)$$

$FDI_{ijyq}$ refers to FDI flows from country $i$ to $j$ in quarter $q$ year $y$. FDI flows are either greenfield FDI or cross-border M&A, measured in terms of either the US dollar values or the number of deals/cases. We regress FDI flows (the US dollar value of M&A, the number of M&A deals, the US dollar value of greenfield FDI, and the number of greenfield projects) for the manufacturing and service sectors separately.[5] $COVID_{iyq}$ and $COVID_{jyq}$ are the extent of the COVID-19 damages in the home and host countries, respectively. $\delta_{ijy}$, $\delta_{ijq}$, and $\delta_{yq}$ are various fixed effects, which are explained below. $\epsilon_{ijyq}$ is a disturbance term. As our dataset for estimation includes zero-valued FDI in many pairs, we estimate the equation using the Poisson pseudo maximum likelihood (PPML) method proposed by Santos Silva and Tenreyro (2006). The PPML method estimates the equation without taking

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[5] We do not disaggregate the service sector because the number of observations in each subsector is too small. In addition, we do not examine FDI in the primary sector because there are few quarterly observations in our bilateral setting.

the log of the dependent variable.[6]

The data on bilateral greenfield FDI are from fDi Markets (Financial Times Ltd.). Relying on various social and news media as well as investment promotion agency sources, fDi Markets tracks companies announcing or opening greenfield FDI in a new physical project or expansion of an existing investment, which creates new jobs and capital investment. The data includes FDI projects that have either been "opened" or "announced" by a company. An announced project is when the company has made their final investment decision and are moving toward project implementation. An opened project is when the project is fully operational. When the information on the dollar values of greenfield FDI is not publicly available, fDi Markets use "algorithms" to estimate the values.[7]

The data on bilateral M&A are from the Zephyr database. The information is collected by Bureau van Dijk researchers from a large number of sources worldwide. It includes not only completed and announced but also pending and rumors. When the dollar values of M&A FDI are not publicly available, Zephyr simply indicates that the values are unavailable in their data. Whereas Fu et al. (2021) included FDI rumors, announcements, and completions in their study, we restrict our study to opened greenfield FDI and completed M&A because rumors and announcements are often not realized.[8]

In our sample, global greenfield FDI ("opened" only) in the manufacturing sector decreased by 44.7% in dollar value, from US$ 84 billion in 2019 to US$47 billion in 2020. In terms of the number of projects, it decreased by 40.2%, from 4,407 projects in 2019 to 2,636 projects in 2020. Moreover, cross-border M&A ("completed" only) decreased by 19.4% in dollar value from US$452 billion to US$364 billion and decreased by 29.8% in terms of the number of deals, from 8,670 to 6,086 deals. Moreover, global greenfield FDI in the service sector decreased by 30.5%, from US$ 157 billion in 2019 to US$ 109 billion in 2020, whereas global M&A FDI in the service sector decreased by 7.2%, from US$ 766 billion in 2019 to US$ 711 billion in 2020.

Figure 1 shows the trend of the quarterly flow of global greenfield FDI and cross-border M&A in the manufacturing sector. The figure shows that in Q2 of 2020, there was a drastic decrease in both the US dollar value and the number of greenfield projects, and in the following quarters of 2020 and 2021, greenfield FDI was smaller than the pre-COVID-19 period. In contrast, there was a surge of cross-border M&A in Q2 of 2020, especially in terms

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[6] For various discussions on PPML, see https://personal.lse.ac.uk/tenreyro/lgw.html. We use the ppmlhdfe Stata command written by Correira, Guimarães, and Zylkin (2020) to deal effectively with many zeros in the dependent variable and with multiple high-dimensional fixed effects.

[7] For details, see pp.5-6 of fDi Markets Methodology (fDi Markets).

[8] As a robustness check, we will also assess the impact of COVID-19 on announced greenfield FDI and announced and pending M&A. In the case of M&A, we include "pending" because there are very few "announced" M&A deals, and both "announced" and "pending" refer to the status before completion.

of the US dollar value.[9] In the subsequent quarters of 2020, both M&A value and the number were smaller than those in the same quarters of 2019. In Q1 and Q2 of 2022, there was a gradual recovery of M&A FDI in terms of both the value and number.

=== Figure 1 ===

Figure 2 shows the trend of the quarterly flow of global greenfield FDI and cross-border M&A in the service sector. Similar to the results of the manufacturing sector shown in Figure 1, both the value and the number of greenfield FDI projects started to decrease in Q2 of 2020, whereas the M&A FDI value and number increased in Q2 of 2020 and decreased only in Q3 of 2020. Thus, cross-border M&A responds to the pandemic slowly.

=== Figure 2 ===

We measure the extent of the damages caused by COVID-19 on three scales. The first and second are the numbers of confirmed cases and deaths by quarter; the data are obtained from the COVID-19 Data Repository by the Center for Systems Science and Engineering at Johns Hopkins University. The figures for 2019 are set to zero. We then add a value of one to these numbers and then take logs. The third measure is the stringency index, which is calculated by the Oxford Coronavirus Government Response Tracker project. This index is a composite measure of nine response metrics, taking a value between 0 and 100.[10] A higher score indicates a stricter response. We use the simple average of the daily indices for each quarter.

Both confirmed cases and deaths cause physical harm to people. A higher number of cases and deaths also have a psychologically negative effect on people who are not infected. Because the number of confirmed cases and deaths presents different perceptions of the severity of COVID-19, these two figures may have different effects on FDI. In particular, the effectiveness of lockdown policies depends on the cooperation of citizens. If a large number of cases or deaths are observed, the citizens are likely to abide by strict control measures (Zhang et al., 2021). The stringency index captures the existence of measures that restrict people's activities and hence directly affect businesses. The numbers of cases and deaths are entered in logs in regressions, whereas the stringency index ranges from 0 to 100, with a higher value indicating stronger stringency.

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[9] This surge was partly because one M&A deal from the U.S. to Ireland had a large value (US$ 63.5 billion), which accounted for 40% of the total M&A (US$ 159.9 billion) in that quarter.

[10] The nine metrics used to calculate the stringency index are school closures, workplace closures, cancellation of public events, restrictions on public gatherings, closures of public transport, stay-at-home requirements, public information campaigns, restrictions on internal movements, and international travel controls. See Hale et al. (2021) for full description of how this index is calculated.

The fixed effects controls for various elements. $\delta_{ijy}$ is country pair-year fixed effects, which control for the annual averages of investors' mass and host countries' demand sizes, as well as the availability of trade or investment agreements. As this type of fixed effect also controls for population size, the effect of the number of cases or deaths is equivalent to the effect of the number per population.[11] $\delta_{ijq}$ is country pair-quarter fixed effects and controls for the seasonality of FDI. $\delta_{yq}$ is year-quarter fixed effects, which controls for variations in world income. It also controls for the major type of COVID-19 variants in the world.[12] Furthermore, most countries began to close their borders to foreign travelers from around the latter half of March 2020. Thus, year-quarter fixed effects may also control for the effects of people's cross-border movements worldwide.

One important empirical issue is the timing of investment decisions and investment payment/registration. The general process of FDI is as follows: conducting feasibility studies, making a concrete business plan, applying for the registration of affiliates, paying investment capital, constructing factories, recruiting workers, and initiating business. The process is slightly different between greenfield FDI and cross-border M&A. As explained above, we restrict our study to "opened" greenfield projects and "completed" M&A deals, which are identified around the time of registration. Thus, our equation uncovers how the severity of COVID-19 in a country affects the decision of firms that have already selected a particular country as a host country on whether they finally complete the registration of their affiliates or not. If the COVID-19 damages are severe at the registration stage, investors might delay or even stop their registration.

## 4. Empirical Results

This section reports the estimation results. The basic statistics of our variables are presented in Table 1. For all estimates, we cluster standard errors by country pair.

=== Table 1 ===

Table 2A presents the estimated results of greenfield FDI and M&A FDI in the manufacturing sector. We examine the three measures of COVID-19 damages—(I) the number of confirmed cases, (II) the number of deaths, and (III) the stringency index—in

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[11] The unusual workloads in governments due to the spread of COVID-19 may delay the approval of FDI. If this effect is associated with the capacity or quality of government services, our country pair-year fixed effects may control for it to some extent.

[12] The expert group convened by the WHO has recommended using letters of the Greek Alphabet for specific variants. The Beta variant was first found in South Africa in May 2020, followed by the Alpha variant in the U.K. in September 2020. Subsequently, the Delta and Gamma variants were discovered in India in October and in Brazil in November 2020, respectively.

three panels. All the coefficients of the variables representing the host country's COVID-19 damage are negative and highly significant for both types of FDI, especially when they are expressed as per the number of greenfield projects and M&A deals. For example, a 10% rise in confirmed cases in host countries decreases both the number and value of greenfield FDI by 1.4%. In contrast, the home country's COVID-19 variables do not have any statistically significant negative coefficients. Rather, they appear to have statistically significant positive coefficients when COVID-19 damages are measured in terms of the number of confirmed cases and the stringency index. As discussed in Section 2, this result may suggest the increase in export-platform FDI from more damaged countries to less damaged countries.

=== Table 2A ===

The results about the service sector are presented in Table 2B. In the case of greenfield FDI, the results are somewhat similar to those about the manufacturing sector, that is, COVID-19 damages in the host country negatively impacted greenfield FDI in the service sector. The difference is in the host country's COVID-19 damages in terms of the number of death and the stringency index but not in terms of the number of confirmed cases, as it also had a statistically significant negative impact on greenfield FDI flows in the service sector. Another difference is that COVID-19 damages in the home country also negatively impacted greenfield FDI in the service sector, but their impact was weaker than those in the host country in terms of the value of the coefficients and the level of significance. Regarding cross-border M&A, the COVID-19 damages did not appear to have an immediate impact in the same quarter. This is consistent with the observations depicted in Figures 1 and 2, which show that the response of M&A to the pandemic damages was somewhat slow.

=== Table 2B ===

Next, based on our expectation about the delayed effects in cross-border M&A, we report the results when the COVID-19 damages are lagged one quarter. Tables 3A and 3B present the results for the manufacturing and service sectors, respectively. It is interesting to note that the COVID-19 damage variables in the equations for greenfield FDI flows no longer have statistically significant negative coefficients for both the manufacturing and service sectors. However, for cross-border M&A, the COVID-19 variables in the host country are negative and significant in most cases. Overall, the finding that COVID-19 damages in the host country impacted greenfield FDI in the same quarter and M&A FDI in the following quarter is consistent with the observations depicted in Figures 1 and 2, which show the quarterly pattern of greenfield and M&A FDIs for the manufacturing and service sectors, respectively. Although we expect more instantaneous impacts in cross-border M&A due to its less time-consuming permitting process, our result indicates that immediate withdrawal

is challenging due to the contract with M&A partners.

=== Tables 3A & 3B ===

As a robustness check, we repeat the estimation of the benchmark equation by restricting the home countries to only OECD member states. As shown in Tables 4A and 4B, the results are similar to those reported in Tables 2A and 2B. One difference is that COVID-19 damages in the home countries no longer have significantly positive effects on greenfield FDI in the manufacturing sector. Thus, the positive effects found in Table 2A are due to the increase in greenfield FDI from non-OECD (middle- or low-income) investing countries. Another difference is that COVID-19 damages in host countries do not have significant impacts on cross-border M&A in terms of both values and numbers. This result implies that OECD countries carry out cross-border M&A regardless of the severity of COVID-19 in the host countries.

=== Tables 4A & 4B ===

So far, we have investigated the effects of COVID-19 damages on completed FDI. Although announced FDI may be withdrawn and not realized later, it may represent business or investment sentiment better than completed or registered FDIs. Announced FDI may respond more instantaneously to the contemporaneous damages of COVID-19. Therefore, as the last robustness check, we repeat the estimation of the benchmark equation, replacing our "opened" greenfield FDI with "announced" and replacing "completed" M&A with "announced" and "pending." As noted earlier, in the case of M&A, we include not only "announced" but also "pending" because there are very few "announced" M&A deals, and both "announced" and "pending" refer to the status before completion.[13]

The estimation results are reported in Table 5. In the manufacturing sector, a stronger stringency policy in the host country results in fewer greenfield FDI announcements in terms of both the number and value. The severity of COVID-19 in home countries has positive effects on the announced values of greenfield FDI. Interestingly, all the three measures of COVID-19 damages in the host countries are negatively associated with announced and pending cross-border M&A deals. Thus, unlike the case of completed M&A, announced and pending M&A deals were negatively affected by the COVID-19 damages. In the service sector, the number of both confirmed cases and deaths in the host country had an adverse impact on the number of greenfield project announcements, whereas stringency measures had a similar impact on the value of greenfield project announcements. Also, stronger stringency measures in the host countries negatively impacted announced and

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[13] In the case of greenfield FDI data, there is no type of "pending."

pending M&A deals. However, the COVID-19 damages in home countries seem to have positive effects on both types of FDI.

=== Tables 5A & 5B ===

## 5. Concluding Remarks

The COVID-19 pandemic is a lifetime game-changer, affecting almost every aspect of human society. In particular, the economic impact is more direct and profound than the political and social impacts. The economic exchanges of goods and services between countries are severely affected. In addition, the FDI of multinational corporations, which has been a key source of global value chains for the past decades, has been severely affected. Thus, this study conducts an in-depth analysis of the extent to which COVID-19 damages affected the FDI flows between countries. Specifically, we analyze how COVID-19 confirmed cases and deaths in the home (investing) and host countries and the stringency intensity of policies, such as government lockdown or social distancing, affected the flow of FDI in 2020 and the first half of 2021.

We find that in the case of the manufacturing sector, the host country's COVID-19 damages had an immediate negative impact on greenfield FDI and cross-border M&A, whereas in the service sector, the host country's COVID-19 damages had a negative impact only on greenfield FDI. Moreover, the home country's COVID-19 damages had a positive effect on greenfield FDI in the manufacturing sector. We also find that the host country's COVID-19 damages had a negative lagged impact on M&A FDI in both the manufacturing and service sectors, whereas there was no such lagged impact on greenfield FDI. Furthermore, when we examine announced-based FDI flows, which may be withdrawn and not realized later, we find more instantaneous effects of COVID-19 damages on FDI flows. In summary, the COVID-19 damages have had complex effects on FDI flows.

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Figure 1. FDI Flows in the Manufacturing Sector [Value: US$ Billion (Left Axis) and Number (Right Axis)]
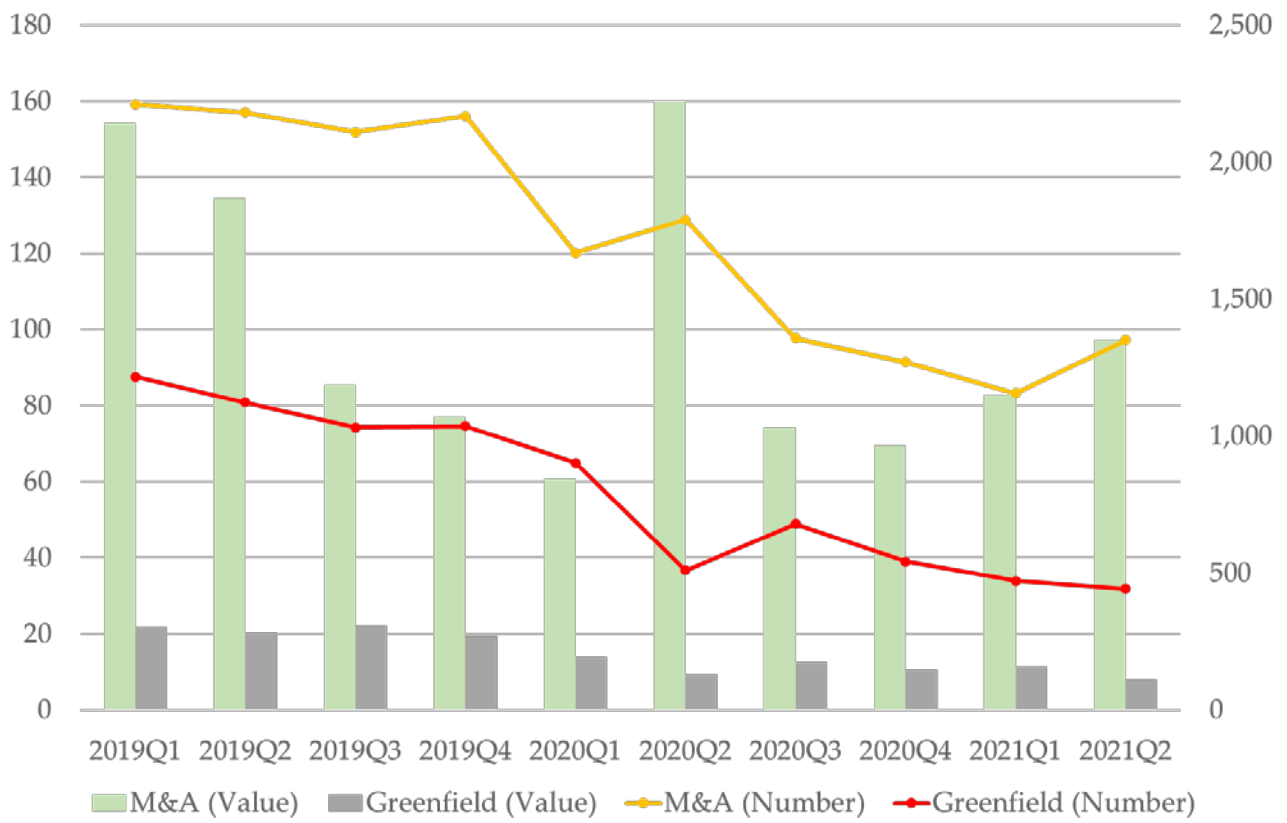


*Source*: Authors' drawing using the cross-border M&As data of Zephyr (Bureau van Dijk) and the greenfield FDI data of fDi Markets (Financial Times Ltd.).

Figure 2. FDI Flows in Service Sector [Value: US$ Billion (Left Axis) and Number (Right Axis)]
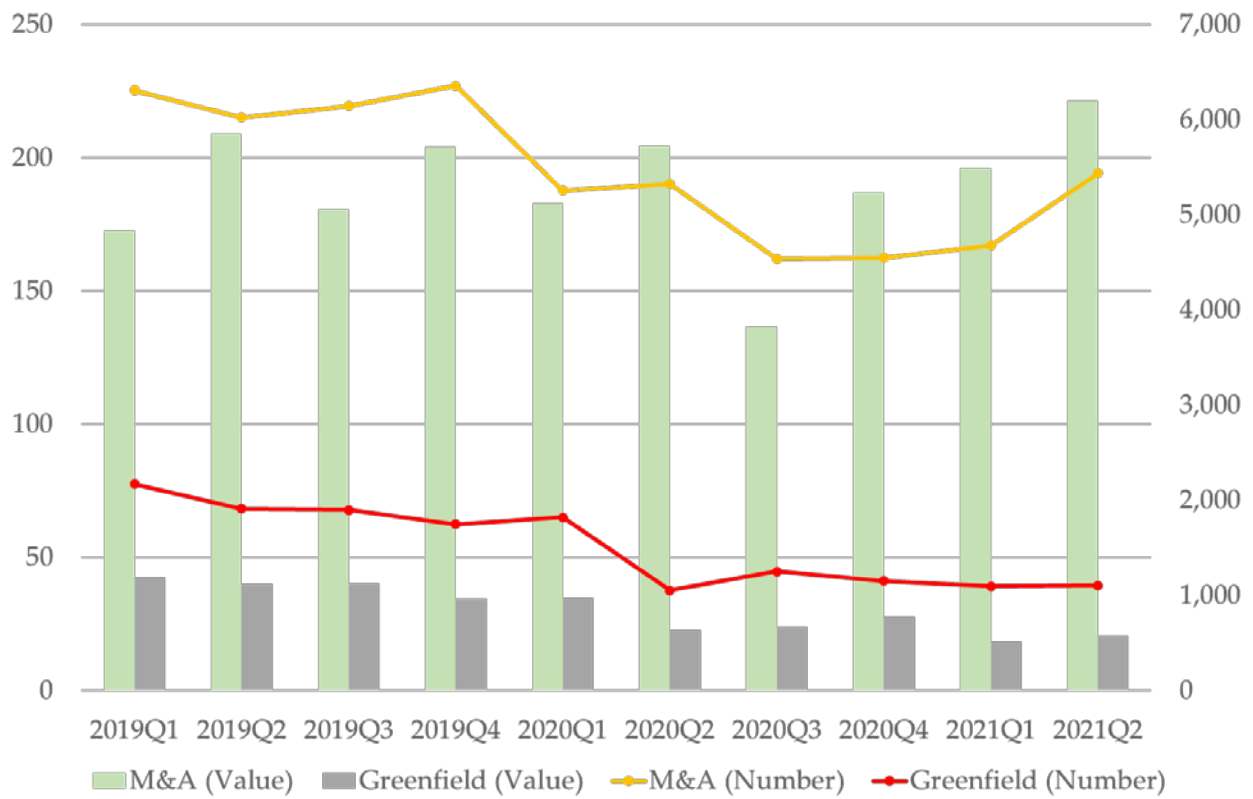


*Source*: Authors' drawing using the cross-border M&As data of Zephyr (Bureau van Dijk) and the greenfield FDI data of fDi Markets (Financial Times Ltd.).

Table 1. Basic Statistics

|  | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **Manufacturing** | | | | | |
| Greenfield FDI: Value (US$ Billion) | 3,808 | 31 | 87.7 | 0 | 1,967 |
| Greenfield FDI: Number | 3,808 | 2 | 2.5 | 0 | 39 |
| M&A FDI: Value (US$ Billion) | 3,002 | 295 | 1914.4 | 0 | 63,682 |
| M&A FDI: Number | 4,218 | 4 | 13.6 | 0 | 286 |
| Host Cases | 4,218 | 6.1 | 5.9 | 0 | 16.7 |
| Home Cases | 4,218 | 5.7 | 5.8 | 0 | 16.7 |
| Host Death | 4,216 | 3.8 | 4.2 | 0 | 12.4 |
| Home Death | 4,216 | 3.5 | 4.1 | 0 | 12.4 |
| Host Stringency | 3,794 | 33.3 | 31.7 | 0 | 92.6 |
| Home Stringency | 3,794 | 31.9 | 30.6 | 0 | 89.8 |
| **Services** | | | | | |
| Greenfield FDI: Value (US$ Billion) | 6,022 | 42 | 102.4 | 0 | 1,629 |
| Greenfield FDI: Number | 6,022 | 2 | 4.2 | 0 | 95 |
| M&A FDI: Value (US$ Billion) | 6,114 | 280 | 1210.4 | 0 | 33,768 |
| M&A FDI: Number | 9,112 | 6 | 22.9 | 0 | 529 |
| Host Cases | 9,112 | 5.9 | 5.7 | 0 | 16.7 |
| Home Cases | 9,112 | 5.7 | 5.8 | 0 | 16.7 |
| Host Death | 9,088 | 3.6 | 4.1 | 0 | 12.4 |
| Home Death | 9,088 | 3.5 | 4.1 | 0 | 12.4 |
| Host Stringency | 8,172 | 33.4 | 31.4 | 0 | 94.1 |
| Home Stringency | 8,172 | 32.6 | 30.9 | 0 | 92.6 |

*Source*: Authors' compilation.

Table 2A. Effects of COVID-19 Pandemic on Bilateral FDI Flows in the Manufacturing Sector

|  |  | GF | | M&A | |
|  |  | Number | Value | Number | Value |
|  |  | (1) | (2) | (3) | (4) |
| I | Case in host | -0.138*** | -0.141*** | -0.084** | -0.137 |
|  |  | [0.026] | [0.044] | [0.034] | [0.118] |
|  | Case in home | 0.067** | 0.057 | -0.047 | 0.015 |
|  |  | [0.031] | [0.084] | [0.047] | [0.151] |
|  | Number of obs | 3,808 | 3,808 | 4,218 | 3,002 |
|  | Pseudo R-squared | 0.455 | 0.849 | 0.771 | 0.93 |
| II | Death in host | -0.083*** | -0.03 | -0.074*** | -0.103 |
|  |  | [0.018] | [0.032] | [0.027] | [0.091] |
|  | Death in home | 0.028 | -0.048 | -0.034 | -0.112 |
|  |  | [0.022] | [0.070] | [0.027] | [0.164] |
|  | Number of obs | 3,794 | 3,794 | 4,216 | 3,002 |
|  | Pseudo R-squared | 0.454 | 0.848 | 0.772 | 0.93 |
| III | Stringency in host | -0.009** | -0.013 | -0.010*** | -0.022 |
|  |  | [0.004] | [0.008] | [0.004] | [0.015] |
|  | Stringency in home | 0.007** | 0.001 | 0.001 | 0.022 |
|  |  | [0.003] | [0.009] | [0.006] | [0.014] |
|  | Number of obs | 3,808 | 3,808 | 3,794 | 2,630 |
|  | Pseudo R-squared | 0.453 | 0.848 | 0.781 | 0.93 |

*Notes*: The estimation results using the PPML method are reported. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 2B. Effects of COVID-19 Pandemic on Bilateral FDI Flows in Services Sector

|  |  | GF | | M&A | |
|  |  | Number | Value | Number | Value |
|  |  | (1) | (2) | (3) | (4) |
| I | Case in host | -0.073*** | -0.07 | -0.029 | 0.007 |
|  |  | [0.021] | [0.054] | [0.028] | [0.068] |
|  | Case in home | -0.043* | -0.08 | 0.03 | -0.056 |
|  |  | [0.026] | [0.073] | [0.033] | [0.080] |
|  | Number of obs | 6,022 | 6,022 | 9,112 | 6,114 |
|  | Pseudo R-squared | 0.574 | 0.843 | 0.838 | 0.926 |
| II | Death in host | -0.068*** | -0.083** | -0.038 | -0.008 |
|  |  | [0.016] | [0.038] | [0.026] | [0.044] |
|  | Death in home | -0.031 | -0.064 | 0.005 | -0.077* |
|  |  | [0.019] | [0.056] | [0.018] | [0.045] |
|  | Number of obs | 6,002 | 6,002 | 9,088 | 6,102 |
|  | Pseudo R-squared | 0.575 | 0.843 | 0.839 | 0.927 |
| III | Stringency in host | -0.008*** | -0.015*** | -0.003 | 0.002 |
|  |  | [0.002] | [0.006] | [0.003] | [0.007] |
|  | Stringency in home | -0.006** | -0.014* | 0.002 | 0.003 |
|  |  | [0.003] | [0.007] | [0.004] | [0.009] |
|  | Number of obs | 6,010 | 6,010 | 8,172 | 5,356 |
|  | Pseudo R-squared | 0.574 | 0.844 | 0.846 | 0.929 |

*Notes*: The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 3A. Effects of COVID-19 Pandemic on Bilateral FDI Flows in the Manufacturing Sector: One-quarter Lag

| | | GF | | M&A | |
| | | Number | Value | Number | Value |
|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) |
| I | Case in host | 0.017 | 0.021 | -0.108*** | -0.204** |
| | | [0.022] | [0.051] | [0.033] | [0.098] |
| | Case in home | 0.037 | 0.01 | 0.018 | -0.037 |
| | | [0.026] | [0.061] | [0.025] | [0.095] |
| | Number of obs | 3,808 | 3,808 | 4,218 | 3,002 |
| | Pseudo R-squared | 0.453 | 0.847 | 0.772 | 0.931 |
| II | Death in host | 0.029 | 0.016 | -0.102*** | -0.166** |
| | | [0.018] | [0.042] | [0.026] | [0.078] |
| | Death in home | 0.035 | 0.041 | 0.006 | -0.135 |
| | | [0.023] | [0.054] | [0.028] | [0.101] |
| | Number of obs | 3,800 | 3,800 | 4,208 | 3,000 |
| | Pseudo R-squared | 0.453 | 0.847 | 0.773 | 0.932 |
| III | Stringency in host | 0.007 | 0.018* | -0.011 | -0.016 |
| | | [0.005] | [0.009] | [0.007] | [0.021] |
| | Stringency in home | 0.003 | 0.006 | 0.004 | -0.016 |
| | | [0.004] | [0.008] | [0.005] | [0.020] |
| | Number of obs | 3,808 | 3,808 | 3,794 | 2,630 |
| | Pseudo R-squared | 0.453 | 0.849 | 0.781 | 0.93 |

*Notes*: The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 3B. Effects of COVID-19 Pandemic on Bilateral FDI Flows of the Services Sector: One-quarter Lag

|  |  | GF | | M&A | |
|---|---|---|---|---|---|
|  |  | Number | Value | Number | Value |
|  |  | (5) | (6) | (7) | (8) |
| I | Case in host | -0.013 | -0.033 | -0.047* | -0.037 |
|  |  | [0.018] | [0.051] | [0.025] | [0.034] |
|  | Case in home | -0.016 | -0.068 | 0.030* | -0.033 |
|  |  | [0.023] | [0.065] | [0.016] | [0.032] |
|  | Number of obs | 6,022 | 6,022 | 9,112 | 6,114 |
|  | Pseudo R-squared | 0.574 | 0.842 | 0.839 | 0.927 |
| II | Death in host | -0.004 | -0.019 | -0.040** | -0.037 |
|  |  | [0.015] | [0.042] | [0.019] | [0.036] |
|  | Death in home | -0.009 | -0.045 | 0.032* | -0.043 |
|  |  | [0.018] | [0.057] | [0.017] | [0.032] |
|  | Number of obs | 6,002 | 6,002 | 9,072 | 6,094 |
|  | Pseudo R-squared | 0.574 | 0.842 | 0.839 | 0.927 |
| III | Stringency in host | 0.002 | 0.001 | -0.008* | -0.007 |
|  |  | [0.003] | [0.006] | [0.004] | [0.007] |
|  | Stringency in home | 0.001 | 0.006 | 0.004 | 0.007 |
|  |  | [0.003] | [0.009] | [0.003] | [0.009] |
|  | Number of obs | 6,010 | 6,010 | 8,172 | 5,356 |
|  | Pseudo R-squared | 0.574 | 0.842 | 0.846 | 0.929 |

*Notes*: The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 4A. Effects of COVID-19 Pandemic on Bilateral FDI Flows in the Manufacturing Sector: OECD Home Countries

|  |  | GF | | M&A | |
|  |  | Number | Value | Number | Value |
|  |  | (1) | (2) | (3) | (4) |
| I | Case in host | -0.134*** | -0.120*** | -0.063 | -0.037 |
|  |  | [0.027] | [0.046] | [0.043] | [0.151] |
|  | Case in home | 0.033 | 0.068 | -0.012 | 0.257 |
|  |  | [0.055] | [0.093] | [0.093] | [0.236] |
|  | Number of obs | 3,182 | 3,182 | 2,890 | 1,940 |
|  | Pseudo R-squared | 0.463 | 0.844 | 0.798 | 0.937 |
| II | Death in host | -0.085*** | -0.028 | -0.063 | -0.115 |
|  |  | [0.019] | [0.035] | [0.039] | [0.150] |
|  | Death in home | -0.030 | -0.082 | -0.039 | 0.304 |
|  |  | [0.040] | [0.076] | [0.050] | [0.237] |
|  | Number of obs | 3,172 | 3,172 | 2,890 | 1,940 |
|  | Pseudo R-squared | 0.463 | 0.843 | 0.799 | 0.938 |
| III | Stringency in host | -0.010** | -0.011 | -0.007 | -0.025 |
|  |  | [0.004] | [0.008] | [0.005] | [0.020] |
|  | Stringency in home | 0.005 | -0.000 | 0.004 | 0.016 |
|  |  | [0.004] | [0.009] | [0.009] | [0.019] |
|  | Number of obs | 3,182 | 3,182 | 2,836 | 1,886 |
|  | Pseudo R-squared | 0.462 | 0.843 | 0.799 | 0.937 |

*Notes*: The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 4B. Effects of COVID-19 Pandemic on Bilateral FDI Flows of the Services Sector: High-income Home Countries

|  |  | GF | | M&A | |
|  |  | Number | Value | Number | Value |
|  |  | (1) | (2) | (3) | (4) |
| I | Case in host | -0.070*** | -0.099* | -0.024 | 0.015 |
|  |  | [0.022] | [0.052] | [0.037] | [0.069] |
|  | Case in home | -0.049 | -0.142 | 0.077 | 0.107 |
|  |  | [0.041] | [0.098] | [0.065] | [0.176] |
|  | Number of obs | 4,684 | 4,684 | 5,876 | 3,878 |
|  | Pseudo R-squared | 0.597 | 0.855 | 0.863 | 0.930 |
| II | Death in host | -0.068*** | -0.095** | -0.048 | -0.015 |
|  |  | [0.017] | [0.040] | [0.038] | [0.054] |
|  | Death in home | -0.047* | -0.056 | 0.001 | -0.020 |
|  |  | [0.027] | [0.080] | [0.029] | [0.142] |
|  | Number of obs | 4,664 | 4,664 | 5,860 | 3,866 |
|  | Pseudo R-squared | 0.598 | 0.855 | 0.863 | 0.930 |
| III | Stringency in host | -0.008*** | -0.016*** | -0.004 | 0.005 |
|  |  | [0.002] | [0.006] | [0.004] | [0.008] |
|  | Stringency in home | -0.008*** | -0.012 | 0.005 | 0.015 |
|  |  | [0.003] | [0.009] | [0.007] | [0.012] |
|  | Number of obs | 4,676 | 4,676 | 5,730 | 3,770 |
|  | Pseudo R-squared | 0.597 | 0.855 | 0.864 | 0.930 |

*Notes*: The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 5A. Effects of COVID-19 Pandemic on Bilateral FDI Flows in the Manufacturing Sector -Announcements and Pending

| | | GF | | M&A | |
| | | Number | Value | Number | Value |
| | | (1) | (2) | (3) | (4) |
| I | Case in host | -0.026 | 0.01 | -0.122 | -0.956** |
| | | [0.019] | [0.042] | [0.085] | [0.449] |
| | Case in home | 0.019 | 0.202*** | 0.071 | 0.418 |
| | | [0.026] | [0.073] | [0.090] | [0.726] |
| | Number of obs | 2,956 | 2,956 | 2,108 | 1,220 |
| | Pseudo R-squared | 0.429 | 0.885 | 0.303 | 0.794 |
| II | Death in host | -0.008 | -0.02 | -0.010 | -1.108*** |
| | | [0.014] | [0.033] | [0.069] | [0.380] |
| | Death in home | 0.021 | 0.137** | -0.008 | 0.376 |
| | | [0.019] | [0.060] | [0.062] | [0.436] |
| | Number of obs | 2,948 | 2,948 | 2,108 | 1,220 |
| | Pseudo R-squared | 0.429 | 0.884 | 0.303 | 0.793 |
| III | Stringency in host | -0.005** | -0.012** | -0.018* | 0.039 |
| | | [0.002] | [0.006] | [0.010] | [0.059] |
| | Stringency in home | 0.002 | 0.023*** | 0.003 | -0.064 |
| | | [0.003] | [0.008] | [0.009] | [0.049] |
| | Number of obs | 2,952 | 2,952 | 1,890 | 1,050 |
| | Pseudo R-squared | 0.429 | 0.885 | 0.305 | 0.795 |

*Notes*: GF includes "announcements" while M&A includes both "announcements and pending." The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.

Table 5B. Effects of COVID-19 Pandemic on Bilateral FDI Flows in Services Sector - Announcements and Pending

| | | GF | | M&A | |
|---|---|---|---|---|---|
| | | Number | Value | Number | Value |
| | | (1) | (2) | (3) | (4) |
| I | Case in host | -0.054** | -0.029 | -0.103 | -0.112 |
| | | [0.023] | [0.062] | [0.067] | [0.159] |
| | Case in home | -0.034 | 0.015 | -0.031 | 0.240 |
| | | [0.029] | [0.060] | [0.059] | [0.219] |
| | Number of obs | 3,954 | 3,954 | 4,564 | 2,496 |
| | Pseudo R-squared | 0.515 | 0.857 | 0.376 | 0.776 |
| II | Death in host | -0.030* | -0.014 | -0.040 | 0.036 |
| | | [0.018] | [0.046] | [0.053] | [0.119] |
| | Death in home | 0.017 | 0.039 | -0.025 | 0.386* |
| | | [0.027] | [0.056] | [0.043] | [0.230] |
| | Number of obs | 3,950 | 3,950 | 4,556 | 2,492 |
| | Pseudo R-squared | 0.515 | 0.857 | 0.376 | 0.776 |
| III | Stringency in host | -0.004 | -0.009* | -0.005 | -0.081** |
| | | [0.003] | [0.005] | [0.009] | [0.036] |
| | Stringency in home | 0.007** | 0.017*** | -0.008 | 0.083* |
| | | [0.003] | [0.006] | [0.007] | [0.043] |
| | Number of obs | 3,950 | 3,950 | 3,548 | 2,014 |
| | Pseudo R-squared | 0.515 | 0.858 | 0.358 | 0.775 |

*Notes*: GF includes "announcements," whereas M&A includes both "announcements and pending." The estimation results using the PPML method are reported. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The standard errors reported in parentheses are those clustered by country pairs. In all specifications, we control for country pair-year fixed effects, country pair-quarter fixed effects, and year-quarter fixed effects.