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Pandemic Arbitrage in Foreign Direct Investments:
A Perspective on the Modes of Entry

Paul CHEUNG

Ammu GEORGE

Taojun XIE

Huanhuan ZHENG

Yan ZHU

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Paul Cheung [*]   Ammu George[*][†]   Taojun Xie [*]   Huanhuan Zheng[‡]   Yan Zhu [§]

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Abstract

Foreign Direct Investments (FDI) are often considered long-term and less sensitive to global shocks as they involve large amounts of capital investment that are costly to reverse. This study examines whether a pandemic arbitrage through a difference in COVID-19 infection rates impacts FDI. Using bilateral FDI inflows data from January 2019 to December 2020, we show that COVID-19 pandemic shock deterred global FDI mainly through the greenfield FDI mode of entry. Our results also show that strong social connections and loose COVID-19 policy stringency alleviates the pandemic's effect on FDI, especially for M&As.

Keywords: COVID-19, Foreign Direct Investment, Greenfield FDI, Mergers & Acquisition, Social Connection, COVID-19 Policy Stringency

JEL Codes: F20, F21, F23

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[*]Asia Competitiveness Institute, Lee Kuan Yew School of Public Policy, National University of Singapore, 469C Bukit Timah Road, Singapore 259772.

[†]Corresponding author, Email: sppammu@nus.edu.sg, Declarations of interest: none.

[‡]Lee Kuan Yew School of Public Policy, National University of Singapore, 469C Bukit Timah Road, Singapore 259772.

[§]Naveen Jindal School of Management, The University of Texas at Dallas, 800 W Campbell Rd, Richardson, TX 75080, United States.

1 Introduction

Foreign direct investments (FDI) are a significant component of long-term investments contributing to recovery from economic recessions (Smarzynska Javorcik, 2004; Ito and Rodrik, 2008), including the current one due to the coronavirus disease 2019 (COVID-19). Tracking the allocation of FDI during the COVID-19 pandemic is thus important to understand the path towards recovery. According to UNCTAD (2021), FDI inflows declined by 1 trillion USD in 2020, with the impact felt largely by greenfield FDI. It is, however, not clear how the pandemic has reshuffled global FDI. On the one hand, long-term oriented FDI are less sensitive to global shocks than short-term oriented capital such as portfolio flows (Lipsey et al., 1999). On the other hand, there may be "pandemic arbitrage" in the sense that destinations coping well with the pandemic are more favorable to the investors. We explore how FDI in different entry modes responds to the COVID-19 pandemic shock worldwide in this paper.

Our main contribution lies in identifying the asymmetric deterring effects of COVID-19 on different types of FDI. Applying a continuous treatment difference-in-differences (DID) approach to bilateral cross-border investment data between January 2019 and December 2020, we find that the pandemic deters overall FDI inflows. The result is intuitive as the pandemic generates negative economic shocks, disrupts supply chains, impedes business operations, cuts international connections, which all discourage profit-seeking and cost-minimizing FDI. FDI of different entry modes are likely to be exposed to the pandemic shock. In particular, we find that the impact of the pandemic shock on greenfield FDI is more pronounced than cross-border mergers and acquisitions (M&As). We further show that strong social connections and loose COVID-19 policy stringency mitigate the pandemic's impact on FDI, especially for M&As.

Related literature: There is a large body of literature that explores the macroeconomic consequences of the COVID-19 pandemic, primarily focusing on the domestic economy setting pertaining to growth (Altig et al., 2020), consumption (Chen et al., 2021; Coibion et al., 2020; Bounie et al., 2020; Krueger et al., 2020), labor (Forsythe et al., 2020; Brynjolfsson et al., 2020; Fang et al., 2020), etc. Our paper joins the relatively small albeit growing literature on the international spillovers of

the COVID-19 pandemic shock that deals with international trade and global value chain linkages (Antràs et al., 2020; Bonadio et al., 2021; Cakmakli et al., 2020; Espitia et al., 2021; George et al., 2021; Hayakawa and Mukunoki, 2021; Vidya and Prabheesh, 2020). We contribute to the existing discourse on the pandemic's international consequences through the dimension of FDI, which has not been adequately explored. We show that pandemic shocks discourage FDI, and such an impact differs between greenfield FDI and cross-border M&As.

The nascent FDI literature on the COVID-19 pandemic comprise studies that deals with FDI flows to individual countries. For example, Fang et al. (2021) provide empirical evidence concerning the impact of the Covid-19 pandemic on FDI flows to China (outward and inward). Our paper is more related to FDI studies with a cross-country perspective. Fu et al. (2021) identifies the pandemic impact on bilateral FDI margins. Our study is distinct in three ways. First, we focus on the pandemic impact on the FDI modes of entry. We show that the pandemic impact differs between greenfield FDI and cross-border M&As. Second, we use a more robust empirical specification in terms of a continuous difference-in-difference framework. This enables us to include periods before and after the pandemic. Third, we use a bilateral Covid-19 infection covariate to examine whether there was an arbitrage in FDI flows post-pandemic.

The remainder of the paper is organized as follows. Section 2 presents the empirical framework and data. Section 3 discusses the results. Section 4 concludes.

2 Empirical framework

To examine FDI response to the COVID-19 pandemic, we employ the below empirical framework as our baseline model.

$$ln(1 + FDI_{ijt}) = \beta covid_{ijt} + c_{ij} + \delta_t + \gamma_{iy} + \lambda_{jy} + \epsilon_{ijt} \tag{1}$$

where,

- FDI_{ijt} is the bilateral FDI inflow from source market i to destination market j at time period t. We use $ln(1 + FDI_{ijt})$ specification to tackle the issue of zero FDI values.

- $covid_{ijt}$ denotes the difference in newly infected cases as a ratio of the total population between destination market j and source market i at period t. Hence, $covid_{ijt} = 0$ for all market pairs before the outbreak of the COVID-19 pandemic. This makes Eq. (1) a continuous treatment DID specification.

- The fixed effects in Eq. (1) automatically controls for important factors that determine FDI . c_{ij} pertains to fixed effects that account for time-invariant bilateral variables like whether the source and destination markets share a common language, common border, common history, etc. δ_t controls time fixed effects. Finally, γ_{iy} and λ_{jy} account for source market-year and destination market-year fixed effects, respectively. The inclusion of γ_{iy} and λ_{jy} automatically controls time-varying source and destination market specific variables that are commonly found to determine FDI inflows.

An estimate of $\beta < 0$ will indicate that MNCs invest in markets having similar rates of COVID-19 infections. In other words, a rise in the COVID-19 infections in the destination market relative to the source market would deter bilateral FDI inflows.

2.1 Data on FDI

We use Orbis cross-border investment which tracks daily information on greenfield FDI projects and cross-border M&A deals for our FDI data. Orbis data reports the location of the investor and project/deal destination in addition to the project value and status. Using this transaction-level data, we construct global monthly bilateral FDI inflows by aggregating the announced or completed investments by the source country of the investor and the destination market for each month. We conduct the aggregation for both greenfield projects and M&A deals. The summation of both entry nodes: greenfield and M&A, provides bilateral FDI inflows from market i to market j each month. FDI, greenfield FDI, and M&A are the main dependent variables in our paper.

Our sample period extends from January 2019 to December 2020, 12 months before and 12 months after the pandemic started. We drop bilateral pairs who recorded investment flows for less than six months during the pre-treatment period (January 2019 to December 2019) to avoid

irregular investment patterns. The final aggregated FDI dataset is a balanced panel of 11,592 observations from 483 bilateral pairs comprising 46 source markets and 67 destination markets.

2.2 Data on COVID-19

The monthly data on newly infected COVID-19 cases as a ratio of the total population is collected from Johns Hopkins Coronavirus Resource Center. We map this country-specific COVID-19 infections data to the FDI dataset for both source and destination markets and construct the following time-varying COVID-19 measure for each bilateral pair:

$$covid_{ijt} = \frac{Covid_{it}^{new}}{Population_{it}} - \frac{Covid_{jt}^{new}}{Population_{jt}} \tag{2}$$

where $Covid_{it}^{new}$ and $Population_{it}$ denotes the new COVID-19 cases and population, respectively of market i in period t. $covid_{ijt} = 0$ for all periods before January 2020.

3 Results

Before discussing the empirical results, we show the dynamics of global FDI inflows during the study period in Fig. 1. As the figure shows, global FDI declined after the onset of the COVID-19 pandemic. Among the modes of entry, greenfield FDI declined more substantially than M&As.

3.1 Baseline

Table 1 reports the results from the estimation of the baseline model in Eq. (1). Column (1) shows the results from the baseline estimation. A negative and statistically significant $covid_{ijt}$ coefficient in column (1) indicates that a higher COVID-19 infection rate in the destination market relative to the source market deters FDI inflows to the destination market. In other words, FDI moves to destination markets less affected by the pandemic (or with better pandemic management). $covid_{ijt}$ coefficient value indicates that a one percentage point increase in the new infection rate in the destination market relative to that in the source market corresponds to a drop in FDI inflows by 9 percent.
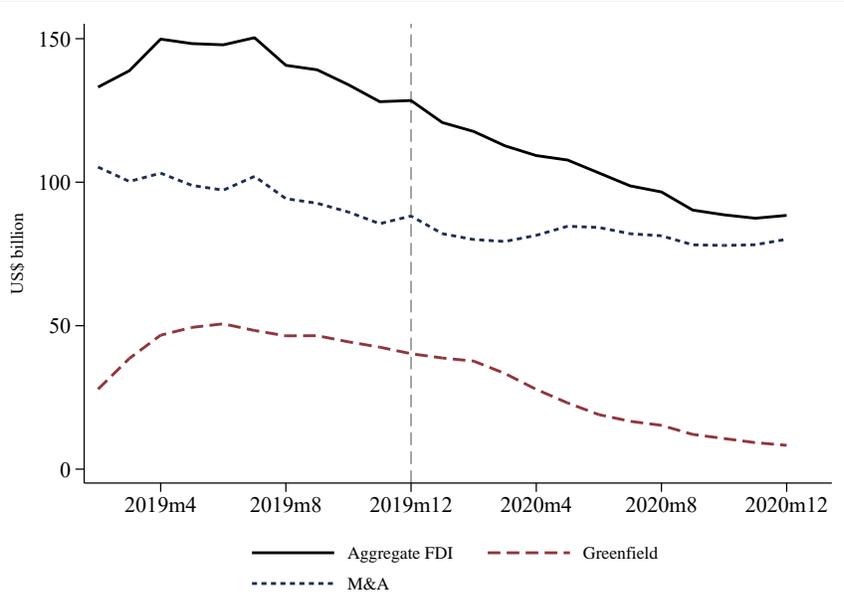
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Figure 1: Global Foreign Direct Investment Flows (Jan 2019 - Dec 2020)

We next decompose FDI into greenfield and M&As to identify the pandemic's impact on the different modes of FDI entry. The results from column (2) and (3) highlights greenfield FDI to being more adversely impacted from the pandemic than M&A. $covid_{ijt}$ estimate in column (2) reveals that greenfield FDI inflows declines by 12 percent when the COVID-19 infection rate in destination market relative to the source market increases by one percentage point. However, COVID-19 infections appears to be statistically insignificant in the determination of M&As (column (3)).

As a robustness check, we re-estimate the baseline model using Poisson Pseudo-Maximum Likelihood (PPML) estimator established by existing literature to provide consistent coefficient estimates in the presence of heteroscedasticity and measurement error. Additionally, the PPML estimator helps tackle zero FDI values in our balanced panel where missing bilateral FDI entries are replaced with zero observations. Columns (4) to (6) reveal the robustness of the baseline results with PPML estimation. The negative and statistically significant $covid_{ijt}$ coefficient in column (5) re-iterates the pandemic's adverse impact on greenfield FDI inflows.

Table 1: Baseline results

Dependent var.	$ln(1 + FDI_{ijt})$			FDI_{ijt}		
	FDI (1)	Greenfield (2)	M&A (3)	FDI (4)	Greenfield (5)	M&A (6)
$covid_{ijt}$	-0.09**	-0.12***	0.02	-0.03	-0.74***	0.03
	(0.01)	(0.00)	(0.00)	(0.05)	(0.11)	(0.04)
Constant	2.15***	1.36***	1.14***	6.43***	4.90***	6.54***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.00)
Source-destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Source-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,592	11,592	11,592	11,544	10,968	10,044
R-squared	0.42	0.47	0.38	0.52	0.56	0.51

FDI_{ijt} denotes the bilateral FDI (Aggregate, Greenfield or M&A) from market i to market j in period t. $covid_{ijt}$ refers to the difference in new infected covid cases a ratio of population between markets i and j. $covid_{ijt} = 0$ for the pre-treatment period (January 2019 - December 2019). Columns (1) to (3) reports the OLS estimation results from using $ln(1 + FDI_{ijt})$ as the dependent variable. Columns (4) to (6) reports the PPML estimation results from using FDI_{ijt} as the dependent variable. *, **, *** denotes significance level at 1, 5 and 10 percent, respectively. Robust standard errors clustered by market pair and year are reported in the parenthesis.

3.2 Does social connection and COVID-19 policy stringency matter?

The results in Section 3.1 showcased the adverse impact of the pandemic on FDI inflows. This section sheds light on whether factors like social connections and COVID-19 policy stringency affect the pandemic's negative impact on FDI inflows.

3.2.1 Social connection

According to existing literature on FDI mode of entry (Nocke and Yeaple, 2008), M&As involve corporate assets purchase (existing facilities, firm ownership, etc.) in the destination country that the MNC lacks. Such transactions become more effective when the acquirers have a good understanding on the preferences, culture and norms of the destination markets (Stahl and Voigt, 2008). This suggests that negotiations and ownership transfer in M&A deals can be performed online if the acquirer and target have social connections. A similar social or cultural connection argument cannot be inferred for greenfield FDI which involves building production capacity in

the destination market to enable MNC to transfer the corporate assets abroad (Harzing, 2002). Physical connections are essential in greenfield FDI. Since M&As require less mobile capabilities than greenfield FDI, a social connection may substitute physical connection for M&As during the pandemic, but less so for greenfield FDI.

To investigate the role of social connection in pandemic's impact on bilateral FDI inflow, we estimate the below equation:

$$ln(1 + FDI_{ijt}) = \beta_1 covid_{ijt} + \beta_2 covid_{ijt} \times social_{ij} + c_{ij} + \delta_t + \gamma_{iy} + \lambda_{jy} + \epsilon_{ijt} \qquad (3)$$

where $social_{ij}$ refers to the social connection between source and destination market. First, we use the bilateral social connectedness index from Facebook friendship data as a proxy for $social_{ij}$. The results from columns (1) to (3) in Table 2 shows no evidence that the social connection index (SCI_{ij}) affects the impact of COVID-19 on FDI. Such a result could arise due to friendship connections derived from Facebook being not business oriented. We next consider common colonial history from the CEPII gravity dataset as an indicator of social connection. Hence, $social_{ij} = Colonial_{ij}$ in Eq. (3), where $Colonial_{ij}$ is a binary variable that takes the value 1 when markets i and j share common colonial history and 0 otherwise. The results reported from columns (4) to (6) shows $covid_{ijt} \times social_{ij}$ coefficient as positive and significant for M&As alone. In line with our expectation, a common colonial history that represents similar culture, institution, and rule between source and destination markets weakens only M&As response to the COVID-19 infections.

3.2.2 COVID-19 policy

Over the course of the pandemic, governments worldwide undertook policy measures to manage COVID-19 transmission. If MNCs expect the destination market COVID-19 policies to be effective in curbing future infection, their investments should be less responsive to COVID-19 infection rates. On the other hand, if COVID-19 policy imposed further constraints on business operations, destination market policy responses may strengthen the response of FDI to the COVID-19 infections. We estimate the below equation to identify which of the afore-mentioned effect dominates.

Table 2: Role of social connection

Dependent var.	$ln(1 + FDI_{ijt})$					
	FDI (1)	Greenfield (2)	M&A (3)	FDI (4)	Greenfield (5)	M&A (6)
$covid_{ijt}$	-0.04 (0.02)	-0.06 (0.02)	-0.00 (0.02)	-0.10** (0.01)	-0.12*** (0.00)	0.01 (0.00)
$covid_{ijt} \times SCI_{ij}$	-0.08 (0.05)	-0.01 (0.06)	-0.02 (0.04)			
$covid_{ijt} \times Colonial_{ij}$				1.00 (0.17)	0.39 (0.14)	0.67*** (0.00)
Constant	2.10*** (0.00)	1.38*** (0.00)	1.06*** (0.00)	2.20*** (0.01)	1.37*** (0.03)	1.17*** (0.00)
Source-destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Source-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,672	9,672	9,672	11,160	11,160	11,160
R-squared	0.41	0.47	0.34	0.42	0.47	0.38

FDI_{ijt} denotes the bilateral FDI (Aggregate, Greenfield or M&A) from market i to market j in period t. $covid_{ijt}$ refers to the difference in new infected covid cases a ratio of population between markets i and j. $covid_{ijt} = 0$ for the pre-treatment period (January 2019 - December 2019). SCI_{ij} pertains to the bilateral social connectedness index between market i and market j from Facebook. $Colonial_{ij}$ is a binary variable that takes the value 1 if market i and market j has common colonial history. Columns (1) to (6) reports the OLS estimation results from using $ln(1 + FDI_{ijt})$ as the dependent variable. *, **, *** denotes significance level at 1, 5 and 10 percent, respectively. Robust standard errors clustered by market pair and year are reported in the parenthesis.

$$ln(1 + FDI_{ijt}) = \beta_1 covid_{ijt} + \beta_2 covid_{ijt} \times PolicyStringency_{jt} + \beta_3 PolicyStringency_{jt} + c_{ij} + \delta_t + \gamma_{iy} + \lambda_{jy} + \epsilon_{ijt}$$

$$(4)$$

where $PolicyStringency_{jt}$ denotes the COVID-19 policy stringency in the destination market j at period t. We use the stringency Index from Oxford COVID-19 Government Response Tracker (OxCGRT) to proxy for destination market policy stringency. The negative and significant interaction term coefficient from column (1) and (3) in Table 3 shows the second effect to dominate i.e., COVID-19 policy stringency in destination market strengthens the adverse impact of the pan-

demic on FDI inflows primarily through M&A mode of entry. From the negative and significant $PolicyStringency_{jt}$ coefficient estimate in column(1), we also decipher that COVID-19 policy stringency directly discourages FDI.

Table 3: Role of COVID-19 policy stringency

Dependent var.	$ln(1 + FDI_{ijt})$		
	FDI	Greenfield	M&A
	(1)	(2)	(3)
$covid_{ijt}$	-0.06*	-0.10**	0.02
	(0.01)	(0.00)	(0.01)
$covid_{ijt} \times PolicyStringency_{jt}$	-0.78*	-0.26	-0.59*
	(0.10)	(0.07)	(0.05)
$PolicyStringency_{jt}$	-0.38**	-0.21	-0.14
	(0.02)	(0.04)	(0.03)
Constant	2.16***	1.36***	1.14***
	(0.00)	(0.00)	(0.00)
Source-destination fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Source-year fixed effects	Yes	Yes	Yess
Destination-year fixed effects	Yes	Yes	Yes
Observations	11,592	11,592	11,592
R-squared	0.43	0.47	0.38

FDI_{ijt} denotes the bilateral FDI (Aggregate, Greenfield or M&A) from market i to market j in period t. $covid_{ijt}$ refers to the difference in new infected covid cases a ratio of population between markets i and j. $covid_{ijt} = 0$ for the pre-treatment period (January 2019 - December 2019). $PolicyStringency_{jt}$ pertains to the stringency index of destination market j from Oxford COVID-19 Government Response Tracker (OxCGRT). $Colonial_{ij}$ is a binary variable that takes the value 1 if market i and market j has common colonial history. Columns (1) to (3) reports the OLS estimation results from using $ln(1 + FDI_{ijt})$ as the dependent variable. *, **, *** denotes significance level at 1, 5 and 10 percent, respectively. Robust standard errors clustered by market pair and year are reported in the parenthesis.

4 Conclusion

This study examines the pandemic consequences on FDI inflows using a bilateral panel dataset of FDI inflows from 46 source markets to 67 destination markets spanning January 2019 to December 2020. Using the difference in COVID-19 infections between destination and source market in a continuous treatment DID specification, we show that pandemic deters FDI inflows with differing impacts across entry modes. Our findings suggest greenfield FDI as more responsive to the pandemic than M&As. Further, we also find bilateral social connections through common colonial history mitigates the impact of COVID-19 infections on M&As but not greenfield FDI. Finally, our results show that destination market COVID-19 policy stringency strengthens the adverse effect of the COVID-19 pandemic on FDI.

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