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IMPACT OF COVID-19 PANDEMIC ON FOREIGN DIRECT INVESTMENT – THE WORLD PERSPECTIVE[1]

Summary

Purpose – Foreign Direct Investment (FDI) has been considered a robust element of globalization that was chiefly immune to financial and economic threats. However, late 2019 introduced international direct investors to COVID-19, a yet unknown risk factor. The aim of this study is to take a holistic perspective and test a research hypothesis of a negative impact of COVID-19 on relative inward FDI activity on the global scale.

Research method – FDI is modelled with a series of literature-based determinants including aggregate independent variables that allowed to overcome the issue of too many FDI determinants and model underspecification simultaneously. A series of tests is run on two models (n = 152 and n = 141) to assure their econometric validity.

Results – Results show that number of COVID-19 related cases and number of deaths have not had an impact on relative inward FDI on the world scale.

Originality/value/implications/recommendations – Unlike most studies, this one examines relative FDI host attractiveness from a global/holistic perspective, which provides additional analytical context. Such determinants as market size, access to qualified labour force and quality of governance are shown to trump risks associated with COVID-19 in determining FDI activity. Policymakers should focus on economic growth, access to qualified labour force and political stability. Hence, lockdown policies were not the optimum solution.

Keywords: Foreign Direct Investment, COVID-19 pandemic.

JEL classification: F21, F23

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1. Introduction

Multinational corporations (MNC) are accustomed to accounting for traditional risk factors (e.g., political: Charpin et al. [2020]; Yasuda, Kotabe [2020, pp. 162–164]), but a world-wide pandemic is something that recent globalization trends and MNC representing them did not have to deal with in recent history [Hitt et al., 2021, p. 6] with some researchers referring to it as a "black swan" [Hysa et al., 2022]. The new risk factor of the COVID-19 was even further increased by varying political responses of governments across the world (even on a country level – see: Sapat et al., [2022, p. 11]), which made "one size fits all" strategic responses impossible to implement.

As much as COVID-19 can be seen as just another risk increasing factor (i.e., an element creating uncertainty [Ho, Gan, 2021, p. 10]) – albeit not always accounted for by investors [Jaworek et al., 2020, p. 282] – predictions and their verification made by UNCTAD [2020, p. 2; 2021, p. X] have shown a big shift in MNC approach to their international operations; especially, to global value chains (e.g., their shortening, re-domestication of activities, more flexibility: Hejazi, Tang [2021, p. 88]; McMaster et al. [2020, pp. 1, 6–8]) as well as to new and reinvested FDI strategies. This in turn will have to coexist with new FDI policies introduced in host countries [Kowalski, 2020, pp. 140–146; Congressional Research Services, 2021, pp. 44–48], e.g., re-evaluation of the focus on low-cost labour [Kalotay, Sass, 2021, p. 82] or more restrictive FDI screening systems [Sharma, 2021, p. 71].

Existing studies tend to focus on a single country or are panel studies on relatively short (due to recency of COVID-19 – issue discussed by, e.g., Chattopadhyay et al. [2022, p. 56]) time frames. This study fills in the existing gap as it examines the impact of COVID-19 on inward FDI across 152 and 141 countries (depending on the model) – i.e., on a global scale – at one moment in time (year 2020). Another contribution of this study comes from using % of world total as a measure of inward FDI (stock) activity instead of much more volatile (hence susceptible to short-term shocks) inflows of FDI.[2] The use of such a measure of the independent variable allows for two things. Firstly, it measures relative FDI attractiveness of host countries. This allows to go beyond the traditional 'increase/decrease' analysis lacking a point of refe-

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[2] Standard deviation of a year-to-year % change for a period of 1981–2020 for FDI inflows is equal to 26.29 and 8.85 for inward FDI stock when measured as US dollars at current prices in millions [www 1].

rence. Secondly, the use of stocks instead of flows allows for contributions to a long-term strategy aimed at creating relative host's attractiveness, instead of responses to short-term, one-time events. This is especially important in the light of on-the-spot economic decisions/responses (e.g., lockdowns), which proved to be harmful even for developed economies.

To structure the study, based on literature review, the author puts forward a research hypothesis that there is a statistically significant negative impact of COVID-19 pandemic on relative inward FDI on a global scale.

After this introduction, the author conducts a literature review, followed by the empirics of the study, ending with observations, and policy implications.

2. Literature review

There is a high degree of unanimity in research results across studies in terms of there being a negative impact of the COVID-19 on FDI activity (e.g., Aysan et al. [2020, p. 1100]). However, there are differences in the way the pandemic is measured/accounted for (e.g.: new, overall cases and deaths, lockdowns, changes in resource prices, a dummy variable, or a stringency index).

Fang et al. [2021, p. 15] found that there is a negative relationship between COVID-19 (measured by new and aggregate cases, and new deaths) and FDI. The same results in terms of COVID-19's impact on FDI were obtained by Nawo and Njangang [2021, p. 13] and Fu et al. [2021, p. 2798]. As much as the number of cases and deaths can impact the market- (fall in demand) and resource-seeking (fall in labour) FDI, it is the associated policies (i.e., lockdowns) that take the actual toll on economies and therefore on the FDI activity [www 2; IMF, 2020, p. 5]. Camino-Mogro and Armijos [2021, pp. 732–733] with their case-study of Ecuador have shown that there is a negative impact of lockdowns on inward FDI flows. Lockdowns were also mentioned as a factor negatively impacting greenfield FDI pledges by OECD [2020, p. 7] and as having an overall negative impact on economic elements (domestic and international) by Congressional Research Services [2021]. When studying the impact of COVID-19 on inward FDI in BRICS nations, Chattopadhyay et al. [2022, p. 56] used a time dummy to account for the pandemic. Interestingly, unlike most studies, Chattopadhyay et al. [2022, p. 56] found their COVID-19 explanatory variable to be insignificant for the studied group of countries. This falls in line with Napiórkowski [2022a, p. 70], who – for a case-study of Poland – talks of a small relationship between the studied pandemic and inward FDI activity. There are also studies like that by Hayakawa et al. [2022,

p. 9–10] where (in addition to cases and deaths) it is the actual damage caused by the COVID-19 pandemic that is taken under consideration. This is done by using a stringency index. Hayakawa et al. [2022, p. 5] show that the impact of the studied pandemic on FDI is generally negative, but it will depend, e.g., on the entry mode (greenfield vs. cross-border mergers and acquisition). Another way in which COVID-19 can impact FDI activity is through changes in demand for resources (e.g., oil) that translates negatively into transnational corporations' and FDI activity [Nwosa, 2020, p. 135]. Ando and Hayakawa [2022, p. 5] note that a decline in FDI activity can lead to second-tier negative consequences like a reduction of business-to-business transactions in such areas as insurance or financial services, which come from lower volume of foreign exchange transactions. Far more reaching consequences of a decline in FDI due to COVID-19 have been highlighted by Chaudhary et al. [2020, p. 132], as the authors describe FDI as a key economic growth factor (in line with Napiórkowski, [2017, pp. 225–230]; Ciobanu at al. [2020, p. 71]).

The presented literature review shows that the research hypothesis of this study falls in line with the general trend seen in other COVID-19-FDI papers. At the same time, the fact that the significance of the examined impact can depend on the variable used to measure the pandemic also needs to be noted.

3. Econometric modeling

Based on the literature review, empirical analysis consists of two models: one where COVID-19 is represented by cases (M1) and one where it is represented by deaths (M2).[3] Initially data was collected for 214 countries, but due to data availability for specific variables the final number of observations are 152 for M1 and 141 for M2. At the time of data collection, year 2020 has been the only year, for which all data was available.

Initially, model's equation took the form presented as (1), where inward FDI stock (FDI, % of world total [www 1]) is a function of Gross Domestic Product (GDP, USD constant 2015 prices [www 3]); human capital (H, 0–1 scale [www 4]); average rank of World Governance Indicators (GOV [www 5]); doing business score – not ranking per Jovanovic and Jovanovic [2018, p. 589] – (DB, score [www 6]) and two COVID-19 measures (Covid): a) a cumulative number

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[3] Due to the use of cross-section data, a dichotomous variable is not an option and data on a stringency index was not available for the whole studied group of countries.

for 14 days of COVID-19 (cases per 100,000) and b) deaths (number [www 7]), and the error term (ε). GDP measures host's market potential (market seeking FDI – e.g., Mugableh [2021, p. 200]), while human capital represents availability of qualified labour force (resource and efficiency seeking FDI – e.g., Kottaridi et al. [2019]). GOV accounts for the quality of government that represents the political stability of the host country (e.g., Ross [2019, pp. 112–113]) and DB represents host's macroeconomic and business environment quality and stability (e.g., Contractor et al. [2020]). These explanatory variables correspond to the general groups of FDI determinants identified, for example, by Saini and Singhania [2018, pp. 364–365] as well as by Antonakakis and Tondl [2015, pp. 6–7]. The decision to use aggregate measures as independent variables was dictated by an idea to account for as many processes determining inward FDI as possible, while keeping in mind the overbearing number of possible determinants of FDI [Eicher et al., 2012, p. 17; Blonigen, Piger, 2014] and their country specificity [Chattopadhyay et al., 2022, p. 43]. Such an approach allowed also to avoid the problem of model's overspecification.

$$lnFDI_i = \beta_0 + \beta_{GDP}lnGDP_i + \beta_H lnH_i + \beta_{GOV}lnGOV_i + \\ + \beta_{DB}lnDB_i + \beta_{Covid}lnCovid_i + \varepsilon_i \tag{1}$$

The first step in the modelling procedure was to assure a correct specification form as it can be a source of issues with model's residuals (e.g., heterogeneity of variance – see Napiórkowski [2022b, pp. 104, 115]). Results of the non-linearity squared terms test (p-value = 0.005 < α = 5% = 0.05; Table 1) show that the relationship of GDP and human capital with inward FDI stock is not linear. Therefore, squares of these two explanatory variables were added to M1 yielding (2).

$$lnFDI_i = \beta_0 + \beta_{GDP}lnGDP_i + \beta_H lnH_i + \beta_{GOV}lnGOV_i + \\ + \beta_{DB}lnDB_i + \beta_{Cases}lnCases_i + \beta_{GDP^2}lnGDP^2_i + \beta_{H^2}lnH^2_i + \varepsilon_i \tag{2}$$

This allowed for the null hypothesis of a linear relationship to be accepted (p-value = 0.758). As a result, the Adjusted R-squared increased from 0.8246 to 0.8395 and the Akaike Criterion fell from 401.750 to 390.153; both indicating a better model. An analogous null hypothesis has been accepted for the non-linear log terms test (p-value = 0.999). To finalize structural form tests, a series of Ramsey's RESET specification tests (squares only, cubes only, squares and cubes) was carried out. P-values for all three cases (0.154, 0.402 and 0.345, accordingly) are greater

than the accepted 5% level of statistical significance; hence, the null hypothesis of adequate specification for each variation was not rejected. After estimating model's parameters with Ordinary Least Squares, model's residuals have been tested for heteroskedasticity with the White (p-value = 0.053) and the Breusch-Pagan with the Koenker robust variant (p-value = 0.059) tests. Next, residuals' normal distribution was analysed with the Doornik-Hansen, Shapiro-Wilk, Lilliefors and Jarque-Bera tests (p-values accordingly: 0.071, 0.073, ~ = 0.3 and 0.096). Based on these results it was concluded that residuals from M1 do not suffer from heteroskedasticity and fo low a normal distribution.

TABLE 1

M1 and M2 residuals tests' results

Model Test	M1 p-value	M2 p-value
Non-linearity squared terms test's results (1/2)	0.005	0.005
Non-linearity squared terms test's results (2/2)	0.758	0.912
Non-linearity log terms test's results	0.999	0.780
RESET specification test's results – squares only	0.154	0.165
RESET specification test's results – cubes only	0.402	0.100
RESET specification test's results – squares and cubes	0.345	0.261
White test's results	0.053	0.002
Breusch-Pagan with the Koenker robust variant test's results	0.059	0.006
Doornik-Hansen	0.071	0.017
Shapiro-Wilk	0.073	0.008
Lilliefors test	~ = 0.3	~ = 0.41
Jarque-Bera	0.096	0.001

Source: author's own elaboration on the basis: [www 1; www 3–7].

The null hypothesis that all estimated coefficients are equal to each other and to zero has been rejected (p-value(F) = 1.86E-55) and M1 explains 84.7% of variance in inward FDI stock (R^2 = 0.847; Table 2). M1's well fit is also con-

firmed by the actual vs. fitted chart (Chart 1). Referencing to the hypothesis of this study, obtained results (Table 3) show that there is no statistically significant impact across countries of COVID-19 as measured by Cases on relative inward FDI activity (p-value = 0.468).

TABLE 2

M1 and M2 residuals tests' results

M1		M2	
R^2	0.847	R^2	0.834
$F_{(7, 144)}$	113.873	$F_{(7, 133)}$	92.151
P-value(F)	1.86E-55	P-value(F)	7.04E-48
Adjusted R^2	0.840	Adjusted R^2	0.825
Akaike criterion	390.153	Akaike criterion	353.818
Hannan-Quinn	399.980	Hannan-Quinn	363.405

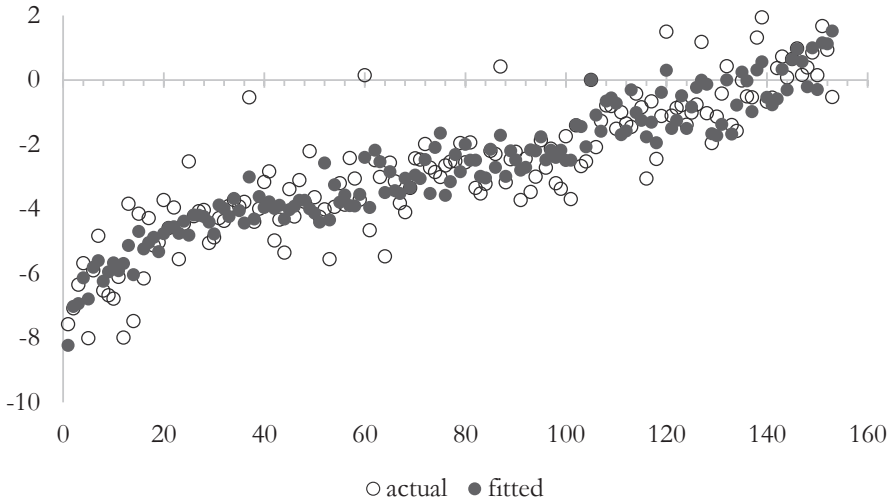Source: author's own elaboration on the basis: [www 1; www 3–7].

TABLE 3

M1 and M2 models' estimates

Parameter	M1		M2	
	Coefficient value	p-value	Coefficient value	p-value
Constant	-35.289	0.000	-38.661	0.004
GDP	2.217	0.003	2.493	0.016
H	6.487	< 0.0001	7.070	0.000
GOV	0.526	0.010	0.624	0.003
DB	-1.035	0.142	-1.028	0.215
Covid	0.031	0.468	0.091	0.048
GDP2	-0.029	0.045	-0.036	0.087
H2	3.892	0.001	4.507	0.000

Source: author's own elaboration on the basis: [www 1; www 3–7].

CHART 1.

Actual vs. fitted values of inward FDI stock from M1

Source: author's own elaboration on the basis: [www 1; www 3–7].

An identical procedure as for M1 has been carried out for M2 that examined the potential impact of COVID-19 deaths on relative inward FDI stock. As a result of the non-linearity squared terms test (p-value = 0.005), squares of GDP and human capital have been added, yielding a new model specification (3), new test's p-value (0.9123), higher Adjusted R-squared (0.8252 vs. 0.8064) and a lower Akaike Criterium (353.818 vs. 366.431).

$$lnFDI_i = \beta_0 + \beta_{GDP}lnGDP_i + \beta_H lnH_i + \beta_{GOV}lnGOV_i + \\ \beta_{DB}lnDB_i + \beta_{Deaths}lnDeaths_i + \beta_{GDP^2}lnGDP^2_i + \beta_{H^2}lnH^2_i + \varepsilon_i \tag{3}$$

The results of the non-linearity log terms test (p-value = 0.780) and of the series of RESET procedures (squares only p-value = 0.165, cubes only p-value = 0.1, squares and cubes p-value = 0.261) allow for a conclusion of a proper structural form of the model (Table 1). Since the results of the White (p-value = 0.002) and of the Breusch-Pagan with the Koenker robust variant (p-value = 0.006) tests indicate a problem of heteroskedasticity, robust (heteroskedasticity consistent) standard errors HC3 [Long, Ervin, 2000, p. 223; Hayes, Cai, 2007, p. 716] were used. Lastly, there is a disagreement between the results of normality tests (Doornik-Hansen

p-value = 0.017, Shapiro-Wilk p-value = 0.008, Lilliefors p-value ~ = 0.41 and Jarque-Bera p-value = 0.001); however, given the number of observations and favouritism of these type of tests to reject the null hypothesis with large sample sizes [Field, 2013, p. 148], the lack of normal distribution is not considered an issue [Napiórkowski, 2022b, p. 115].

M2 explains 83,41% of variance in the dependent variable (R2 = 0.8341) with p-value(F) = 7.04E-48 (Table 2), which suggests a good fit of the model to the data (also seen in Chart 2). Regarding the hypothesis of this study, statistical significance of the coefficient assigned to Deaths explanatory variable (p-value = 0.0482) suggests that COVID-19 related deaths had an impact on relative inward FDI activity across countries (Table 3) – an issue discussed later.

CHART 2

Actual vs. fitted values of inward FDI stock from M2
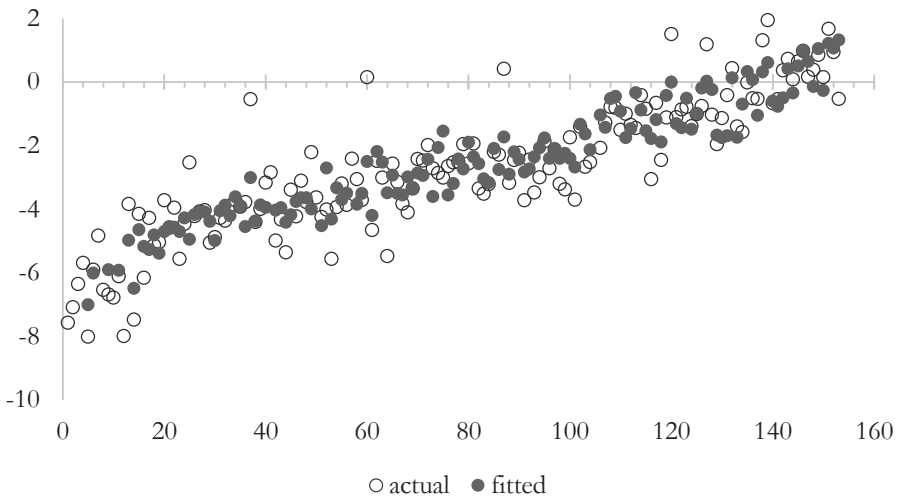
Source: author's own elaboration on the basis: [www 1; www 3–7].

4. Observations and conclusions

The aim of this study was to analyse the relationship between COVID-19 pandemic and relative inward FDI activity. The prior was represented by cases and deaths, while the latter by inward FDI stock (% of world total). The sample

included 152 and 141 countries from across the globe respectively of the pandemic measure. To avoid the issue of underspecification or overspecification of the model, aggregate measures were used to represent various aspects of FDI determinants. Estimated models have been tested (and corrected when needed) for a proper structural form and a series of residual issues yielding econometrically correct estimates. It is worth noting that each tested element was examined with a series of tests, which removed the potential bias coming from applying one test over another and speaks towards the robustness of obtained results.

The study's results did not confirm the research hypothesis of a negative impact of COVID-19 on relative inward FDI activity on the world level. Therefore, these results fall more in line with such studies as Chattopadhyay et al. [2022, p. 56]. The impact of GDP (and its square), human capital (and its square) and government quality on inward FDI activity is (as suggested by FDI literature) statistically significant and positive regardless of the COVID-19 measure. Interestingly, doing business score has been found to be statistically insignificant in both models (which is in line with the discussion by Jovanovic and Jovanovic [2018, p. 620]). The statistically significant and positive coefficient of Deaths COVID-19 variable suggests that the more pandemic-related deaths there were, the higher the relative FDI attractiveness of a host country was, which is irrational given such risks as longer, tougher government responses (e.g., lockdowns) that harm market and production conditions. This result can be explained by the fact that developed economies had a greater number of registered COVID-19 deaths [Tomer et al., 2021, p. 11271] alongside with better, more advanced measurements. At the same time, since the pandemic was a world crisis, it was expected that investors will be shifting their attention and actions towards developed and away from developing economies [Nguyen, Lee, 2021, pp. 1, 6].

From the policy perspective, obtained results show that traditional, long-term determinants of inward FDI activity (e.g., GDP, access to qualified labour force) are more – as compared to one-time, short-term events – robust factors influencing FDI behaviour (which is in line with the findings of Jaworek et al. [2020, pp. 276, 282]). Given these results and the devastating impact lockdowns have had on economies, policymakers oriented on maintaining or upgrading an uninterrupted relative attractiveness for inward FDI activity should focus on economic growth, access to qualified labour force and political stability. In other words, policies that keep the economy going (like 'masks, distance, disinfection') seem to be favoured over hard lockdowns.

The obtained results have their limitations. Firstly, this study takes into consideration only one year (2020), which does not allow for inclusion of cross-time

dynamics that could have been captured with a panel study. This, however (as mentioned earlier) was not possible due to the lack of data. Secondly, since the model is built on a world level (as was the intention of the study), it accepts the presence of outliers. Attempts at creating relative variables (e.g., GDP per capita) yielded models that were incorrect from the statistical point of view. Lastly, there is a lack of uniformity, a common standard of COVID-19 data gathering across the world (or even within a country – Sapat et al. [2022, p. 11]), which acts as a source of direct comparison bias. Such differences can also be a source of interference. Despite these limitations (which were out of control of the researcher), both models are statistically correct and of good explanatory value.

More work should be done on the specifics of various policy response mixes used by different governments to see how they have impacted the economic growth. Such research – while falling in line with studies looking at the relationship between lockdowns and FDI – would allow for a creation of more robust answers to such crises as the COVID-19 pandemic.

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