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FDI During the First Covid-19 Year in a Developing Country

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Abstract
This study addresses the FDI flows into developing countries during the first COVID-19 pandemic year, regarding their resilience countries or not. From a realistic perspective, unlike previous crises, the Covid-19 pandemic is a health crisis affecting all of society, and secondly an economic crisis. We Used the percentage change in FDI flows between 2018-2019, and 2020 and other explaining indicators to illustrate the effects. the results revealed Covid-19 has affected FDI flows into developing countries severely by negatively affecting FDI flows to you through indices. Infrastructure, education, export, and death rate. In contrast, the positive impact on GDP, the workforce, openness, and trade in services. In terms of countries, the effects of Covid-19 are negative in terms of FDI flows in Asian countries, led by Macao while India and China resisted steadfastly as China focused on IT industries, while India focused on digital investment. The most vulnerable is Africa, which relies on FDI for its growth and development, despite Africa's lag in foreign direct investment flows, while the Central African region resisted due to oil exports, as well as Senegal due to investments in energy in 2020. Finally, the state of weakness also extended to a large extent, Latin American countries appear to have had a history of grappling with structural development challenges before the onset of the pandemic, adding to its impact.
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1. Introduction

The outbreak of Covid-19 was initially identified in December 2019 in Wuhan- China and quickly spread throughout the world. Many countries implemented social segregation policies, lockdowns, and entry restrictions on foreigners to stop the pandemic from spreading.

These measures significantly restricted economic activities in all fields. (Imf, 2021) estimates that the world economy shrank by 3.2% and commerce shrank by 8.3% in 2020. In 2020, the pandemic led to a more severe decline in FDI. (UNCTAD, 2021) Reveals that global FDI flows decreased by 35% to $1 trillion in 2020 from $1.5 trillion in 2019, a decrease of $1.5 trillion. As a result, worldwide FDI decreased more dramatically in 2020 than either the global GNP or trade.

FDI is frequently susceptible to shocks in the economy. Financial crises (Dornean et al., 2012; Fang et al., 2021; Poulsen & Hufbauer, 2011; Stoddard & Noy, 2015) In the same context, the disasters brought on by natural disasters on FDI (Anuchitworawong & Thampanishvong, 2015; Escaleras & Register, 2011) have been shown to have a negative impact on FDI. While natural catastrophes that are caused by natural hazards devastate physical infrastructures like electric power plants, industrial parks and roads, financial crises cause liquidity difficulties for investors.

One of the most remarkable characteristics of Covid-19, in contrast to previous shocks, is the compulsory adoption of infection prevention strategies including lock downs and social seclusion. These policies increase the price of pre-investment research, workers, site searches, and ongoing FDI expenses.

Additionally, Covid-19 has once again demonstrated how open global value networks are to external shocks. The entire world supply chain may be hampered if a country involved in the global value chain experiences a Covid-19 that forces the closure of its enterprises. Many firms have been tempted to lessen their reliance on concentrated production in foreign firms to reduce and diversify the risk of disruptions Given the integration between the trade of intermediate goods and FDI, a prospective change in the direction and patterns of the global supply chain could have an impact on FDI decisions (Aizenman & Noy, 2006; Carril-Caccia & Pavlova, 2018; Hanson et al., 2005)

According to UNCTAD (2021a) FDI in developing economies fell by 12 %. In fact, they represented 72 % of total global FDI, the highest share ever recorded, while FDI hardest hit in developed countries fell 69 % to an estimated $229 BN, the lowest level in nearly 25 years. Nearly 80 % of the global decline can be attributed to developed countries. Similarly, FDI in Sub-Saharan Africa declined by 12% to $30 billion. FDI to Southern Africa decreased by 16% to $4.3 billion, however multinational corporations' (MNEs) capital repatriation to Angola slowed. FDI to West Africa decreased by 18% to $9.8 billion in 2020. FDI to East Africa fell to $6.5 billion, down 16% from 2019. Central Africa is the only region in Africa that recorded an increase in FDI in 2020, with inflows of $9.2 billion, up from $8.9 billion in 2019. Moreover, the report shows that the successive economic and health challenges due to the epidemic and the difficult environment along with the decline in the

prices of energy commodities affected all aspects of FDI.

Likewise, Latin America and the Caribbean plunged a stunning 37% in 2020, With a 55% decrease, Brazil was the worst hit, according to UNCTAD (2021b). The report says that the pandemic only exacerbated the crisis already sparked by the low demand for commodities in the international market. In contrast, 2019 and 2020 were exceptional for ASEAN in terms of FDI: according to the ESCAP report, 2019 reveals the region's highest-ever flows, at $182 billion making ASEAN the largest recipient of FDI in the developing world. clearly, developing Economies are a mix of emerging and developing economies, characterized by regional imbalances and socioeconomic differences.

Against this background, this study empirically investigates FDI flows during the first Covid-19 year in developing countries to explore the heterogeneity and the reasons for that. We use the percentage of FDI flows as a dependent variable on 95 countries. We measure the severity of Covid-19 damage using 9 independent variables. FDI 2019-year, market size, infrastructure, openness to trade, education, labor force, trade in services, export of goods and services, and mortality rate during the first covid-19 year. Therefore, our study aims to uncover the heterogeneous effects of Covid-19 on FDI flows at various dimensions in developing countries. To do that, we rely on the OLS methodology like (Teller, 2021).

There haven't been many studies on how Covid-19 affects FDI flows. (Ando & Hayakawa, 2022) investigated quarterly data on bilateral FDI flows from 173 to 192 host countries. Using weekly data Camino-Mogro and Armijos, (2022)), investigate how lockout measures affect FDI inflows to Ecuador. They discovered that Covid-19 has a detrimental effect on FDI flows. Shen et al.,(2020) investigated The Impact of the Covid-19 Pandemic on Firm Performance and they found Covid-19 had a negative impact. In the same vein, Anyanwu & Salami, (2021) investigated a study on the impact of Covid-19 on African economies and they found a negative impact was worsened by low commodity prices experienced in much of 2020. It was estimated that for Africa, cross-border mergers, and acquisitions (M&A), Greenfield, and international project financing. As earlier mentioned, this leads us to ask why FDI in some countries has been more resilient in the Covid-19 pandemic period. To our knowledge, there is no study to date that has examined FDI during the first Covid-19 year in developing countries using our case study. The advantages of this study are that we use a large set of data among developing countries, which represents a big percentage that increases the degrees of freedom and thus enhances the credibility of the results and fills the gap in the study.

Our findings are summarized as follows. Covid-19 has affected the FDI flows in developing countries severely through Negative impact on the FDI flows for 2019-year, infrastructure, education, export, and mortality rate. In contrast, a positive impact on GDP, labor force, openness, and trade in services. In terms of the countries, the effects of Covid-19 are negative in terms of FDI flows in Asian countries, led by Macao. At the other side, India and China resisted steadily as China focused on IT industries, while India focused on digital investment. The most vulnerable is Africa, which depends on the FDI in its growth and development, despite Africa lagging in FDI flows, the results uncovered many countries suffering from weak infrastructure in Africa. In comparison, the Central African region has resisted due to oil exports, and so will Senegal due to investments in energy in 2020. Lastly, the state of vulnerability has also spread to Latin American countries significantly, as it appears that the Latin American and Caribbean region has a history of facing structural development challenges before the emergence of the pandemic, which has increased the impact. We organize the remainder of the paper as follows. Section (2) literature review. Section (3) Empirical analysis. Section (4) Results. Section (5) Discussion. (6) Conclusion. (7) References, and other appendixes tables

2. Literature Review

As global mobility has become easier and global societies, economies and policies have become more interconnected, responses to emerging and re-emerging infectious diseases have become more complex. The covid-19 pandemic has sparked a crisis in world trade, investment, and the economy ((Handoyo, 2020; Sharma et al., 2021)). Additionally, it significantly hurt the global economy (Marjanović et al., 1 C.E.; Sharma et al., 2021) The economic situation of the countries is typically taken into consideration first by international businesses. The literature talks about potential ways that the Covid-19 pandemic affects FDI flows. The amount of FDI is primarily determined by the capacity of supply in the origin country, for instance, the size of demand in the host country, the number of potential investors, fixed costs for FDI, and production costs (wages) in the host countries (Helpman et al., 2004; Kleinert & Toubal, 2010)

It is thought that the pandemic will affect these variables and, in turn, global FDI flows. We investigate how FDI flows during the first covid-19 year. We review several dimensions through which we explore the performance of FDI during the Covid-19 time. the first point is the damage caused by Covid-19 to the host country versus the home country. Given that the host country may serve as both the investor's physical location of the business and a market for consumer goods, the severity of the host country's damage would probably deter FDI flows. The pandemic damage will reduce economic activity, weakening market demand, and lessen the host nation's appeal as a location for investments.

In countries where Covid-19 damage is severe, the fixed cost of investment, for instance, various search costs for workers and places will probably moreover, be significantly higher. Additionally, the pandemic's different forms of uncertainty deter FDI flows (Azzimonti, 2019; Choi et al., 2021; Gao et al., 2019; Julio & Yook, 2016) In the same context, by lowering investment capital, the intensity of Covid-19 in the home country can also have a detrimental effect. Investors may have heightened domestic business restraints, a need to minimize domestic business loss, and an inability to finance international investments. As a result, there are fewer investors.

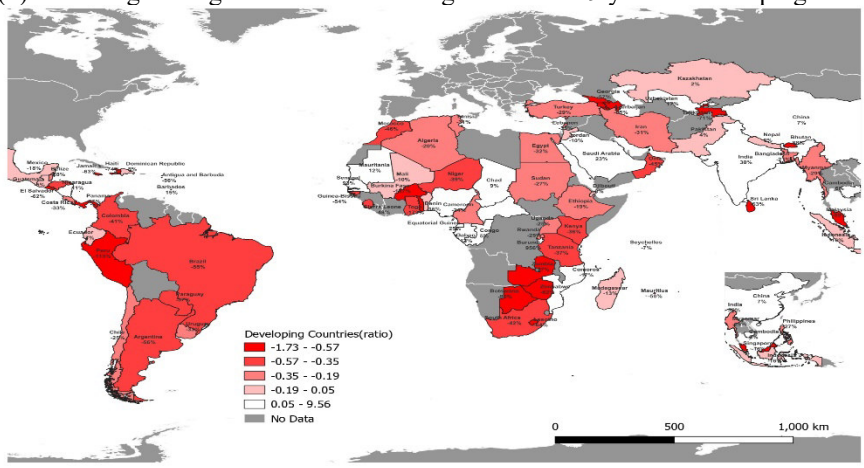
On the other side, Covid-19's effects in the home country may encourage FDI to leave. The growth in export-platform FDI to less damaged countries is one pathway of this beneficial effect. To keep up production, businesses may move their export base from their home country to another country. Secondly, is cross-border M&A versus greenfield FDI. In contrast, which requires the investor to start a new firm from the beginning, the former involves purchasing the assets of a foreign company, including its facilities and employees. However, it would be challenging to hire new staff and construct new factories after the lock down had been enacted.

Therefore, the effects of the pandemic may have a greater impact on cross-border M&A than greenfield FDI. On the other side, serious harm to the host nation may result in "fire-sale FDI," which allows investors to purchase local businesses for less money by lowering the valuation of acquired firms (Stoddard & Noy, 2015) In countries that have been badly impacted by Covid-19, this could enhance cross-border M&A. Another distinction is that M&A often proceeds considerably more rapidly because it skips the lengthy permitting procedure.

The last point is manufacturing versus services. Many nations implemented various restrictions on corporate operations to stop the spread of Covid-19. The work-from-home concept is generally more challenging in manufacturing than in services (Dingel & Neiman, 2020) If work-from-home is not a realistic option for their business operations, such as production operations in factories, investors cannot start a new firm abroad. Some service industries may see a similar effect (e.g., warehousing and transportation, food services, accommodation, construction, and retail trade)

Fig. (1) illustrates a map of 95 developing countries in which countries are placed in 6 color categories, The highlighting of dark red countries increased FDI exposure to Covid-19, and so gradually, countries with white color which is pandemic resistant. Naturally, the effect of Covid-19 is uneven, as negative demand shocks are concentrated in the economies most severely hit by the pandemic. therefore, the effect of Covid-19 on developing countries is not homogeneous. Both Countries with large and small economies were affected together, but countries with small market sizes and fragile infrastructure were affected more than countries with large sizes and large infrastructure. For instance, without limitation, Asia emerged as the first continent where the most affected epidemic appeared, represented by Mako, Bhutan, Armenia, Tajikistan, Azerbaijan, and Russia. The massive vulnerability situation reaches African countries, which are strongly dependent on FDI flows, and foreign Aid for their development, Whereas Togo, Burkina Faso, Zambia, Botswana, Lesotho, and Morocco were affected the most in terms of receiving FDI flows, as well as Africa has never been a major recipient of FDI inflows, and thus it lags other regions of the world.(Anyanwu & Yaméogo, 2015) finally, the most vulnerable affected countries in terms of receiving FDI flows in LAC, are Peru, Panama, Haiti, Jamaica, Brazil, and Argentina. Fig (1) Percentage change of FDI flows during Covid-19 year in developing countries.

Fig (1) Percentage change of FDI flows during the Covid-19 year in developing countries



Source: Own elaboration according to UNCTAD data.

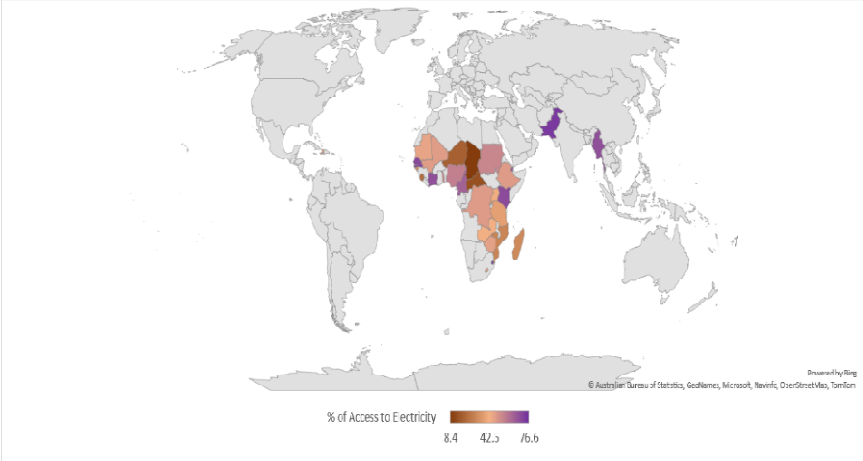
It seems The LAC region has a history of facing structural development challenges due to financial debt and erosion of democracy, environmental degradation digital inequality, which have led to profound discontent among people in the LAC region and this dissatisfaction has been intensified by the crises stemming from the

Covid-19 pandemic. (Ezequiel et al., 2021).

On the other side, despite the outbreak of Covid-19 in China first, to prevent and control the epidemic, China adopted strict quarantine measures such as completely shutting down cities and communities seriously affected by the virus, mobilizing national resources to build specialized and temporary hospitals, providing free medical examinations, medical care/treatment, etc. This enabled the country to contain the disease effectively in a relatively short time. Jing Fang, (2021) explains the strength of China's infrastructure in the face of global crises. Apart from the above, India has dominated the rate of FDI inflows and its leading position by seizing geopolitical opportunities. Consequently, perhaps the most striking result is that countries that are more resilient in facing Covid-19 have strong infrastructure, a good health system as well as large market size, also dependent on trade in services particularly information technology in developing countries, and the situation is totally different in developed countries.

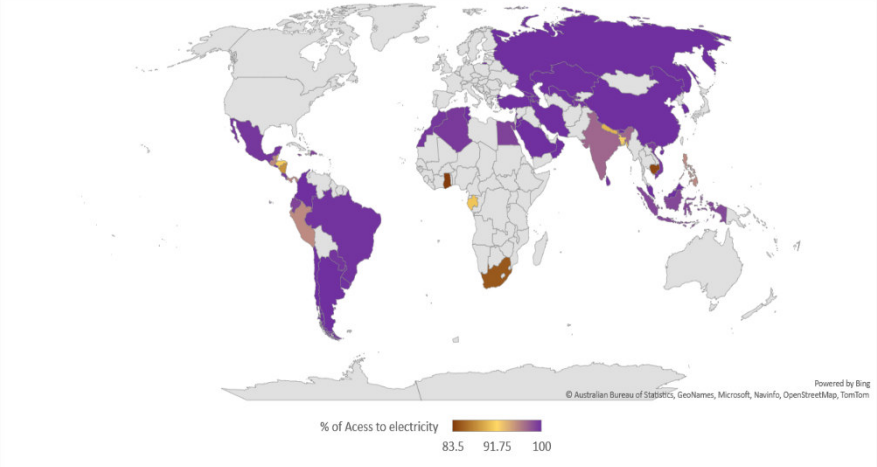
Figures (2) and (3) of the maps below demonstrate the differences between developing countries that have access to electricity.

Fig. (2) The rate of access to electricity is less than 80% in developing countries. 2019



Source: Own elaboration according to world bank data.

Fig. (3) The rate of access to electricity is more than 80% in developing countries, 2019



Source: Own elaboration according to world bank data.

One limitation highlighted by the maps is the insufficient supply of electricity. In particular, the figure shows in a unique way that African countries are the most vulnerable with 33%, 1% in LAC, and 2% in Asia. In contrast, 59% have access to electricity with more than 80% in developing countries. The provision of public services, modern economic activity, and quality of life are all greatly hampered by the lack of access to electricity. In addition, it severely restricts the adoption of cutting-edge technologies in industries such as banking, education, agriculture, and finance that can help fragile states to overcome some of their most pressing problems, such as lack of access to affordable health care and low-productivity job opportunities.

3. Empirical analysis

3-1 Data source and measurement of variables

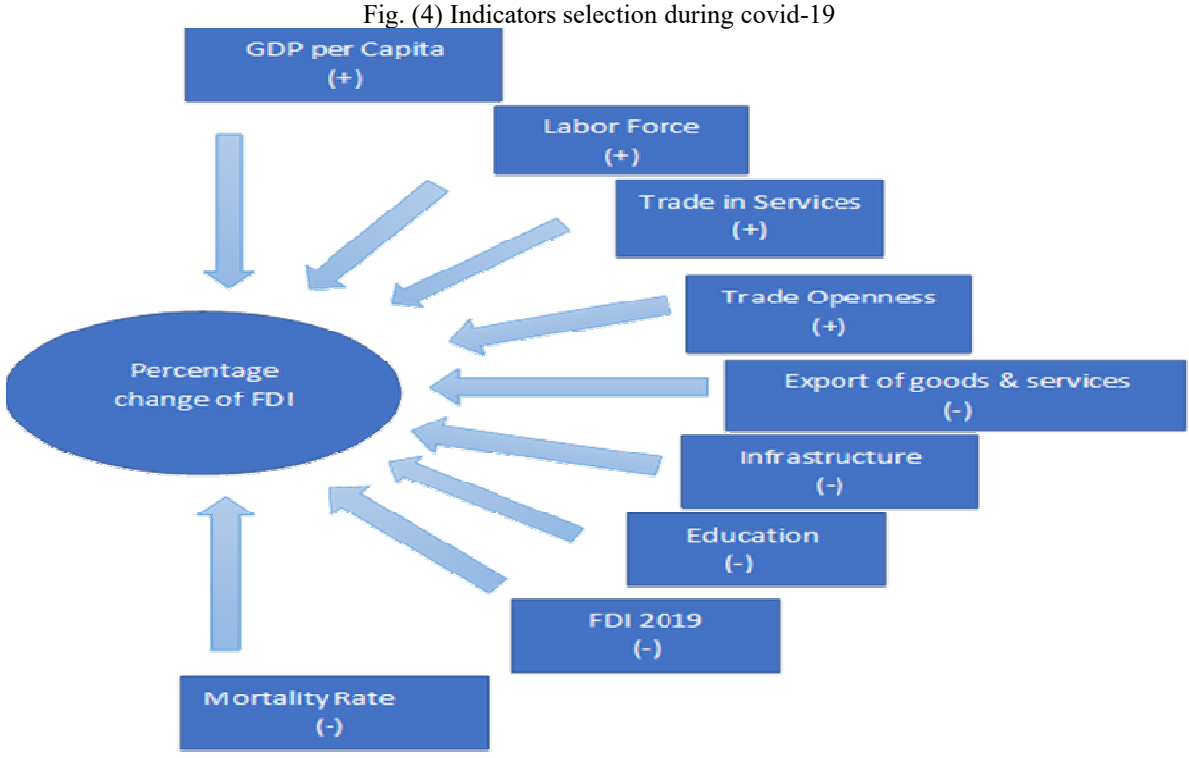
Indices are based on a plurality of factors, which may help understand the complex, multidimensional characteristics of heterogeneity and vulnerability of FDI flows. The main purpose of this study is to investigate FDI flows during the first year of Covid-19 in developing countries and to explore the heterogeneity based on countries' resistance to the health crisis. because of limited data and difficulty to cover all developing countries during the Covid-19 pandemic.

We use the percentage change of FDI as the dependent variable of our model, the data comes from UNCTAD, for the years 2018, 2019, and 2020 (The latest observation available) and independent variables come from the (WB) for the 2019 year.

Table (5) includes all the countries that we examined, as well as the variables used in appendix (A). The choice of the independent variables was carefully based on the variation of the FDI during Covid-19. All the independent variables are expressed in a natural logarithm. Fig (2) summarizes these variables which are employed as follows: GDP per capita refers to the market size of the host countries. FDI inflows to countries with increasing GDP and it leads to an increase in economic activity in the recipient country. Thus, we expect a positive sign between GDP and FDI. (Grosse & Trevino, 1996).

Foreign direct investment, FDI flows, 2019 to annual US$ at current prices in Million refers to the investment made by a resident enterprise in one economy to an enterprise that is resident in another economy (direct investment enterprise or foreign affiliate). In a long-term relationship between the direct investor and the other direct investors' enterprise in a significant degree of the management of the enterprise. the expected sign is ambiguous depending on the correlation with other indicators in the crisis case. Access to electricity (Infrastructure) is the percentage of the population with access to electricity. We expect a positive sign. The labor force refers to the people ages 15 to older who supply labor to produce goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time jobseekers. we expect a positive relationship with FDI.

Fig. (4) Indicators selection during covid-19



Source: own elaboration.

Merchandise trade (Openness) refers to the sum of merchandise exports and imports divided by the value of GDP, the variable is a driver of the development in developing countries, a greater degree of trade openness means more openness towards external markets and foreign capital.(Chakrabarti, 2001). The expected signs are a positive relationship to FDI. Trade in services refers to the sum of service exports and imports divided by the value of GDP, all in the current U.S. dollar and we expect a positive relationship with FDI flows. Pauwelyn, (2019).

School enrollment tertiary (Education) is the ratio of total enrollment. Tertiary education, whether an advanced research qualification, normally requires, as a minimum condition of admission, the successful

completion of education at the secondary level. One of the channels that helped globalization in developing countries is education. It does not take as much quantity of schooling, as established in Borensztein et al. (1998), for inward FDI to have a positive impact on economic growth in the host country, we expect a positive relationship with FDI. Exports of goods and services refer to the value of all goods and other market services provided to the rest of the world. including the value of transport, insurance, freight, license fees, royalties, travel, merchandise also, construction, financial, information, business government services, and communication. We expect that will be a negative sign because the indicator provides rich services during the crisis. Crude mortality rate indicates the number of deaths occurring during the year, per 1,000 population estimated at midyear. we expect a negative sign during the crisis. Nawo & Njangang, (2022). The methodology that we used in this article is the Ordinary Least Squares (OLS) to test FDI during the first Covid-19 year in developing countries with other explanatory variables The model was specified as follows:

$$\frac{(fdi2020-Avrgfdi2018,fdi2019)}{Avrgfdi2018,fdi2019} = \beta 0 + \beta 1FDI19 + \beta 2GDPpc + \beta 3Infra + \beta 4Lf + \beta 5Opn + \beta 6Trs + \beta 7Edu + \beta 8Xpgs + \beta 9Mr + \mu$$

Where FDI is the Percentage change of FDI flows; are parameters to be estimated and they measure the slope of the regression equation. GDP pc is the gross domestic product. FDI 2019 is FDI flows in the year 2019. Infra is access to electricity. LF is the labor force, and OPN is the merchandise trade. TRS is a trade-in service. EDU as school enrollment tertiary. XPGS is the export of goods and services. MR is the mortality rate, and μ is the error.

Before employing estimations, we also conducted specific pre-estimation tests: We made sure that there was no multicollinearity among the variables included in the models, where the mean Variance Inflation Factor (VIF) of 2.06. The correlation analysis was undertaken between the Percentage change of FDI flows and independent variables such as FDI-19, GDP per capita, Infrastructure, labor force, Openness, Trade in service, Education, Export of goods and services, and mortality rate, in cross-sectional during the covid-19 pandemic. The impact of factors on the percentage of FDI flows could be a positive or negative sign as shown in Table 2.

Table (1) Variance inflation factor (VIF) test

Variable	VIF	1/VIF
FDI 2019	3.11	0.321452
GDP pc	3.30	0.303048
Infrastructure	2.46	0.405930
Labor force	3.27	0.305905
Openness (M. Trade)	1.30	0.766800
Trade in services	1.44	0.695394
Education	1.27	0.784892
XP. of goods & services	1.22	0.822783
Mortality Rate	1.13	0.887390
Mean VIF	2.06	

Table (2) correlation matrix

FDI	FDI_19	GDPpc	Opn	Infra	Mortality	LF	Edu	TS	XPGS
FDI	1.0000								
FDI_19	-0.2847	1.0000							
GDPpc	-0.2147	0.3886	1.0000						
Opn	-0.0065	0.0167	0.1070	1.0000					
Infra	-0.2511	0.2634	0.7350	0.1058	1.0000				
Mortality	0.0908	-0.2186	-0.2782	-0.0970	-0.2504	1.0000			
LF	0.0441	0.6322	-0.0638	-0.2959	0.0651	-0.0608	1.0000		
Edu	-0.2702	0.3665	0.2834	0.1067	0.1836	-0.1382	0.0903	1.0000	
TS	-0.0460	-0.1386	0.0877	0.2207	0.0457	-0.0917	-0.4495	0.1378	1.0000
XPGS	-0.2115	-0.0621	0.0095	0.2953	-0.0401	-0.0743	-0.2197	-0.0974	0.2922	1.0000

Table (3) OLS Estimation, Dep. var (P. change of FDI flows

Variables	(1)
FDI_19	-0.357***
	(0.0855)
GDP Per capita	0.417**
	(0.161)
Infrastructure	-0.935***
	(0.295)
Labor force	0.373***
	(0.0960)
Openness (M. Trade)	0.651**
	(0.258)
Trade in services	0.277*
	(0.161)
Education	-0.249**
	(0.119)
XP. goods & services % gdp	-0.446***
	(0.151)
Mortality Rate	-0.0680
	(0.364)
Constant	-3.732
	(2.461)
Observations	95
R-squared	0.340
F- statistic	0.0000

4. Results

Table (2) shows the regression results of our aim which is the Percentage change of FDI during the first covid-19 year in a developing country. We covered 95 developing countries, (See appendex 1), according to available data from WDI and UNCTAD. The estimation showed massive results of the variables related to explaining the percentage change of FDI in developing countries. The results of the coefficients of FDI-19, Infrastructure, Education, and export of goods & services responded statistically significantly but with a negative sign to the percentage change of FDI inflows at levels of 1%, 1%, 5 %, and 1 % respectively. while the coefficients of GDP per capita, Labor force, Openness and Trade in services responded statistically significantly with a positive relationship to FDI inflows at levels 5 %, 1 %, 5 %, and 10 % respectively and the mortality rate coefficient has a negative sign with insignificant statistically.

In the short run according to the estimation results obtained, it seems that the effects of the Covid-19 pandemic have different effects on the indicators. The F-Statistics in the column shows the significance of the model, and the P-value is less than one percent. Furthermore, the R-square shows that the explanatory power of the model is about 0.340%.

5. Discussion

The evaluation was between the percentage change of FDI and all independent variables apart through correlation. Clearly, the correlation seemed to perfectly represent a relationship between each of the independent variables and FDI at different levels. The results provide strong support for our expectations. The GDP per capita has a positively associated relationship with FDI inflows. In fact, growth rates are positively related to foreign capital stocks, therefore, FDI inflows go to countries with increasing GDP which leads to an increase in economic activity in the recipient countries. as confirmed by various researchers (Asiedu, 2002; Resmini, 2000).

The outcomes indicated that the market size variable is a positive and significant determinant of FDI inflows, which implies that a faster-growing market attracts more FDI inflows. This outcome is in line with the empirical results of Moosa (2009). While the results of the independent variable FDI 19 on the dependent variable the Percentage change of FDI have a significant negative relationship during the first covid-19 year, to clarify, the restrictions can explain this sign. The signs that always came before the crisis greatly affected foreign investors, then the general closure policies in the whole world came because of this directly affecting FDI.

The Covid-19 Pandemic crisis was severe because it is not only a health crisis, but it has exceeded that within its limits. The effects of the economic downturn on world FDI were noteworthy because of their speed and severity. According to UNCTAD, (2021b). The pandemic caused a more dramatic fall in FDI in 2020, and the global FDI flows dropped by 35% to $1 trillion in 2020, from $1.5 trillion in 2019. The negative sign of the

discretionary variable of access to electricity suggests that there may be a massive crisis influence on developing countries. Access to Electricity is used due to the specificity of the study on a big group of developing countries which constitutes 37% of the African countries that suffer from access to electricity in our case of study (Asiedu, 2002).

The measure falls short because it only captures the availability and not the reliability of the infrastructure, despite most of the conclusions which indicate that access to electricity is a good measure of infrastructure, it differs in some places and times. At the first confrontation of crises, the vision of the infrastructure of countries becomes clearer. Therefore, through the Covid-19 pandemic, most of the developing and developed countries of the world were affected, but the impact varies according to the degree of infrastructure solidity.

There are reasonable explanations for this. the infrastructure covers many dimensions ranging from roads, access to electricity, ports, railways, and communication systems, to institutional development (e.g., accounting, legal services, etc.). According to ODI (1997), poor infrastructure can be seen as an obstacle and an opportunity for FDI. Therefore, the lack of access to electricity primarily constrains modern economic activities, the provision of public services, and the quality of life.

In addition, it severely limits the adoption of emerging technologies in sectors such as banking, education, agriculture, and finance and low productive employment opportunities, and limited healthcare. Secondly, supply and demand constraints in access to electricity are related to each other. therefore, a significant share of the access to electricity gap can be explained by demand factors that vary in importance across countries.

(Blimpo & Postepska, 2017) analyzed 31 countries in Africa - the study revealed significant variations across countries and sub-regions. Demand considerations account for 56 percent of the overall constraint in lower-middle-income countries, compared with 30 percent in low-income countries, where infrastructure development lags further behind.

Thirdly, another significant barrier provides insight into how far Africa is behind the rest of the world in terms of access to electricity. Half of the world's 87 percent access rate to electricity is currently achieved by its average access rate of 43 percent. On the other hand, the report of Patel (2019) research also issues a warning that the rapid population growth in Africa would only increase the number of people without electricity

Similarly, Fig. (2) proves the weak countries that get electricity in the developing countries in our study, which represent 37 percent compared to 58 percent that gets enough electricity. This confirms the weak infrastructure in developing countries in terms of access to electricity. while the massive positive sign between the Labor force and FDI is at 1%.

There are plausible explanations as follows, according to economic theory and practice in developing countries. This indicates that, if all other variables remain constant, an increase in the labor force that is sufficient and diverse will draw FDI into any host country, but only those that are suited for FDI projects that require more labor, and Extractive industries that require more workers. On the other hand, a rise in labor force size without a corresponding rise in labor quality will eventually raise the possibility of a fall in FDI inflows.

Many developing and poor nations make heavy use of their comparative advantages—young, inexpensive labor, an abundance of diverse natural resources, and many other factors—to remain competitive. Moreover. Many countries in the initial stages of development mainly use the competitive advantage of young and cheap labor, abundant and diversified natural resources, and many political incentives to attract FDI flows. Due to the continuous development of science and technology and consumer demand, companies require foreign direct investment to change technology lines in production, business, and corporate management.

Therefore, the rapid shift from unskilled to skilled labor by changing the growth model and improving the quality of human resource training helps to attract foreign direct investment to developing countries which are the most populous among other continents of the world. The positive results are consistent with (Nguyen, 2021; Rong et al., 2020). In addition, the Openness to trade positively significant impact on FDI flows to developing countries, the Merchandise trade may have a special path that does not have obstacles between some countries, such as the movement of people between borders, as important as commodities are necessary for crises (Cherif & Dreger, 2018; Sahoo & Dash, 2022).

As an expected result, since the onset of the pandemic, developing financial markets have witnessed a sharp deterioration in investor sentiment, and risk appetite has turned into a sudden and negative reversal of capital flows (OECD, 2020). The result is consistent with our expected there is a positive and significant relationship between openness and FDI inflows. in the same context, the most significant impact of trade openness in a country is its ability to attract capital.

If the investor knows that in long term, he will face obstructions via tariff or instruments out of tariff in this situation he will be reluctant to invest in that country. In other words, in countries with a lack of savings, the entry of the sources such as FDI may increase the marginal profitability in production in short term. This increase can be expected to have a positive impact on growth in the long term. In fact, government policies are important criteria in terms of determining the degree of openness Isabel, (2009). Nevertheless, the performance of the trade-in service has a positive and significant relationship with FDI flows coming into developing

countries at 10%. the indicator proved to be more resilient in the face of the covid-19 in our study.

It is possible due to its lower sensitivity to demand shocks and its less reliance on supply financing. Although Covid-19 triggered an immediate supply shock followed by a demand shock, what will be more important this time around are social distancing and contagion concerns. It will influence transactions of services that require some form of physical proximity between buyers and sellers, which cannot be exchanged or substituted for online trading services. In terms of the total value, trade-in service accounts for a quarter of global trade in goods and services. (WTO Report 2019, n.d.). according to Ariu, (2016), and Borchsenius et al., (2010), trade in services was confirmed to be more resilient than the trade of merchandise. Nevertheless, the negative relationship between education and FDI in developing countries is of the least statistical significance

In general, the education coefficient is used to measure economic development and is one of the determinants and dimensions of human development, and it is a major factor in determining the shape of the state, whether it is developed, developing, or underdeveloped. To clarify the negative relationship, When Covid-19 appeared, most countries of the world worked on how to address this pandemic, and the closest thing to protecting students was to close schools and universities in the Q1 and Q2 of 2020 and take preventive measures, unlike developed countries, which tried to transfer the educational process and that distance education.

This confirms the weak infrastructure of the countries. According to UNESCO, in April 2020, schools, and higher education institutions (HEIs) were closed in 185 countries, affecting 1.542.412.000 learners, which constitute 89.4% of total enrolled learners (Gautam et al., 2022).

Another reason possible, the levels of education in developing countries can have negative influences on FDI, educational levels may act as a proxy for quality of employment because foreign investors should be interested in setting up operations in countries with high educational attainment if it does not come at a high cost (Trevino et al., 2008).

In the same context to support that, (Borensztein et al., 1998) indicated that developing countries need a minimum level of human capital to attract FDI. The performance of the Export of goods and services shows a significant negative relationship with FDI. It's an unexpected result.

On the exports of goods and services side, the relationship is quite ambiguous during the crisis: firstly, investments abroad may represent a means of directly accessing markets previously supplied by exports, and this may have a negative impact on the latter. moreover, it can be explained the relationship by the variable we use in our case study, which describes the Covid-19 period well.

This includes the value of goods, freight, insurance, transportation, travel, royalties, license fees, and other services, such as communications, construction, finance, information, business, personal, and government services, and the potential impact of the pandemic on export-related jobs could be severe in the developing countries. In return, the EU supported European countries to resist the pandemic, despite its severe impact on all vital sectors. On the contrary, developing countries do not have a strong infrastructure or readiness to face crises and disasters. In the same vein, many service sectors that employ a large proportion of women in the least developed countries in developing countries have been hit hard by restrictions on personal interaction imposed to combat Covid-19. Among these, the travel and tourism sectors have performed particularly poorly, due to broad global travel restrictions and the resulting downturn in the global tourism economy. The crisis has also contributed to high unemployment rates almost all over the world with women among the hardest hit, making up a large proportion of workers in service sectors such as retail and tourism that have been hit hard by the lock down and other restrictions imposed to combat Covid-19. Women were also often employed in the type of labor-intensive and low-skill activities that were more likely to lose jobs because of the pandemic (A Parisotto, n.d.).

Finally, despite the output of the insignificant negative sign in the coefficient of mortality rate on the percentage change of FDI, it confirms that the pandemic of Covid-19 affected the independent coefficient of FDI inflows in 2019. This means the effects are likely to be greater for FDI because of the restriction on the export and the goods and services between the countries, which confirmed our result of trade openness. the result consists of Jing Fanga (2021).

Over and above, Koçak & Barış-Tüzemen, (2022) indicated there was a negative association between FDIs that had been impacted by Covid-19. Overall, the results are in line with the submission of (Nawo & Njangang, 2022; Stoddard & Noy, 2015) who show that the crises have a negative impact on FDI inflows.

6. Conclusion

In this work, we investigated FDI flows during the first Covid-19 year in developing countries. We analyzed the vulnerability of the percentage change in FDI flows during the Covid-19 pandemic in 95 countries and we identified a set of independent variables related to FDI flows that may explain the vulnerability in FDI flows.

We found the effect of Covid-19 on the Per change of FDI flows in developing countries is heterogeneous and, depends on FDI policies in countries. Both large and small economies were affected, in contrast, small market sizes and fragile infrastructure have been affected more than countries with large market sizes and large infrastructure.

Empirically, the indicators namely GDP pc, Lf, Trs, and Opn have a positive association with the percentage change of FDI flows. In contrast, the indicators namely, FDI19, Infra, Edu, Xpgs, and Mr have a negative association with FDI flows during the first Covid-19 year.

Asia emerged as the first continent in which the most affected epidemic appeared, represented by the mako, Bhutan, Armenia, Tajikistan, Azerbaijan, and Russia. while, the vulnerability also reaches African countries, which depend heavily on FDI flows for their development which is represented by Togo, Burkina Faso, Zambia, Botswana, Lesotho, and Morocco. However, Africa has never been a major recipient of FDI inflows. In contrary. Central African region has resisted due to oil exports, and so will Senegal due to investments in energy in 2020. Eventually, the most vulnerable countries in LAC are Peru, Panama, Haiti, Jamaica, Brazil, and Argentina. it seems The LAC region has a history of facing structural development challenges due to financial debt and erosion of democracy, environmental degradation digital inequality, which have led to profound discontent among people in the LAC region and this dissatisfaction has been intensified by the crises stemming from the Covid-19. Moreover, China, India, and Saudi Arabia resisted steadily as China focused on high-tech industries and information technology. While India focused on investing in the digital economy. while the latter is on the Export of extractive industries. Although Covid-19 represents an unparalleled global shock in recent years, this guide may be useful to change of the way of attracting FDI.

Our results have many practical implications for facing crises. Firstly, there are many advantages to strengthening the infrastructure of the host countries to attract investors. Secondly, to develop global indicators and keep pace with advanced countries in technology.

Finally, from a regulatory perspective, if the investment becomes the primary driver in both developing and developed countries the covid-19 pandemic is a game changer in our lifetime and has affected almost every aspect of human society. Deeply, policymakers must work to assess the impacts of the Covid-19 crisis on countries and markets and provide plans that protect investors from being exposed to the least risks in the future.

Appendix (1) Countries grouped by developing countries

No	Country	Region	No	Country	Region	No	Country	Region
1	Algeria	Africa	1	Armenia	Asia	1	Antigua and Barbuda	LAC
2	Benin	Africa	2	Azerbaijan	Asia	2	Argentina	LAC
3	Botswana	Africa	3	Bangladesh	Asia	3	Barbados	LAC
4	Burkina Faso	Africa	4	Bhutan	Asia	4	Belize	LAC
5	Burundi	Africa	5	Cambodia	Asia	5	Brazil	LAC
6	Cabo Verdi	Africa	6	China	Asia	6	Chile	LAC
7	Cameroon	Africa	7	Hong Kong	Asia	7	Colombia	LAC
8	C. African Republic	Africa	8	Macao	Asia	8	Costa Rica	LAC
9	Chad	Africa	9	Georgia	Asia	9	Dominican Republic	LAC
10	Comoros	Africa	10	India	Asia	10	Ecuador	LAC
11	Congo	Africa	11	Indonesia	Asia	11	El Salvador	LAC
12	Congo, Dem. Rep.	Africa	12	Iran	Asia	12	Guatemala	LAC
13	Côte d'Ivoire	Africa	13	Jordan	Asia	13	Haiti	LAC
14	Djibouti	Africa	14	Kazakhstan	Asia	14	Honduras	LAC
15	Egypt	Africa	15	South Korea	Asia	15	Jamaica	LAC
16	Equatorial Guinea	Africa	16	Lebanon	Asia	16	Mexico	LAC
17	Eswatini	Africa	17	Malaysia	Asia	17	Nicaragua	LAC
18	Ethiopia	Africa	18	Myanmar	Asia	18	Panama	LAC
19	Gabon	Africa	19	Nepal	Asia	19	Paraguay	LAC
20	Gambia	Africa	20	Oman	Asia	20	Peru	LAC
21	Ghana	Africa	21	Pakistan	Asia	21	Uruguay	LAC
22	Guinea Bissau	Africa	22	Philippines	Asia			
23	Kenya	Africa	23	Russian Federation	Asia			
24	Lesotho	Africa	24	Saudi Arabia	Asia			
25	Madagascar	Africa	25	Singapore	Asia			
26	Mali	Africa	26	Sri Lanka	Asia			
27	Mauritania	Africa	27	Tajikistan	Asia			
28	Mauritius	Africa	28	Turkey	Asia			
29	Morocco	Africa	29	Uzbekistan	Asia			
30	Mozambique	Africa	30	Viet Nam	Asia			
31	Niger	Africa						
32	Nigeria	Africa						

No	Country	Region	No	Country	Region	No	Country	Region
33	Rwanda	Africa						
34	Senegal	Africa						
35	Seychelles	Africa						
36	Sierra Leone	Africa						
37	South Africa	Africa						
38	Sudan	Africa						
39	Tanzania	Africa						
40	Togo	Africa						
41	Tunisia	Africa						
42	Uganda	Africa						
43	Zambia	Africa						
44	Zimbabwe	Africa						

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