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# The Impact of ESG on Foreign Direct Investments in Developing and Emerging Markets

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MSc in Finance

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## **Abstract**

This thesis studies whether and how ESG (environmental, social, and governance) factors affect FDI (foreign direct investment) inflows to emerging and developing markets. We use a panel data analysis to test the relationships between FDI inflows and sustainability indicators, incorporating country-fixed effects for 59 emerging and developing countries over 22 years (1998-2019). We find evidence that carbon emissions have a negative and significant impact on attracting FDI inflows, while the impact of other ESG variables including political stability, property registration, contract enforcement and human development is insignificant. We also find evidence that annual growth in GDP per capita, trade openness and infrastructure have a positive and significant impact on FDI. When country-fixed effects are introduced to the model, all factors are insignificant except infrastructure which has a positive and significant relationship with FDI.

## **Section 1. Introduction**

According to Luiz and Mello (2007), Foreign direct investment (FDI) is a composite bundle of capital stocks, know-how, and technology. In addition to capital flows, FDI often entails the transfer of management, technology, and organizational skills. There are two main types of FDI: horizontal FDI which involves the extension of the same activities as in the home country, and vertical FDI which involves allocating different stages of production to the host country (Financial Times Lexicon, 2023).

Empirical studies have shown that FDI inflows are instrumental in driving economic growth in emerging markets. For example, FDI promotes sustainable growth and development through technology transfer to the host country. FDI also contributes to the development of host country human capital, enterprise, and integration into global trade (OECD, 2002 p.5). By understanding what motivates FDI into a country, policy makers can reallocate resources to prioritize the improvement of corresponding factors to attract more foreign capital.

In recent years, there has been an increased focus on driving sustainable economic growth worldwide. The main pillars of sustainability can be summarized into three categories: environmental, social and governance (ESG). Global initiatives such as

the Sustainable Development Agenda by the UN and the Paris Agreement have been developed to provide a framework to drive sustainable development forward.

Given the growing importance of sustainability in economic and financial fields, it is sensible for foreign investors to evaluate ESG issues alongside other factors before deciding to invest in a host country. If there is significant evidence ESG factors do indeed play a role in attracting FDI inflows, we could expect an effort by local authorities to enhance the corresponding ESG standards in the relevant countries. The promotion of sustainable development can improve the host countries' living conditions as well as contributing to their long-term value creation.

Nevertheless, the existing research on the relationship between FDI and driving factors in emerging markets mainly consists of (i) FDI's impact on the host country's economic development, and (ii) financial profits as determinant of FDI location choice. Although some studies have addressed the role of sustainability, there is still a gap in assessing the impact of ESG factors on FDI inflows into emerging and developing markets. We aim to fill this gap by evaluating whether FDI inflows are affected by ESG factors, which could help us understand the importance of sustainability to foreign direct investors. Additionally, we consider which ESG factors matter most to them when investing in emerging and developing markets.

The purpose of this thesis is thus to answer these questions:

1. Is there a relationship between foreign direct investment and ESG characteristics of target countries in emerging and developing markets?
2. If yes, which ESG factors have the most impact on FDI inflows and what kind of effect do they have as FDI drivers?

We are interested in how foreign direct investors evaluate costs and benefits associated with sustainability, and whether they view weak ESG standards as a risk or an opportunity. The issue is relevant today as increased focus is placed on ESG globally. The results can help policy makers determine which ESG measures or improvements are necessary to attract more foreign direct investment.

Despite the potential value our findings may appear to suggest, it is important to clarify that correlations do not automatically equal causality. Our assumption about the existence of directional relationships, i.e., the attempt to assess ESG factors as FDI drivers, is based on the results of previous studies in this field.

In the next section, we review literature on FDI and review studies that look at the link between FDI and ESG factors. In section 3, we present our hypothesis and the methodology used to conduct the analysis, followed by a description of the data we use. We then present the results of our analysis and discussion in section 4. In section 5 we discuss the implications of our results and propose areas for further studies.

## **Section 2. Literature review**

This is a literature review on the driving factors of Foreign Direct Investment. This review focuses on the theoretical background for FDI and on the empirical evidence relating ESG to FDI.

### **Theoretical Background for FDI**

According to Kindleberg (1969), in a world with perfect competition, the only way to participate in the international market would be through international trade. In this scenario, there would be no FDI. Therefore, market failures in a host country attract FDI and give foreign firms an advantage when operating in these markets. There are 3 main theories used to explain the existence of FDI. These are: the internalization theory, the eclectic paradigm theory and the product life cycle theory.

#### ***Internalization Theory***

Local firms have better information on the local environment compared to foreign firms (Hymer, 1966). For FDI to be successful given the information asymmetry, foreign firms must have certain advantages that make the investment viable. Additionally, the market for these advantages must be imperfect, i.e., the advantages are exclusive to the foreign firms.

Buckley and Casson (1976) further developed this idea by postulating that companies organize their internal activities to develop firm-specific advantages. This is the case due to the imperfection of markets. Therefore, instead of conducting business externally between 2 firms in different countries, the firm would opt to set up a business unit in the foreign country and maximize profits by doing business internally across national boundaries. According to Hymer (1966), the firm would only undertake the foreign investment if the benefits from exploiting the firm-specific advantages outweigh the cost of operating abroad.

### *The Eclectic Paradigm Theory*

According to Dunning (1973, 1980), firms consider 3 main advantages when evaluating whether to establish operations in a foreign country. These are:

**Ownership advantages:** These involve intangible assets within a firm that are exclusive to the firm. The firm can transfer these assets to its subsidiaries in a foreign country at low cost leading to higher income or reduced cost relative to competitors. This could include advantages arising from superior technology and knowledge within the firm or from economies of scale due to the size of the firm.

**Location advantages:** These include economic benefits of a particular location stemming from the cost of the factors of production, transportation cost and market size. Other location advantages include social advantages from cultural similarities, attitude towards foreigners and political stability.

**Internalization advantages:** If international market imperfections make operations across borders using third parties too expensive and the firm can reduce costs by carrying out tasks internally, then the firm is incentivized to undertake the investment abroad itself rather than issue licenses or franchises to third parties.

### *The Production Life Cycle Theory*

According to Vernon (1966), a company goes through 4 main cycles during its lifetime, i.e. innovation, growth, maturity and decline. During the innovation stage, the company develops an innovative product and targets the local market. Excess production is then exported to foreign countries. As the company grows, and demand for the product increases abroad, the company may opt to establish

operations in foreign countries to better service the demand and to maintain market share as other players enter the space.

### **Empirical Evidence on determinants of FDI**

The theories presented above are primarily focused on firm-level factors that determine FDI investments. In this section we look at other factors that are exogenous to the firm that determine the flow of FDI. We focus on both macroeconomic and institutional factors.

#### ***Macroeconomic Factors***

Economic growth has been identified as one of the determining factors of FDI inflows into developing countries. According to Dollery et. al (2010), FDI inflows have a positive impact on economic growth in the presence of a skilled labour force. De Vita et al. (2008) finds that host country GDP growth, as an indicator of its economic prospects, has a positive impact on attracting FDI inflows. Other researchers have explored the direction of the relationship between FDI and GDP growth. Choe (2003) finds that the relationship between FDI and GDP is bi-directional, i.e., FDI causes GDP growth and GDP growth causes FDI. However, the study reveals that the effect of GDP growth on FDI is more apparent than the effect of FDI on GDP growth.

Empirical studies have also found that market size, exchange rate, exchange rate volatility, interest rate and trade openness have an impact on FDI inflows. A study on FDI inflows into South Africa conducted by Fedderke and Romm (2006) found that market size, which is measured by GDP size, has a strong positive impact on FDI inflows into South Africa. They also find that when it comes to trade openness, increased exports have a positive relationship with FDI while increased imports have a negative relationship with FDI. According to Asiedu (2002), trade openness promotes FDI inflows into Sub-Saharan and non-Sub-Saharan African countries. Similar results are found in Australia where trade openness is identified as a significant factor in attracting FDI (Yang et al, 2000). Aizenman and Noy (2006) postulate that the exact impact of trade openness is dependent on the type of FDI. Horizontal FDI which is more prevalent in developed countries is trade substituting while vertical FDI which is more prevalent between developed and developing countries tends to create trade.

According to Sayek (2009), inflation rate, which is a measure of economic stability, is an important macroeconomic factor for attracting FDI. The study reveals that inflation rate and FDI had a negative and significant relationship. A proposed reason for this is that high inflation rates reduce existing and prospective FDI flows by reducing the value of the real return expected from the investments. On the other hand, Mason and Vracheva (2017) have found a positive relationship between FDI and inflation. Agudze and Ibhagui (2021) postulate that this positive relationship could be because an increase in price levels creams up the economy and ensures investors get an adequate return on their investment.

Froot and Stein (1991) find that exchange rate effects have an impact on FDI. They find that currency depreciation in the host country leads to an increase in FDI inflows as it becomes cheaper for foreign investors to acquire assets abroad. Goldberg and Kolstad (1994) investigate the impact of exchange rate uncertainty on FDI. They find that FX uncertainty will increase FDI by risk averse enterprises if the uncertainty is positively correlated with export demand shocks in their intended markets. However, Campa (1993) examines how exchange rate uncertainty affects FDI based on option theory and finds that greater uncertainty increases the value of the firm's option to wait until investing in a market hence reducing FDI.

Saini and Singhania (2008) find that for developed countries, FDI seeks policy related determinants, i.e., GDP growth, trade openness and freedom index, while in developing countries, FDI shows positive association with gross fixed capital formation (GFCF), trade openness, and efficiency variables.

Infrastructure development has also been identified as an important factor in attracting FDI. According to Kang and Lee (2007), investors prefer to invest in a country with established infrastructure. Therefore, it is reasonable to expect infrastructure development to have a positive and significant relationship with FDI (Mina, 2007).

Existing literature has also assessed the impact of financial development on FDI flows. According to Alfaro et al. (2010), financial development is an enabler of FDI. In their study, FDI results in higher economic growth in countries with a developed financial sector as compared to those with an underdeveloped financial sector. Additionally, Rajan & Zingales (1998) find that well-functioning financial



markets in host countries reduce the cost of external finance for firms which in turn promotes FDI inflows especially from firms that tend to be dependent on outside capital. Bilir et al. (2019) also find that financial development in a country is associated with relatively more entry by multinational firms in the host countries. However, the study also notes that a higher financial development leads to increased local competition which in turn reduces the profits of firms in the country. This could have a deterring effect on FDI if the multinational firm's primary market is the local market.

Human capital is another key consideration. According to Chidlow et al (2009), cost and productivity of labour in particular have been found to have significant relationship with FDI. They find that low input costs including labour costs and high labour productivity have a positive and significant relationship with FDI inflows.

### *Institutional factors*

According to Federrke and Romm (2006), political risk and property rights are a key consideration for foreign investors. Additionally, Dupasquier and Osakwe (2006) find that poor governance and inhospitable regulatory environments serve as a deterrent for FDI. Institutional factors in literature are closely linked to governance factors discussed below.

### **Empirical Evidence on the link between FDI and ESG**

Most studies that have been carried out to date about FDI and ESG have looked at the relationship between FDI and the individual factors, E, S, and G. There is minimal literature that focuses on the relationship between FDI and the 3 factors combined.

### **Relationship between FDI and Environmental Factors**

Two main hypotheses have been investigated regarding the relationship between FDI and environmental factors. The first is the pollution haven hypothesis and the second is the pollution halo hypothesis.

### ***Pollution Haven Hypothesis***

The pollution haven hypothesis postulates that lower environmental standards attract FDI (Copeland et al., 1994). Cole (2004) studied the impact of environmental regulation on FDI and found that stricter regulation leads to less FDI. This is supported by Dam and Scholtens (2012), who observe that multinational enterprises relocate their pollution intensive operations to countries with weak environmental regulations. Additionally, Spatareanu (2007) finds that FDI in a host country is associated with strict environmental regulations in the investor's home country.

However, according to Bu and Wagner (2016), firms' heterogeneities in environmental capabilities and sizes affect their investment patterns. Firms with higher environmental capabilities are able to invest in countries with stricter regulations while those with lower environmental capabilities would naturally shy away from investing in countries with strict environmental regulation.

### ***The Pollution Halo Hypothesis***

The pollution halo hypothesis postulates that FDI leads to reduction in pollution through technology transfer and transfer of best practice to host countries from home countries (Gallagher et al., 2007).

According to Pisani et. al (2019), multinational companies prefer to invest in greener cities because of their commitment to the well-being of their employees and to improve their corporate image in the wake of higher awareness and pressure from stakeholders. In their study, they find that "greener" cities which they characterized as having good air quality and proper waste water treatment attract FDI flows. Mert and Caglar (2020) evaluate the relationship between environmental pollution and FDI in Turkey, and they find that increasing FDI leads to a decrease in the rate of emissions growth in both the long and the short-run. This is due to the transfer of technology that is more resource-efficient.

Other studies have investigated the inverse relationship, i.e., the impact of FDI on the environment. According to Nadeem et. al (2020), there is no conclusive result to support that FDI inflow leads to environmental degradation in Pakistan. However, Xie et al. (2023) find that while FDI can positively moderate the impact of economic growth on environmental degradation through better technology, it

increases industrialization which may ultimately increase environmental degradation.

### **Relationship between FDI and Social Factors**

Theoretically, greater level of human capital characterized by good education, higher life expectancy, and higher standards of living from an economic perspective leads to higher productivity and therefore higher FDI inflows (Benhabib et al., 1994).

According to Li and Lu (2005), the level of human capital is an important factor in attracting FDI. According to Sharma and Gani (2004), FDI has a positive effect on human development measured by the Human Development Index (HDI). Kheng, Sun and Anwar (2017) evaluate the direction of the relationship between human capital and FDI. They find significant bi-directional causality between FDI and human capital.

### **Relationship between FDI and Governance Factors**

Buchanan et al. (2012) find that good institutions and governance, and lower levels of corruption attract FDI. This is consistent with Bailey (2018), finding that political stability, democracy, and rule of law encourage FDI, whereas corruption, cultural distance and tax discourage FDI. Additionally, Contractor et al. (2020) find that countries with strong contract enforcement and efficient international trade regulations attract FDI. Globerman and Shapiro (2002) investigate the relationship between governance infrastructure and FDI inflows and outflows. They define governance infrastructure as including “an effective, impartial and transparent legal system that protects property and individual rights; public institutions that are stable, credible and honest; and government policies that favor free and open markets”. They find that investing in governance infrastructure is an important determinant for FDI inflows. Moreover, governance infrastructure also creates an environment where domestic firms can grow and invest abroad. They also find that the benefits of investing in governance infrastructure to promote FDI inflows is more pronounced in smaller and less developed economies (Globerman et al., 2002).

### Section 3. Methodology and Data

We start from the possible drivers of FDI as discussed in the traditional “push vs. pull” framework, and see that country-specific (pull) factors have indicated relationships with FDI to emerging and developing markets. Explicitly, domestic output growth (positive) and country risk indicators (negative) have shown impact on FDI (Koepke, 2015). We consider ESG factors as country-specific features, and ESG risks as country risk indicators.

Based on the ideas above, our hypothesis is that ESG factors have a significant impact on FDI inflows to emerging and developing markets. We will test this hypothesis using a panel regression model.

Unlike pure time series or pure cross-sectional data, panel data include both dimensions: time series ( $t = 1, \dots, T$ ) and cross-sectional ( $i = 1, \dots, N$ ), giving the equation:

$$y_{it} = \alpha + \beta x_{it} + u_{it} \quad (1)$$

where  $y_{it}$  is the dependent variable,  $\alpha$  the intercept,  $\beta$  the vector of coefficients to be estimated on  $x_{it}$ , and  $x_{it}$  the explanatory variables.

The panel approach provides two advantages for our purpose. First, we are able to examine how variables or their relationships change over time. The short history of our subject makes it challenging to conduct a meaningful hypothesis test for individual countries due to few data points. However, the combination of time series and cross-sectional data increases the number of degrees of freedom, and thus compensates for the power of the test lost to the limited period available. Second, we can eliminate the endogeneity caused by omitted-variable bias by including fixed-effects in our model (Brooks, 2019, p.491). Omitting important variables can affect the regression estimates when addressing complex problems with higher likelihood of unobserved factors. Addressing omitted-variable bias can help us get rid of a potential source of bias.

Since our intention is to study the impact of ESG factors on FDI inflows, which could work in a unique way for each country, we will focus more on the host or

country-fixed effects. The use of a country-fixed effects model will allow us to address host-specific FDI drivers that do not change over time.

The error term  $u_{it}$  from (I) is decomposed into two parts in the country-fixed model:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + v_{it} \quad (II)$$

The country-fixed effect  $\mu_i$  captures all the variables affecting  $y_{it}$  cross-sectionally with no time variant for the same entity. The rest of the disturbance that remains unexplained by the model is covered by  $v_{it}$ .

We use the least squares dummy variable (LSDV) approach to estimate this model, which unfolds into the following structure:

$$y_{it} = \alpha + \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \dots + \mu_N DN_i + v_{it} \quad (III)$$

The value of dummy variable  $D_i$  ( $i = 1, \dots, N$ ) equals 1 for all observations on the  $i^{\text{th}}$  entity (country), and 0 otherwise. For each  $i$ , the regression will return the same vector of  $\beta$  but a different intercept. The entity-specific intercepts reflect the ESG-FDI relationship unique to each country, even though we cannot identify all the relevant elements behind it. To avoid the “dummy variable trap” without dropping the general intercept  $\alpha$ , we choose to give up the first country dummy variable (Algeria) (Brooks, 2019, p.493-495).

Our panel analysis will start with a pooled regression without distinguishing between different countries. We start with control variables to assess the model’s explanatory power on our sample, then add ESG variables to capture any supplementary attribution. In the complete regression, we will introduce country-fixed effects to account for unidentified explanatory variables specific to each country. After presenting our variables in the following paragraphs, we will explain the main regression model in detail.

## ***Regression Variables***

Table 1. Overview of all variables

<b>Variable</b>		<b>Notation</b>	<b>Measurement</b>
Dependent	y	FDIGDP	FDI inflow as a percentage of GDP
Control	x1	logGDP1tot	Natural logarithm of 1st year total GDP in USD
	x2	logGDP1pc	Natural logarithm of 1st year GDP per capita in USD
	x3	$\Delta$ logGDPpc	Annual change of natural logarithm of 1st year GDP per capita in USD
	x4	RI	Real interest rate, measured by the host lending interest rate adjusted for GDP deflator
	x5	TO	Trade openness, measured by total import and export as a percentage of GDP
	x6	IFR	Infrastructure investment, measured by gross fixed capital formation as a percentage of GDP
	x7	$\Pi$	Inflation level, measured by the host GDP deflator
	x8	FIN	Financial development, measured by total stock market capital as a percentage of GDP
ESG	z1	CO <sub>2</sub>	CO <sub>2</sub> intensity residual from the regression of CO <sub>2</sub> intensity on GDP per capita in USD
	z2	POL	Political stability score
	z3	PRO	Registering property score
	z4	CON	Enforcing contracts score
	z5	HDI	Human Development Index score

### **Control Variables**

We use logGDP1tot as a variable for the size of the host economy, measured by the starting level (year 1998) of total GDP in USD. Natural logarithm is adopted to

address skewness in the data. As a larger economy implies a higher production capacity and a broader investment universe, we expect economy size to have a positive effect on FDI inflows.

H1: First year total GDP has a significant impact on FDI as a % of GDP.

Both  $\log\text{GDP1pc}$  and  $\Delta\log\text{GDPpc}$  are variables of economic development. On the one hand,  $\text{GDP1pc}$  is the starting level (year 1998) of GDP per capita in USD as a proxy of economic development in the host country. On the other hand, the year-to-year change of economic development reflects the potential of growth. Since a higher level of economic development and growth potentials signal better investment opportunities over a long horizon, we expect both variables to have a positive impact on attracting foreign investors.

H2: First year GDP per capita has a significant impact on FDI as a % of GDP.

H3: Annual GDP per capita growth has a significant impact on FDI as a % of GDP.

Instead of using nominal interest rate, we choose to assess the effects on FDI inflows of the host country's real interest rate (RI) and inflation ( $\Pi$ ), respectively. Real interest rate is measured by the lending rate adjusted for local inflation. Higher real interest rates in the host country increase the cost of capital for foreign investors (De Vita et al., 2008), hence yielding our expectation of a negative effect on FDI inflows. Inflation is measured by the annual growth of GDP deflator, showing the price change rate in the host economy. Since high inflation signals uncertainties in both political and economic environments, we expect FDI inflows to be adversely related to inflation (Reinhart et al., 2003).

H4: Real interest rate has a significant impact on FDI as a % of GDP.

H7: Inflation has a significant impact on FDI as a % of GDP.

Trade openness (TO) is the sum of exports and imports of goods and services measured as a percentage of GDP. Intuitively, a liquid and large flow of trade indicates an efficient connection with the global economic system, ensuring a relatively healthy investment environment. We expect a positive effect of trade openness on FDI inflows.

H5: Trade openness has a significant impact on FDI as a % of GDP.

Infrastructure investment (IFR) is represented by gross fixed capital formation, including land improvements, fixed asset purchases, and the construction of basic facilities. With a well-developed or actively developing infrastructure, foreign investors are provided with a solid basis for investment opportunities. By investing heavily in infrastructure, the host country also demonstrates its intention and ability to support future population demand. We expect a positive relationship between gross fixed capital formation and FDI inflows.

H6: Gross fixed capital formation has a significant impact on FDI as a % of GDP.

We use the host country's total stock market capitalization as a share of GDP to proxy its financial development. A high weight of equity market value relative to total production indicates large demand for and supply of capitals, demonstrating other investors' positive outlook over the host country market. Thus, we expect a positive impact of financial development on FDI inflows.

H8: Market capitalization as a % of GDP has a significant impact on FDI as a % of GDP.

### **ESG Variables**

We focus on one environmental variable (CO<sub>2</sub> intensity residual), three governance variables (political stability, registering property, and enforcing contracts), and one social variable (Human Development Index).

Since the directly available measure of CO<sub>2</sub> emissions (in metric tons per capita) has a high and negative correlation (-0.60) with GDP per capita, we choose a two-step method to remove multicollinearity. We first calculate CO<sub>2</sub> intensity as CO<sub>2</sub> emissions per USD of GDP generated, and run a cross-sectional linear regression at year level, with CO<sub>2</sub> intensity as dependent variable and GDP per capita as independent variable. Then we use the residuals extracted from the regression as the E variable in our panel model. This method allows us to capture the part of CO<sub>2</sub> intensity that is unexplained by GDP per capita. We expect this residual to have a negative impact on attracting FDI inflows, since the carbon emissions beyond production reasons could imply less sustainable usage of resources, which might decrease the incentive of foreign investments.

H9: CO<sub>2</sub> intensity residual has a significant impact on FDI as a % of GDP.



Political stability (POL) estimates the regularity of the flow of political exchanges and absence of violence or terrorism at country level. We expect political stability to have a positive effect on FDI inflows as the former implies lower uncertainty, better property protection, more efficient production and more secure human resources (Opoku et al., 2022).

H10: Political stability has a significant impact on FDI as a % of GDP.

The other two governance factors are chosen from indicators under the “doing business” framework. Registering property (PRO) scores are the simple average of a group of indicators measuring time, cost and procedure steps required to transfer property ownership in the host country. Since a higher score of this variable means a more efficient and investor-friendly system, we expect registering property to have a positive effect on FDI inflows.

H11: Registering property has a significant impact on FDI as a % of GDP.

Similarly, enforcing contracts (CON) scores are the simple average of indicators measuring the efficiency and quality of resolving a commercial dispute in the host country. We expect a positive impact from enforcing contracts on FDI inflows as a higher score of this variable indicates better investor protection in case of disagreements.

H12: Enforcing contracts has a significant impact on FDI as a % of GDP.

Human Development Index (HDI) is a composite measure of people’s life expectancy, educational conditions and standard of living in the host country. A higher HDI score signals a lower reputational risk for foreign investors, especially those who rely greatly on their brand values. We expect a positive effect of HDI on FDI inflows.

H13: HDI has a significant impact on FDI as a % of GDP.

### ***Main Regression Model***

#### *Pooled Regression*

We begin our analysis by estimating a regression of pooled observations for a general view over the relationships. The dependent variable is FDI inflows as a percentage of GDP (FDIGDP). The independent variables in the first step consist only of control variables, giving the equation:

$$\begin{aligned}
FDIGDP_{it} = & \alpha + \beta_{\log GDP1tot} \log GDP1tot_{it} + \beta_{\log GDP1pc} \log GDP1pc_{it} \\
& + \beta_{\Delta \log GDPpc} \Delta \log GDPpc_{it} + \beta_{RI} RI_{it} + \beta_{TO} TO_{it} + \beta_{IFR} IFR_{it} \\
& + \beta_{\Pi} \Pi_{it} + \beta_{FIN} FIN_{it} + u_{it}
\end{aligned} \tag{1.1}$$

The second step of pooled regression includes ESG variables in addition to control variables, thus the equation:

$$\begin{aligned}
FDIGDP_{it} = & \alpha + \beta_{\log GDP1tot} \log GDP1tot_{it} + \beta_{\log GDP1pc} \log GDP1pc_{it} \\
& + \beta_{\Delta \log GDPpc} \Delta \log GDPpc_{it} + \beta_{RI} RI_{it} + \beta_{TO} TO_{it} + \beta_{IFR} IFR_{it} \\
& + \beta_{\Pi} \Pi_{it} + \beta_{FIN} FIN_{it} + \beta_{CO_2} CO_{2it} + \beta_{POL} POL_{it} + \beta_{PRO} PRO_{it} \\
& + \beta_{CON} CON_{it} + \beta_{HDI} HDI_{it} + u_{it}
\end{aligned} \tag{1.2}$$

#### *Fixed-Effects*

Since our study deals with different countries, which introduces heterogeneity, we use a full panel technique beyond the pooled analysis. As in the previous regression, the independent variables consist of control variables, but here we add a country-category (*c\_cat*) variable to represent the country dummy explained above:

$$\begin{aligned}
FDIGDP_{it} = & \alpha + \beta_{\log GDP1tot} \log GDP1tot_{it} + \beta_{\log GDP1pc} \log GDP1pc_{it} \\
& + \beta_{\Delta \log GDPpc} \Delta \log GDPpc_{it} + \beta_{RI} RI_{it} + \beta_{TO} TO_{it} + \beta_{IFR} IFR_{it} \\
& + \beta_{\Pi} \Pi_{it} + \beta_{FIN} FIN_{it} + \beta_{CO_2} CO_{2it} + \beta_{POL} POL_{it} + \beta_{PRO} PRO_{it} \\
& + \beta_{CON} CON_{it} + \beta_{HDI} HDI_{it} + c\_cat + u_{it}
\end{aligned} \tag{1.3}$$

Potential effects of the financial crisis will be incorporated in the robustness check later in this paper.

#### **Data**

Our main sample consists of 59 emerging and developing countries, as shown in Appendix 1. The sample contains 22 years of annual data covering 1998 - 2019.

The list of emerging countries varies across the indices of different institutions. We have chosen our sample from the most frequently included emerging countries. The developing countries are taken from the 2019 WESP list (United Nations, 2019), excluding the majority of least developed countries for our research purpose (United Nations, 2023). We combine the emerging and developing markets in a way to avoid double counting, even though the lists occasionally overlap with each other. As explained earlier, the enlarged selection of entities can contribute to the power of the test, making up for the relatively short sample period.

To compensate for the disadvantages due to the low-frequency nature of ESG data, we try to collect the longest sample possible. We use an unbalanced panel to keep all our selected countries involved. While some countries miss certain observations in the beginning of the sample period, they are gradually included when the ESG records become available over time.

As mentioned previously, the dependent variable is the FDI inflows on net bases, i.e., all liabilities less assets transferred between host country enterprises and their non-resident direct investors. Flows with a negative sign represent reverse investment or disinvestment (the World Bank, 2023).

The main source of data for the control variables is the world bank. The independent variables of our interest consist of selected factors representing the three aspects of ESG. The indicator for the “social” aspect is the Human Development Index (HDI) from the United Nations Development Programme (UNDP, 2023). The factors for the “environment” and the “governance” aspects are collected from the Sovereign ESG Data Portal provided by the World Bank.

Some of the explanatory variables have extreme outliers which could lead to biased parameter estimates. To deal with this issue, we apply selective winsorization. We first detect outliers of each variable at the pooled level, and then winsorize cross-sectionally for each year, at different levels on one or both of the tails accordingly. By replacing the cross-sectional extreme outliers with the next value at the year level, we limit the distribution skewness while keeping the variation within each individual year. For those selected variables, we use winsorized data in the main analysis and un-winsorized data for robustness check.

We use Excel and R to process data. Appendix 2 summarizes statistics of both un-winsorized and winsorized data.

#### Section 4. Empirical Results and Discussion

Table 2. Summary of Regression Results with Winsorized Data

Variable	regression (1.1)		regression (1.2)		regression (1.3)	
	estimate	p-value	estimate	p-value	estimate	p-value
logGDP1tot	0.0099	0.9548	0.4359	0.2067	-1.5672	0.7947
logGDP1pc	1.1800	0.0000***	1.0616	0.0842*	0.4103	0.9324
$\Delta$ logGDPpc	4.7759	0.0189**	7.6608	0.0519*	6.6170	0.1137
RI	0.0475	0.3970	0.2612	0.0429**	0.2312	0.2390
TO	0.0299	0.0002***	0.0532	0.0001***	0.0555	0.1152
IFR	0.0899	0.0387**	0.0718	0.3337	0.2607	0.0521*
$\Pi$	-0.0530	0.4258	0.1376	0.3086	0.1431	0.5003
FIN	-0.0083	0.2968	-0.0066	0.6109	0.0157	0.5724
CO <sub>2</sub>			-2713.16	0.0350**	-1593.25	0.7027
POL			0.2894	0.5285	0.3451	0.7982
PRO			-0.0095	0.7716	-0.0853	0.1407
CON			-0.0248	0.5324	0.1396	0.2315
HDI			2.4390	0.7218	0.2171	0.9910
Adjusted R <sup>2</sup>	0.1099		0.1084		0.1647	

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

The main regression results are shown in Table 2 above. The results of the first regression (1.1) indicate that the relationship between FDI as a % of GDP and the first year GDP per capita is positive and significant. This implies that countries with

a high GDP attract FDI. This is intuitive as GDP of a country can be a proxy for market size as well as economic development. The results also indicate that annual GDP per capita growth, trade openness (represented by international trade as a % of GDP) and Infrastructure (represented by Gross Fixed Capital Formation as a % of GDP) have a positive and significant relationship with FDI as a % of GDP. The positive relationship between annual GDP per capita growth and FDI as a % of GDP could be explained by the fact that positive growth in GDP per capita indicates an increase in economic development in a nation. It could also indicate an increase in purchasing power in the country hence signaling an attractive market for foreign investors to serve. This finding is consistent with the study carried out by Alshamsi and Azam (2015), who found that GDP per capita in the UAE has a significant and positive impact on FDI inflow into the country. The finding of a positive and significant relationship between trade openness and FDI is in line with earlier empirical studies including Yang et al. (2000) and further emphasizes the importance of free flow of funds and resources between host country and home country to foreign investors. The positive relationship between infrastructure and FDI is intuitive as well because well-developed infrastructure can increase productivity and profitability (Kaur and Khatua, 2016).

The results from the second regression (1.2) incorporate our ESG factors. When ESG factors are added to the initial regression, the infrastructure is no longer significant. However, real interest rate which was previously insignificant has a positive and significant relationship with FDI. This is consistent with the theory that investors will channel their investments from countries with low interest rates to countries with real interest rates as interest rates are a proxy for the rate of return on investments (Anna, 2012, Singhania, 2011). The relationship between FDI as a % of GDP and annual GDP per capita growth and trade openness, respectively, remains positive and significant, reinforcing the results discussed above.

We also find that the residual carbon emissions (adjusted for the correlation with GDP per capita) has a negative but significant relationship with FDI as a % of GDP. Our finding confirms Opoku et al. (2022) who find that CO<sub>2</sub> emissions significantly reduce FDI inflows. This consistency applies although their regressor is carbon emissions in metric tons per capita while ours is the residual described in the

previous section. As discussed above, excess emissions over and above what is generated in the production process could signal inefficient use of resources which increases cost of production. Additionally, excess emissions could signal poor air quality which could impact the health of employees and consequently, their productivity and cost to the company.

The other ESG factors, while not significant, reveal information regarding the relationship between FDI and ESG. To start with, political stability, while not significant, has a positive relationship with FDI which is in line with earlier studies including Rashid and Wong (2017), who find that political stability increases the FDI competitiveness of Asian countries. Enforcement of contracts and property registration, nevertheless, have a negative relationship with FDI in our analysis. This is contrary to other studies including Contractor et al. (2020) , who find that strong contract enforcement is key in attracting foreign investors. Globerman and Shapiro (2002) also find that property rights are important to foreign investors. However, according to Tao and Wang (1998), parties prefer to operate based on non-binding contracts, which implies that contract enforcement is not necessary. This could explain why FDI inflows continue to pour into developing countries where contract enforcement is generally difficult and property rights are weak.

The Human Development Index has a positive but insignificant relationship with FDI. This is consistent with earlier studies such as Reiter and Steensma (2012), who find that FDI inflows are positively related when FDI policy restricts foreign investors from entering some economic sectors due to issues such as discrimination of workers.

The third regression (1.3) results include ESG factors and host-fixed effects. When country-fixed effects are introduced to the model, the control variables and the ESG factors in the model become insignificant with the exception of gross fixed capital formation (proxy for infrastructure). However, host-fixed effects are significant for a few countries (not shown in Table 2). This could be explained by that investors' decisions could be driven more by country-specific factors such as cultural distance. Tang (2012) finds that differences in individualism between two countries encourages FDI while differences in power distance discourages FDI. Therefore, this implies that the amount of FDI received will be dependent on the cultural

distance between the recipient country and the investor country. This impact can only be captured in a country-level study rather than an aggregated study like the one we have conducted.

### ***Other Variables***

Inflation is insignificant and positive in 2 out of the 3 regressions, contradicting our hypothesis that high inflation leads to lower FDI flows. Financial development, proxied by the stock market capitalization as a share of GDP, has an insignificant and negative relationship with FDI in 2 out of the 3 regressions. This also contradicts our hypothesis that a more developed financial market attracts FDI. Though literature suggests that the relationship between FDI and these variables is negative and positive, respectively, the countries in our sample are developing and emerging countries which are characterized by high inflation and underdeveloped financial markets, hence the inconclusive results.

Apart from CO<sub>2</sub> intensity residual, the rest of ESG variables are insignificant. We can interpret this as a result of combined issues. Firstly, both registering property and enforcing contracts have data available since 2004, making the sample materially incomplete. Secondly, adding more independent variables to the model might introduce collinearity, even though we only choose regressors with correlations below 0.6 and above -0.6. Thirdly, the sample we use differs from previous studies both in country selection and in time period. Finally, although our sample contains 59 countries across 22 years, the annual frequency of data gives a limited sample size and omits potentially meaningful information within each year.

### ***Robustness check***

In order to assess the reliability of our model, we carry out three robustness tests by using un-winsorized data and adjusting for different effects. We include a dummy variable for non-OECD countries (1 for non-OECD countries, 0 otherwise) to account for the potential difference between OECD members and non-members in, for example, sustainable economic growth. Furthermore, by interacting the non-OECD dummy variable with each of the ESG variables, we attempt to address the potential differential effects of ESG factors on FDI inflows between OECD members and non-members.

The first robustness test (rob1) has the same equation as the main regression (1.2), plus the non-OECD dummy and the interaction term of non-OECD with the ESG variables. The second robustness test (rob2) includes country-fixed effects in addition to rob1 to capture host-specific attribution.

Despite our focus on country-specific factors, we need to consider events like the 2008 financial crisis which may have significant consequences across economies. We address this issue by adding a year dummy. The dummy variable  $DT_t$  ( $t = 1, \dots, T$ ) takes the value 1 for years 2008 and 2009, and 0 for all other years. By estimating a period-specific intercept, we can account for the potential differential effect of the financial crisis shock on the relation between regressors and FDI (Chipalkatti et al., 2021). The third robustness test (rob3) includes this financial crisis dummy in addition to rob2.

The results of robustness check are summarized in Appendix 3. In rob1, real interest rate and trade openness have positive and significant effects on FDI inflows, consistent with the main regression (1.2) findings. On the contrary, none of the GDP variables are significant, while infrastructure becomes significant and still positive. CO<sub>2</sub> intensity remains negative and significant. Registering property becomes significant but turns negative. Being non-OECD generally does not affect FDI inflows. However, the interaction term of non-OECD with CO<sub>2</sub> intensity has a positive and significant coefficient. This suggests that carbon emission's negative impact on FDI inflows is lower for non-OECD hosts than OECD hosts. Similarly, non-OECD interacted with registering property has a positive and significant estimate, implying that registering property has a less negative impact on FDI into non-OECD countries than OECD countries.

As the result of rob2 shows, infrastructure remains positive and significant. Compared to main regression (1.3) findings, trade openness remains positive but becomes significant, while registering property turns negative and becomes significant. The interaction term of non-OECD with registering property is positively significant as in rob1.



Rob3 has mostly similar results as rob2, except that infrastructure has lost its significance while the sign remains unchanged. Financial crisis does not add explanatory power to the model.

In comparison with the main model, the robustness check gives different results but higher adjusted  $R^2$ . This interesting finding has two implications for our main analysis. Firstly, we might have winsorized some of the variables at an unnecessarily high level, thus overtreating the data. The source of the removed outliers might actually be a combination of measurement errors and meaningful information. Secondly, the robustness check model could improve the main model's goodness of fit. The added non-OECD dummy variable and its interaction with ESG variables might account for distinct effects not fully captured by the main model. However, for the limitations of this paper, we should be cautious with interpreting the robustness check as yielding a better model fit without further sensitivity analysis.

## **Section 5. Conclusion**

GDP per capita growth, trade openness and level of infrastructure have a positive and significant effect on FDI inflows. As a result, governments of developing countries should focus on increasing GDP by putting in place policies to increase consumption and investment in the country. Additionally, the governments should explore trade agreements with the countries that contribute the highest amount of FDI. They should also explore ways to make external trade easier. This could be by reducing or eliminating export duties and reducing taxes on imports necessary for production. Infrastructure development should also be a key focus for governments. This involves development of road and rail network, telecommunication infrastructure and increasing electricity connectivity.

On the ESG front, our analysis reveals that excessive carbon emissions are key considerations for foreign investors in developing and emerging economies. Policy makers should place focus on reducing carbon emissions in production processes. Governments can do this by incentivizing companies to invest in newer machinery and technology for production.

Literature on the relationship between FDI and ESG is limited. Additionally, there are a variety of factors that can be used to proxy ESG which adds to the complexity of evaluating the topic. Carrying out the study with a different set of ESG variables could reveal more information about the relationship between ESG and FDI. Moreover, very few studies have evaluated the direction of the relationship between ESG factors and FDI. This is a potential area that can be researched with further studies.

## Appendixes

### Appendix 1. Country List

Africa	Asia	Europe	Latin America and the Caribbean
Algeria	Bahrain	Czech Republic*	Argentina
Botswana	Bangladesh	Hungary*	Barbados
Cabo Verde	Brunei Darussalam	Russia	Belize
Côte d'Ivoire	China		Bolivia
Egypt, Arab Rep.	India		Brazil
Kenya	Indonesia		Chile*
Libya	Iran		Colombia*
Mauritius	Iraq		Costa Rica*
Namibia	Jordan	<b>Other</b>	Dominican Republic
Nigeria	Lebanon	Fiji	Guatemala
South Africa	Malaysia	Papua New Guinea	Guyana
Zimbabwe	Maldives	Samoa	Honduras
	Mongolia		Jamaica
	Oman		Mexico*
	Pakistan		Nicaragua
	Philippines		Panama
	Sri Lanka		Paraguay
	Thailand		Peru
	Vietnam		Suriname
			The Bahamas
			Uruguay
			Venezuela

*Note: \*OECD countries*

## Appendix 2.1. Descriptive Statistics

	Un-winsorized				Winsorized			
	Mean	Min	Max	SD	Mean	Min	Max	SD
<b>y</b>	3.64	-40.09	60.19	5.11				
<b>x1</b>	23.64	19.41	27.66	1.89				
<b>x2</b>	7.61	5.87	9.98	0.98				
<b>x3</b>	0.05	-1.02	1.06	0.13				
<b>x4<sup>1</sup></b>	6.44	-78.52	93.92	10.51	5.78	-5.90	20.44	5.16
<b>x5<sup>2</sup></b>	80.27	16.44	220.41	37.63	78.87	16.44	160.10	34.29
<b>x6<sup>3</sup></b>	22.71	2.00	48.41	7.05	22.38	10.94	34.54	5.62
<b>x7<sup>4</sup></b>	7.57	-30.20	225.39	13.33	5.82	-2.38	18.62	4.24
<b>x8<sup>5</sup></b>	46.61	0.01	322.71	46.11	39.11	0.01	128.08	28.35
<b>z1<sup>6</sup></b>	0e+00	0e+00	0e+00	1e-02	0e+00	0e+00	0e+00	0e+00
<b>z2</b>	-0.26	-3.18	1.39	0.95				
<b>z3<sup>7</sup></b>	60.71	0.00	90.43	15.76	62.00	33.13	90.43	12.60
<b>z4<sup>8</sup></b>	54.45	20.82	79.04	10.67	54.53	26.98	79.04	10.47
<b>z5</b>	0.69	0.43	0.90	0.10				

### Notes:

Winsorization is carried out cross-sectionally for each year.

<sup>1</sup>x4 (real interest rate): winsorized at 20% on the upper tail, 15% on the lower tail.

<sup>2</sup>x5 (trade openness): winsorized at 5% on the upper tail.

<sup>3</sup>x6 (infrastructure): winsorized at 10% on the upper tail, 5% on the lower tail.

<sup>4</sup>x7 (inflation): winsorized at 20% on the upper tail, 15% on the lower tail.

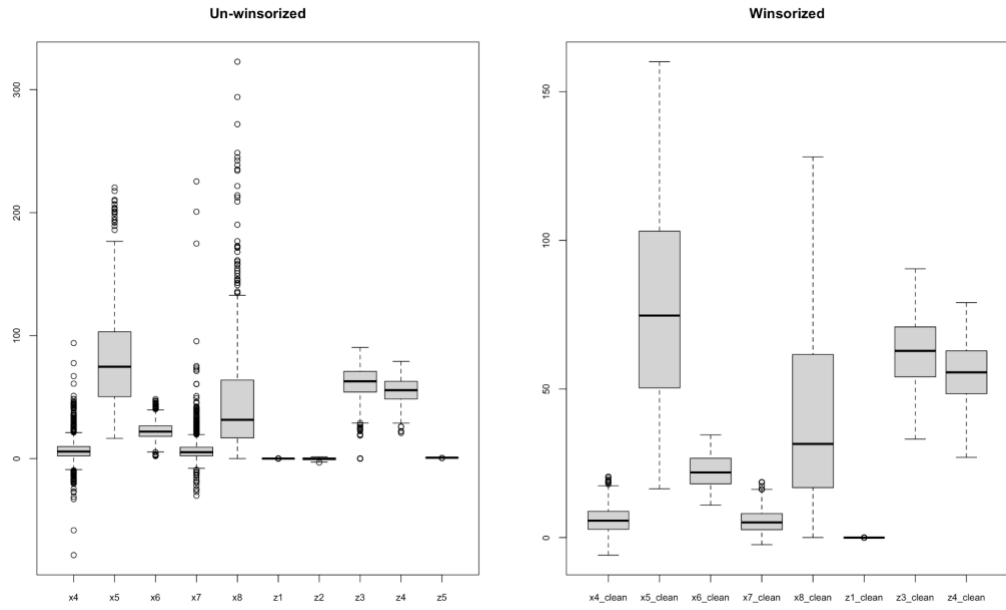
<sup>5</sup>x8 (financial development): winsorized at 15% on the upper tail.

<sup>6</sup>z1 (CO<sub>2</sub> residual): winsorized at 10% on the upper tail.

<sup>7</sup>z3 (registering property): winsorized at 8% on the lower tail.

<sup>8</sup>z4 (enforcing contracts): winsorized at 2% on the lower tail.

## Appendix 2.2. Comparison of Un-winsorized and Winsorized Data



Appendix 3. Summary of Robustness Check Results with Un-winsorized Data

Variable	rob1		rob2		rob3	
	estimate	p-value	estimate	p-value	estimate	p-value
logGDP1tot	-0.3858	0.3070	-4.1209	0.4633	-4.2749	0.4482
logGDP1pc	0.8714	0.1607	3.4584	0.4585	3.4607	0.4587
$\Delta$ logGDPpc	5.6918	0.1040	3.6514	0.3530	3.7647	0.3400
RI	0.1361	0.0455**	0.0655	0.5624	0.0613	0.5900
TO	0.0336	0.0039***	0.0561	0.0681*	0.0547	0.0769*
IFR	0.1161	0.0699*	0.2035	0.0739*	0.1922	0.1006
II	0.0999	0.1284	0.0597	0.5532	0.0550	0.5875
FIN	0.0065	0.4164	0.0181	0.3361	0.0187	0.3207
CO <sub>2</sub>	-21235.01	0.0273**	-1692.93	0.9030	-1574.67	0.9099
POL	-0.0684	0.9702	2.3280	0.5111	2.4676	0.4885
PRO	-0.4018	0.0014***	-0.5090	0.0003***	-0.5049	0.0003***
CON	0.0669	0.5529	0.6272	0.1937	0.6232	0.1972
HDI	54.8004	0.2579	-7.5446	0.8890	-7.1726	0.8946
Non-OECD	23.5219	0.5246	-1.8953	0.9731	-3.1495	0.9555
Non-OECD · CO <sub>2</sub>	20427.41	0.0346**	1470.58	0.9185	1363.87	0.9245
Non-OECD · PRO	0.4309	0.0010***	0.5428	0.0003***	0.5380	0.0004***
Financial crisis					0.4412	0.6709
Adjusted R <sup>2</sup>	0.1459		0.1849		0.1829	

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

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