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Multilevel determinants of FDI: A regional comparative analysis

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ABSTRACT

This study examines firm-, country-, and regional-level determinants of inward foreign direct investment (IFDI) in a three-level logit framework using data on 134 countries. Countries are divided into eight distinct global regions based on their geographic proximity and similarity in macroeconomic settings. The intraclass correlation coefficients (ICCs) at both the country and regional levels are significant, supporting the efficacy of a three-level model. After controlling for the endogeneity of some firm-level variables, several of the obstacles faced by firms are found to significantly (and negatively) affect IFDI: communication, finance, and institutional quality. Surprisingly, however, obstacles related to physical infrastructure seem to attract foreign investment in some regions, and those relating to administration uniformly encourage foreign investment. This suggests that foreign participation is likely a means of bypassing administrative obstacles (likely because foreign-invested firms are more likely to elicit exceptional treatment). The relative consistency in the effects of firm-level attributes is not reproduced for country-level attributes such as capital account openness, gross domestic product (GDP) per capita, inflation, and the tax rate on profits. These variables are shown to have varying impacts across regions—positive in some, negative in others, and statistically irrelevant in others. The regional-level variable, intraregional trade relative to regional GDP, is found to be positively associated with foreign participation in the aggregate model. However, that relationship is reproduced at the regional level for only two regions (Latin America and the Caribbean and South Asia) and is contradicted at that level for Central Asia.

1. Introduction

Foreign direct investment (FDI) is generally believed to be an important source of advanced technology and efficient management techniques, alongside further integration into a developed network for international trade.[1] One of the ways in which advanced technologies are expected to be transmitted is through externalities (spillovers)—some firm-specific advantages that multinational

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[1] FDI has three major modes: mergers and acquisitions, joint ventures, and new plants (i.e., greenfield investment). However, greenfield investment is more likely to be integrated with the parent company than other modes of FDI (Svensson, 1998).

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enterprises (MNEs) or foreign-invested firms (FIFs) more generally cannot completely internalize (Dunning and Lundan, 2008).[2] In the view of many policymakers, these hoped-for benefits justify policy reforms and the incurrence of real costs (e.g., tax exemptions and subsidies) to attract FDI (Aitken and Harrison, 1999). The potential benefits of FDI have become all the more relevant because the rapid increase in FDI in the 1990s was followed by two decades of historically high levels, despite fluctuations.

Developed countries have traditionally attracted the lion's share of total FDI flows. However, several developing countries have attracted sizable amounts of FDI in recent years, though many others remain marginalized. This disproportionate distribution of FDI flows across countries has motivated researchers and policymakers to examine the forces that drive the flow of FDI to particular countries or regions (for the distribution of FDI flows and stocks by country, respectively, see Appendix Figs. A1 and A2). As a result, many papers have explored the country-level determinants of these FDI flows. However, "the eclectic paradigm theory" proposed by Dunning (1980, 1993) suggests that firms invest abroad based on three types of advantages: ownership, location, and internalization (OLI). This approach suggests that firms' decisions to invest abroad are affected by firm- and country-level variables, and perhaps even regional-level variables, implying that the study of FDI determinants demands a multilevel analysis.

The better availability of firm-level data has stimulated efforts to examine the firm-level determinants of inward FDI (IFDI). However, early firm-level studies of FDI determinants focused mostly on developed countries. Some of the firm-specific variables of primary interest were: research and development (R&D), differences in input costs, advertising costs, financial policies, and taxation.[3] Therefore, the findings of these studies are not necessarily pertinent to countries in which inadequate infrastructure, financial constraints, weak institutions, administrative obstacles, and a lack of skilled labor are major challenges. This deficiency has been recognized, and some recent firm-level studies of FDI determinants have covered developing countries.[4] These studies have analyzed FDI determinants in a single-country context or several countries together, using only firm-level data and single-level econometric techniques. Few studies have been conducted using a developing country context to explore multilevel (both firm- and country-level) determinants of FDI stocks. Thus far, the only study to analyze both firm- and country-level determinants of FDI in a multilevel framework is Bhupatiraju (2020). However, an analysis of FDI stocks that explores regional differences in a multilevel framework remains to be produced.[5] This paper fills that gap in the literature.

Considering regional differences in the analysis of FDI determinants is important because some of the conditions faced by FIFs (e.g., macroeconomic settings, infrastructure challenges, and institutional and administrative constraints) may have regional dimensions. For example, South Asian economies have a different combination of challenges from Central Asian or East Asian economies (in terms of infrastructure challenges, financial constraints, institutional weaknesses, and other potential deterrents to IFDI). Regional factors might affect how multinational firms react to or interpret firm- and country-level constraints. This can be particularly important in the context of regional supply chains and trading networks. Accordingly, regional trade agreements to which a country is a signatory and the importance of intraregional trade for an economy can also affect IFDI. In effect, regional characteristics can be important in firm decision-making about capital movements across borders.

Using a large multiregional dataset, this study investigates the multilevel determinants of IFDI, considering differences between firms, countries, and world regions.[6] In particular, this study includes regional-level variables alongside firm- and country-level variables in a three-level hierarchical model to investigate the determinants of IFDI and determine whether any significant differences exist in those determinants across regions. Our results support the inclusion of all three levels of determinants (firm, country, and region) with respect to the impacts on IFDI. Moreover, these results indicate significant differences in the firm- and country-level determinants across regions (in terms of both the significance and sign of coefficients). In other words, some factors may have a positive association with IFDI in some regions, a negative association in other regions, and no relationship to IFDI in the remaining regions.

The rest of the paper is structured as follows. Section 2 presents the theories and related literature, and Section 3 the empirical literature. Section 4 describes the methodology and data. Section 5 presents and describes the results, while Section 6 concludes the paper.

2. Theory and related literature

Since the middle of the twentieth century, many attempts have been made to uncover why firms invest abroad. Early studies on FDI flows were mainly field studies with limited theoretical foundations (e.g., Basi, 1966; Behrman, 1962; Kolde, 1968). The first

[2] MNEs and FIFs are used alternately throughout this paper. According to the standard definition of the International Monetary Fund, if at least 10% of a firm's shares are foreign owned, such firms are called FIFs in this paper.

[3] For surveys, see Braunerhjelm and Svensson (1996), Buch et al. (2005, 2014), Carr et al. (2001), Disdier and Mayer (2004), Hanson et al. (2001), Head et al. (1995), Javorcik and Wei (2009), Jeon and Rhee (2008), Nefussi and Schwellnus (2010), Smith and Florida (1994), Todo (2011), Wheeler and Mody (1992), Urata and Kawai (2000), and Yeaple (2003).

[4] For surveys, see Belkhodja et al. (2017), Bhaumik et al. (2010), Chen et al. (2016), Deichmann et al. (2003), De Beule and Duanmu (2012), Demir and Su (2016), Dollar et al. (2006), Du et al. (2008), Gelb et al. (2008), Guimarães et al. (2000), Kang and Lee (2007), Kinda (2010), Mahbub and Jongwanich (2019), McCulloch et al. (2013), Nguyen et al. (2018), Pradhan (2004), and Tiong et al. (2021).

[5] Region is used here to indicate groups of countries clustered based on their geographic proximity, similarities in macroeconomic settings, and intraregional total trade relative to GDP.

[6] For details on different regions and number of countries in each region, see Appendix Table A1.

attempt to explain FDI in a theoretical framework was based on a Heckscher-Ohlin 2 × 2 × 2 model.[7] The Heckscher-Ohlin model, an example of neoclassical trade theory, assumed perfect competition, differences in relative factor intensities across commodities, and differences in relative factor endowments across countries. The resulting international factor price differentials meant that a capital-abundant country could either export capital-intensive goods or, in the absence of commodity trade, move capital abroad to take advantage of higher returns until factor price equalization was achieved (e.g., Jasay, 1960; Kemp, 1964; MacDougall, 2009).

The underlying assumption of perfect competition in the neoclassical theory of FDI was criticized by Kindleberger (1969) and Hymer (1976), among others. They argued, instead, that FDI needed structural market imperfections to flourish and, hence, introduced the concept of "monopolistic advantage."[8] Later, the "eclectic paradigm" proposed by Dunning (1977, 1980) identified three special advantages for foreign investors in choosing to locate production abroad: ownership (i.e., ownership of the production process, technology, and management and marketing skills), location (i.e., access to protected foreign markets, favorable tax treatments, lower costs of production and transportation, lower risk and less competition), and internalization (i.e., benefits perceived by firms due to the club-good nature of ownership advantages, such as managerial skills and technology).[9]

An alternative theory argues that firms locate their production abroad only when significant differences exist in factor endowments and factor prices (Helpman, 1984, 1985). Firms access low-cost inputs through delocalizing all or a portion of the production process—vertical integration (vertical FDI).[10] Markusen (1984) introduced horizontal integration (horizontal FDI), in which foreign investors can supply the host countries' market through an affiliate when trade friction exists. These two streams of literature, explaining vertical and horizontal FDI, were integrated in Markusen et al. (1996) and Markusen (1997) to explain FDI in the context of trade costs and trade liberalization—the knowledge-capital model. This model argues that similarities in market size, factor endowments, and transport costs determine horizontal FDI, and differences in factor endowments determine vertical FDI. Carr et al. (2001) was the first attempt to estimate the knowledge-capital model, and they found evidence in support of the model.

More recent studies, working within a similar framework, mention two more justifications for FDI: export platforms and vertical interaction. In export platform FDI, foreign investors choose some countries to serve as platforms for exports to a group of neighboring countries (Bjorvatn and Eckel, 2005; Ekholm et al., 2007; Ito, 2013). In vertical interaction (or fragmentation) FDI, affiliates of multinational enterprises (MNEs), or foreign investors more generally, operate in several host countries to supply intermediate goods between them before producing a final or more finished product for the parent enterprise (Baltagi et al., 2007). Notably, and relevant to this paper's objective, regional characteristics are directly pertinent in these models.

The pioneering works by Chandler (1962) and Ansoff (1965) first sketched the motivations for business diversification, and Wrigley (1970) refined and extended them. Later, Rugman (1975, 1977) introduced the "risk diversification motive" to this hypothesis. Core skills—firms' ability to efficiently and effectively combine market and technological knowledge to maximize profit, survive, and grow in a competitive market—are central to this conceptualization. This hypothesis suggests that firms invest overseas to enjoy factor and product market diversification and reduce profit risk (Hughes et al., 1975; Michel and Shaked, 1986; Miller and Pras, 1980).

The seminal work by Krugman (1991) led to a burgeoning theory of FDI under the heading of *new economic geography* (NEG). As this theory suggests, certain regions or countries possess "first-nature" advantages in the form of characteristics such as a large endowment of natural resources or better transportation facilities (i.e., rivers or harbors). These factors often lead to increasing returns to scale (e.g., Fujita and Krugman, 2004; Fujita and Thisse, 2002; Neary, 2001), and, as a result, large concentrations (agglomerations) of economic activity occur (Schmutzler, 1999).[11] The first ingredient in NEG theory is cost. It is argued that spatial interactions are costly; that is, trade in goods incurs costs of shipping and time in transit that, in turn, depend on the distance shipped, transport infrastructure, and geography. The form of communication and coordination also affect costs, meaning that workers may be less effective if they are not in close proximity with coworkers. In addition, the mobility of factors of production can be impeded by distance and geography. Hence, the NEG approach explains how the mobility of different goods and factors between locations leads to FDI concentration in specific locations (Duranton and Puga, 2004).

The second ingredient comprises the clustering forces that drive concentration in economic activity. Clustering may arise in dense labor markets, allowing firms to easily match the skills they require with the least cost (Helsley and Strange, 1990). Another way to drive clustering is through imperfect competition models of industries, which assume that each firm in an industry has increasing returns to scale. These internal economies of scale shape firms' location choices (Starrett, 1978). The Dixit and Stiglitz (1977) and Krugman (1980) models can be used to answer questions such as where firms choose to locate and when they will cluster together. In such models, firms produce a distinct variety of products in a single location and export them to others. As an empirical finding, Wang (2018) claims that industrial clustering and localization in eastern China are due to favorable regional characteristics.

[7] The Heckscher-Ohlin 2 × 2 × 2 model is an economic model that assumes two countries, two inputs, and two products in analyzing international trade. It suggests that countries export commodities that they can produce efficiently and plentifully. It basically explains how countries should trade when their inherent resources are imbalanced.

[8] Monopolistic advantage refers to product differentiation, managerial expertise, new technology or patents, scale of economies, government incentives, etc.

[9] Club goods, sometimes classified as a subtype of public goods, are goods that are excludable but nonrival, at least until the point that congestion occurs.

[10] To reduce overall production costs, MNEs (or foreign investors more generally) move certain stages of production to low-cost economies and produce products that differ from those that they produce at home (Buch et al., 2005). Moreover, vertical integration also gives control to the parent firms over their suppliers, distributors, and retailers in a way that reduces costs and raises efficiency.

[11] However, some regions developed into economic centers without having obvious natural advantages. Additional arguments can be invoked to understand this type of concentration.

3. The empirical literature

3.1. Macroeconomic (or Country-Level) determinants

Faeth (2009), reviewing all the theoretical models of MNEs (or foreign investors more generally), argues that the determinants of FDI should not be analyzed based on a single theoretical model. Instead, various theoretical models should be combined to examine FDI determinants more broadly. Early empirical investigations analyzed country-level (macro) variables to determine why some countries could attract more FDI than others. One such macro variable examined since early on is market size in terms of output (e.g., Lunn, 1980; Scaperlanda and Mauer, 1969). Many FIFs locate their plants in larger markets to supply the host economies and eventually use them as a supply base for nearby smaller markets (Krugman, 1980). Some studies have found a positive effect of market size on FDI inflows (Chakrabarti, 2001; Coughlin and Segev, 2000; Head and Mayer, 2004; Lankes and Venables, 1996; Vijayakumar et al., 2010). Mina (2007), however, found a negative impact of market size on IFDI in the Gulf Cooperation Council (GCC) countries.

Among other macroeconomic variables, inflation is expected to have a negative effect on IFDI. Specifically, high inflation could potentially reduce firms' real earnings (though the net effect on repatriated earnings may depend on exchange rate movements), whereas low inflation may be seen as an indicator of internal stability (Buckley et al., 2007). Coskun (2001), studying Turkey, and Trevino et al. (2002), looking at Latin America, found a negative relationship between the rate of inflation and FDI. However, Vijayakumar et al. (2010) found no significant effect of the inflation rate on FDI inflows in Brazil, Russia, India, and China (four of the five BRICS countries).

The theoretical literature has also identified unemployment as a potentially important influence on FDI inflows. Countries with higher unemployment rates are believed to attract FDI because it helps foreign investors find cheap labor and optimize profits (Blanchard, 2011). In line with this argument, Friedman et al. (1992), Nunnenkamp et al. (2007), and Chidlow et al. (2009), among others, found a positive relationship between a higher unemployment rate and FDI inflows. However, a negative association is not impossible for the following reasons: (1) high unemployment may be perceived by foreign investors as a sign of macroeconomic disequilibrium and instability, making the country less attractive for investment (Brozen, 1958); and (2) FDI generates employment, thus curbing unemployment. In contrast to employment, a high labor force participation rate (the ratio of persons aged 15–64 who are employed or actively searching for work to the total in that age group) is thought to indicate a higher likelihood of an adequate labor supply for production and thus a driving force for FDI inflows. Using data on South Asia, Sahoo (2012) found a positive effect of a high labor force participation rate on FDI inflows.

A higher profit tax in investors' home countries than in other countries is expected to prompt investors to move their capital to countries with lower tax rates (Egger et al., 2014; Morsink and Molle, 1991). Hence, ceteris paribus, a country is expected to induce more FDI inflows than others if it can offer a favorable tax policy to foreign investors, especially a lower tax on profits. Clegg (1998) found that a high tax rate was associated with lower FDI inflows in European countries. However, Buettner and Ruf (2007) found that the marginal effective tax rate has no predictive power over FDI's location choice.

Trade openness is seen in the empirical literature as creating a positive investment climate (e.g., Liu et al., 2001; Mina, 2007; Moosa and Cardak, 2006). In essence, trade openness is presumed to suggest a business-friendly climate attractive to FDI and is thus expected to be positively associated with FDI inflows (Boateng et al., 2015). Studies by Xing (2006) on China and Liargovas and Skandalis (2012) on 36 developing countries found a positive relationship between trade openness and FDI inflows. However, Wheeler and Mody (1992) reported evidence of large FDI inflows in Brazil and Mexico despite their low levels of trade openness.

Weak legal protection for property rights, excessive bureaucratic hurdles, and higher corruption at the country level are seen as likely to increase costs for foreign investors (Wei, 2000). Thus, a country's institutional quality is often considered an important determinant of IFDI (Acemoglu et al., 2005; Ali et al., 2010; Naudé and Krugell, 2007; Seyoum, 2011; Sharma and Bandara, 2010). Jadhav and Katti (2012) provided evidence of the substantial effect of government effectiveness, regulatory quality, control of corruption, voice and accountability, and the rule of law on FDI inflows in Brazil, Russia, India, China, and South Africa (the BRICS countries).[12] Generally, good institutions (in terms of the rule of law, low corruption, and flexible labor markets) are found to attract FDI (Busse and Hefeker, 2007; Daude and Stein, 2007; Harms and Ursprung, 2002; Ibrahim-Shwilima, 2015; Pajunen, 2008).

Some other macroeconomic determinants of FDI in the empirical literature are wage levels (Jeon and Rhee, 2008; Kang and Lee, 2007; Panigrahi and Panda, 2012), the ease of doing business (Morris and Aziz, 2011; Vogiatzoglou, 2016), trade protection in the form of tariffs (Khan and Nawaz, 2010; Kok and Acikgoz Ersoy, 2009; Nunnenkamp, 2002; Rolfe et al., 1993), natural resources (De Beule and Duanmu, 2012), preferential trade agreements (Medvedev, 2012), external debt (Gupta, 2018; Kok and Acikgoz Ersoy, 2009), interest rates (Billington, 1999; Boateng et al., 2015; Culem, 1988), and exchange rates (Aristotelous and Fountas, 1996; Froot and Stein, 1991).

3.2. Firm-level determinants

Analyzing firm-level determinants of the location choice for FDI has been popular since the 1970 s. However, in the context of limited data, most early attempts were theory-based. More recently, with the wider availability of firm-level data, several studies

[12] These five variables (government effectiveness, regulatory quality, control of corruption, voice and accountability, and rule of law) are combined using principal component analysis (PCA) to produce the World Governance Index (WGI).

have tested the theoretical underpinnings of FDI locational choice and examined various firm-specific advantages and disadvantages (such as infrastructural obstacles) as determinants of FDI. Firm size (in terms of either total assets or the number of employees) and other firm-level characteristics have been found to be important in the internationalization decisions of firms. Size is generally viewed as an indicator of scale economies and market power (Trevino and Grosse, 2002), as well as being important for both horizontal and vertical FDI (Caves, 1971; Horst, 1972). However, in their analysis of US and Swedish manufacturing firms, Blomstrom and Lipsey (1986: 7) showed that firm size mattered only in the decision to invest abroad. Once a firm decided to invest abroad, size had "no effect on the fraction of the firm's resources devoted to foreign activity."

In his pioneering work, Knickerbocker (1973) considered agglomeration an attractive local factor for firms competing in a single industry. Strong evidence of agglomeration effects on location choice has been found by Ferrer (1998) for French MNEs, Head et al. (1995) and Smith and Florida (1994) for Japanese MNEs; Braunerhjelm and Svensson (1996) for Swedish MNEs, Guimarães et al. (2000) for FDI in Portugal; and Belkhodja et al. (2017) for FDI in China. However, agglomeration effects may not be similar across regions. For instance, Disdier and Mayer (2004) examined French MNEs in European countries and found that agglomeration effects were stronger in the European Union than in Central and Eastern European (CEE) countries.

It is a reasonable presumption that foreign investors consider the state of infrastructure in a particular country, region, or sector before making any investment decision. Studies employing microdata have generally found a positive effect of good infrastructure on FDI inflows in developing countries (Cheng and Kwan, 2000; Deichmann et al., 2003; Sun et al., 2002; Urata and Kawai, 2000). Financial infrastructure is as important as physical infrastructure because foreign firms may also use financial services, including overdraft facilities, loans, or payments to their suppliers. Moreover, the growth literature has shown that good financial infrastructure can be one of the drivers of growth (Ghali, 1999; Guru and Yadav, 2019) and, thus, a good predictor of the level of future economic activity. A developed financial infrastructure has thus been found to positively affect FDI inflows (Deichmann et al., 2003).

Countries or regions that inherit good access to factors of production have an advantage in attracting FDI (Yeaple, 2003). Specifically, vertical FDI, depending on factor intensity, locates capital-intensive activities in countries with abundant skilled labor (Markusen and Maskus, 2002). In the same line of argument, firms with skilled labor are better able to attract FDI because foreign partners can expect to have access to the skills required for their production activities. Consequently, studies that analyze firm-level characteristics as FDI determinants have shown a positive link between skilled labor and IFDI (Escobar Gamboa, 2013; Pradhan, 2004; Zhao and Zhu, 1998). Access to land has also been shown to be correlated with IFDI (Tiong et al., 2021). Morisset and Neso (2002) revealed that obstacles associated with land—for example, delays related to securing land access and obtaining building permits—were some of the most important barriers to FDI inflows.

Good micro-level institutions help markets function properly and efficiently, attracting FDI (Urata and Kawai, 2000). Poor institutions, by contrast, lead to an environment of corruption and poor property rights guarantees that create additional costs for foreign investors and deter FDI inflows (Shleifer and Vishny, 1993). Firm-level analyses have found a positive effect of institutions on FDI inflows (e.g., Disdier and Mayer, 2004; Du et al., 2008). Administrative obstacles may also influence FDI inflows. In particular, the requirement of complex administrative procedures for starting a business discourages FDI inflows (Morisset and Neso, 2002).

Urata and Kawai (2000) considered low wages a supply-side factor that catalyzed Japanese MNEs in developing countries. A lower wage level is likely to increase firms' profits by giving them a cost advantage. Sethi et al. (2003) found that US MNEs benefited from low wages in Asia and were thus increasing their investment in that region. Some other firm-level determinants of FDI investigated in the empirical literature are technological intensity (Lall, 1980), capital intensity (Pugel, 1981), intangible assets (i.e., R &D intensity and advertising intensity) (Horst, 1972; Özkan-Günay, 2011; Pradhan, 2004), innovation capacity (Özkan-Günay, 2011), the return on equity (Buch et al., 2005; Tobin, 1969), export orientation (Pradhan, 2004), productivity (Demir and Su, 2016), and scale economies (Hymer, 1976).

4. Methodology

4.1. Multilevel Logit

The main objective of this investigation is, on the one hand, to establish the determinants of foreign equity participation at the firm, country, and world region levels and, on the other, to determine whether these determinants differ across world regions. We employ a multilevel (hierarchical) analysis to account for the nested structure of the dataset (firms or plants are conceived as level-1 units nested within level-2 units, country, which are themselves nested within level-3 units, world region).[13] Consistent with the empirical literature, our response variable is a dummy variable indicating whether a firm is foreign-invested (i.e., with a foreign equity share of 10% or more) or domestic. The relevant multilevel logit model (with firm characteristics at the first level, country characteristics at the second level, and global-region characteristics at the third level) is specified as follows:

$$E\left(FDI_{ijk} = 1 \setminus \beta, \gamma, \theta\right) = \varphi_{ijk} \tag{1}$$

$$Log\left[\frac{\varphi_{ijk}}{(1-\varphi_{ijk})}\right] = \alpha_0 + \beta X_{ijk} + \gamma Y_{jk} + \theta Z_k + \xi_k + \nu_{jk} + \varepsilon_{ijk} \tag{2}$$

[13] The use of a single-level model, by contrast, would lead to overestimation of firm-level variables and incorrect standard errors for country-level and regional-level (group) variables because they depend on the number of countries or regions (Goldstein, 1995).

where FDI_{ijk} indicates whether firm i in country j and region k is domestic or foreign-invested. It takes a value of 1 if a firm is foreign-invested and 0 otherwise (domestic). X_{ijk} represents firm-level (first-level) variables, Y_{jk} represents country-level (second-level) variables, and Z_k represents global region-level (third-level) variables. ξ_k, ν_{jk} and ε_{ijk} are third-, second-, and first-level residuals, respectively, and all of them are assumed to have a zero mean and constant variance (i.e., $\xi_k \sim N(0, \sigma_\xi^2)$, $\nu_{jk} \sim N(0, \sigma_\upsilon^2)$, and $\varepsilon_{ijk} \sim N(0, \sigma_\varepsilon^2)$). We also assume that the residuals at all levels are uncorrelated.

Information on some explanatory variables in Eq. (2) is based on firm perceptions. A likely problem with this kind of information is that different firms—in terms of size, productivity, ownership (domestic vs. foreign-invested), and location (country or region)—may perceive identical phenomena differently, creating a potential source of endogeneity (Kinda, 2010). The quality of physical infrastructure and financial obstacles faced by firms are two examples of variables that different firms might perceive differently (small vs. large, domestic vs. foreign-invested, low productivity vs. high productivity). In particular, larger or highly productive firms may be more likely to complain about physical infrastructure, whereas smaller or low-productivity firms may perceive financial obstacles to be more serious (Gelb et al., 2008). We address this problem by instrumenting the endogenous (self-perceived) explanatory variables with their sector-region averages. Following Kinda (2010) and Bhupatiraju (2020), these averages can be considered exogenous by default (Aterido et al., 2007; Dollar et al., 2005). Generalized structural equation modeling (GSEM) is used in instrumenting the endogenous variables with their sector-region averages.

4.2. Data

This study uses firm-, country-, and regional-level data in the analysis. Firm-level data are taken from the World Bank's Enterprise Survey database. Data on 134 countries from 2006 to 2019 are compiled to produce the aggregate dataset. Based on the availability of firm-level data, we use single-year data on 67 countries and two years of data for the remaining 67 countries (see Appendix Table A1). The initial data on 67 countries for which we have used two years of data were originally panel. The panel observations were removed from the latest year using panel identification so that the same firm was not repeated in the two years. We have divided these 134 countries into eight regions based on geographic proximity and similarity in economic characteristics. The regions are (1) Central Asia (CA), (2) East Asia and Oceania (EAO), (3) Eastern Europe (EE), (4) Latin America and the Caribbean (LAC), (5) Middle East and North Africa (MENA), (6) South Asia (SA), (7) sub-Saharan Africa East (SSE), and (8) sub-Saharan Africa West (SSW).[14] After omitting missing observations, the final dataset totals 101,657 firms, of which 91,443 are domestic, and 10,214 are FIFs. Among the FIFs, about 32% indicated foreign ownership of 10–50%, and the remaining 68% indicated foreign ownership of 51–100%.

The Enterprise Survey dataset contains numerical estimates for a large number of variables, such as firms' total sales, number of employees, wages, fixed assets, capital, raw materials, foreign ownership, age, exports and imports, and ordinal (perception-based) data regarding the different kinds of obstacles faced by firms. The ordinal micro-level explanatory variables used in the analysis are firms' different structural characteristics and the obstacles they face. The definitions of the explanatory variables are given in Appendix Table A2. To avoid multicollinearity problems and reduce the number of correlated variables, we use principal component analysis (PCA) to construct some variables.

The number of sectors used for the sectoral classification of firms in the data differs from country to country. More than 25 sectors are identified across countries. In the analysis, we reclassify sectors to reduce their number so that all sectors in any given country will have a sufficient number of firms to make statistical analysis feasible. More specifically, as in Bhupatiraju (2020), we reduced the sectors to the following nine: (1) food; (2) textiles, garments, and leather; (3) metals, machinery, and instruments; (4) petroleum and chemicals; (5) wood and furniture, paper and printing, nonmetallic products, and electronics; (6) other manufacturing; (7) retail and wholesale; (8) hotel and restaurants, and other services; and (9) construction and transportation (for a sectoral distribution of firms, see Appendix Table A4).

We created a variable called *FDI Agglomeration* that indicates the number of FIFs in a given sector in a given within-country region. It captures the density of the existing FIF network in any given region of a country. Including this variable in the regression enables us to control for the direct effect that the (subnational) regional investment climate might have on FDI. Another constructed variable is *average wage*—a sector-region average of wages within a country.[15] This variable is included in the analysis to see how the wage level might affect foreign investors' decisions.

For explaining country-level differentials, we use the following macroeconomic variables in the analysis: *GDP per capita* (in thousands of US dollars); *tax rate,* which is used as a percentage of commercial profit; *inflation rate* (measured as the growth rate of the GDP deflator); *trade relative to GDP* (TRGDP); *KAOPEN,* a measure of the *de jure* level of financial openness developed by Chinn and Ito (2008), which measures the extent and intensity of capital controls; *labor participation,* which is the proportion of the working-age population that is economically active; and *unemployment*. Appendix Table A2 describes these variables.

Except for KAOPEN, these country-level variables are obtained from the World Bank's *World Development Indicators*. The data for KAOPEN come from the Chinn and Ito database. Another macro variable is the *World Governance Index* (WGI), an index constructed

[14] The three-level logit framework could not estimate the model when we treated sub-Saharan Africa as a single region. One likely reason is that this region has 40 countries and around 26,000 observations, which is significantly higher than any other single region. Thus, we divide this region into two parts: East sub-Sahara and West sub-Sahara, consisting of 20 countries each. The estimation results also confirm differences between the two sub-Saharan regions in terms of the sign, significance, and magnitude of the coefficients.

[15] To calculate average wages, the (within-country) sector-region average of wages per employee is calculated first. Then, this sector-region average is converted to US dollars (thousands US dollars) using the average exchange rate of the relevant country in the survey year to express it in a common currency.

Table 1
Descriptive statistics of variables.

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
FDI	101,657	0.1	0.3	0	1
Age	101,657	24.92	15.67	1	220
Agglomeration	101,657	9.24	16.12	0	142
Telecom. problem	101,657	0.51	0.5	0	1
Electricity problem	101,657	1.64	1.48	0	4
Transportation problem	101,657	1.21	1.25	0	5
Financial problem	101,657	1.45	1.31	0	4
Crime and disorder	101,657	1.09	1.24	0	4
Corruption	101,657	1.6	1.47	0	4
Property rights	101,657	2.29	1.08	0	4
Skilled labor problem	101,657	1.31	1.27	0	4
Land problem	101,657	0.95	1.25	0	4
Labor regulation	101,657	1.02	1.14	0	4
Licensing and permit	101,657	1.03	1.19	0	4
Custom and trade	101,657	0.91	1.19	0	4
Tax administration	101,657	1.34	1.27	0	4
Number of workers	101,657	107.27	485.42	0	45,000
Average wage	101,657	8.86	30.27	0	396.60
KAOPEN	134	0.035	1.21	-2	2
GDPPC	134	5.973	5.785	0.275	36.309
Inflation	134	5.476	7.041	-26.7	52.989
Labour participation	134	65.763	10.209	38.515	89.654
Profit tax	134	17.301	8.004	0	58.90
Unemployment rate	134	7.285	5.596	0.398	35.15
Openness	134	-4.724	12.741	-139.365	32.311
WGI	134	0.059	1.997	-5.636	5.245
IRTRGDP	46	9.12	10.17	0.90	66.23

Note: Average wage is in thousand US dollars.

from five variables related to institutional quality. This index is used in the analysis to account for institutional quality. The data on these five variables are taken from the website of the World Bank's World Governance Indicators (for details, see Section 4.3). One regional-level variable, intraregional trade relative to GDP, is included in the analysis (for the definition, see Appendix Table A2).[16] The argument is that a high volume of intraregional trade expands the market for the goods and services that foreign-invested firms produce in a region. Thus, regions with higher intraregional trade volume can attract more FDI than other regions. Table 1 presents the descriptive statistics of all main variables (firm, country, and regional level) used in the analysis.

4.3. Principal component analysis

Some variables in the dataset include more than one dimension. For example, firms face two types of physical obstacles: transportation problems and electricity problems. Similarly, three variables comprise institutional obstacles (i.e., corruption, crime, theft and disorder, and property rights). The simultaneous inclusion of all these sub-variables directly in the regression model could produce serious multicollinearity problems. The PCA approach is one way to produce aggregate indexes without this multicollinearity. PCA is typically a method for transforming a multidimensional space into the minimum number of dimensions while preserving the maximum variance in the original spaces (Ait-Izem et al., 2018). Thus, PCA can be defined as a linear transformation of the original correlated data into a new set of uncorrelated aggregate indices.

If x is an m-component random vector with a mean vector $E(x) = \mu$ and covariance matrix $E(x-\mu)(x-\mu)' = \Gamma$, the variance of a linear combination $\delta' x$ is

$$E[\delta' x - E(\delta' x)]^2 = E[\delta'(x-\mu)]^2 = E\delta'(x-\mu)(x-\mu)'\delta = \delta'\Gamma\delta \tag{3}$$

The linear combination that is normalized by $\delta'\delta = 1$ and has maximum variance is called the first principal component of x. The second principal component is the linear combination that is uncorrelated with the first one, normalized similarly, and has the maximum variance. Similarly, other $p-2$ components are defined accordingly.

In this paper, we obtain five index variables for micro data and one index variable for macro data. Appendix Tables A5 and A6 list the principal components (and related eigenvalues and percentage of variations explained) for micro and macro indices, respectively. The first component in each specification of PCA explains a significant share of the total variation (last row of Appendix Tables A5 and A6). Hence, we produce one index (component) from each PCA specification.[17]

[16] Three regional variables were originally included in the regression, but the other two were not significant across equation specifications.

[17] According to the eigenvalue rule, one should produce as many indices as the number of components for which eigenvalues are greater than 1. This ensures that a significant share of the total variation is explained by that number of indices. In our case, the eigenvalues are greater than 1 only for the first component in each PCA specification. Thus, we proceed with producing one index from each specification.

The first index variable is *physical infrastructure*, derived from two variables: electricity problems and problems in the transportation of goods, supplies, and inputs. These initial variables are categorical, with five possible values: no major obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle. The second index variable is *infrastructure* (as an indicator of the perceived overall quality of infrastructure), constructed from four variables: the two variables used in constructing physical infrastructure, telecommunications problems (proxied by whether firms have their own website—a binary variable with a value of 1 or 0); and financial constraints (proxied by obstacles in accessing finance, which is also a categorical variable with the same five values, from no major obstacle to very severe obstacle).[18]

The third index variable is *institutions* (an indication of overall institutional quality), which accounts for the institutional obstacles that firms face. Three variables are used in constructing this index: corruption; crime, theft, and disorder; and protection of property rights (i.e., whether the court system is fair, impartial, and uncorrupted). These three variables are also categorical. The first two have five possible values, from no obstacle to a very severe obstacle. The third (property rights) has only four possible values: strongly disagree, tend to disagree, tend to agree, and strongly agree.

The fourth index variable is *factor*, which accounts for problems associated with accessing factors of production. Two variables, skilled labor problems (i.e., an inadequately educated workforce) and land access problems, are used to construct this index. These two variables are also categorical and have five possible values, from no obstacles to very severe obstacles.

The last index variable is *admin*, which accounts for the administrative obstacles that firms face. Four variables are used to construct this index: labor regulation obstacles; business licensing and permit obstacles; customs and trade regulation obstacles; and tax administration obstacles. They are all categorical variables, with five potential values, from none to very severe.

The macroeconomic index variable is the *World Governance Index* (WGI), constructed with six variables (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption). Appendix Table A3 defines these variables.

5. Results

First, we estimate a null (or empty) model, specified as $FDI_{ijk} = \alpha_0 + \xi_k + \nu_{jk} + \varepsilon_{ijk}$, where α_0 is a constant, and ξ_k, ν_{jk}, and ε_{ijk} are regional-, country-, and firm-level random effects, respectively. The model can tell us how much regional- and country-level characteristics and firm-level idiosyncrasies separately affect inward FDI across countries and regions. The estimates of interest are the random (unobserved) parts of our model. The parameters σ_ξ^2 and σ_ν^2 are the variances of ξ_k and ν_{jk}, which are the regional- and country-level random intercepts, respectively. The log-restricted likelihood ratio (LR) test statistic is used to test H_0: random-effects $= 0$ (i.e., population variance $\sigma_\xi^2 = 0$ and $\sigma_\nu^2 = 0$) against H_1: random-effects > 0 (i.e., population variance $\sigma_\xi^2 > 0$ and $\sigma_\nu^2 > 0$). We estimate nine different regressions for this null model: one for the aggregate dataset and the other eight for the eight world regions separately. The results are reported in Table 2 and show that the LR test statistics are significant at the 1% level in all specifications, indicating the presence of significant regional and country contexts in explaining IFDI.

The intraclass correlation coefficients (ICC), the correlation of observations within groups (regions and countries), explain how much the country and regional contexts explain firm-level foreign equity participation.[19] In our model, the values of ICC (ρ_c and ρ_r in Table 2) show the degree to which FDI decisions can be attributed to country- and regional-level unobserved characteristics. In the aggregate data model (column 1), the values of ρ_c and ρ_r are 0.158 and 0.174, respectively, and are significant. These values imply that country- and regional-level characteristics explain 15.8% and 17.4% of IFDI, respectively. Although these values are relatively small, they are significant at the 1% level, implying large contextual differences between countries and regions that receive FDI. Among regions, the highest value of ρ_c is 0.234 (for SSW), and the smallest value is 0.068 (for EU). Therefore, the presumption that differences in country-level and region-level factors help explain FDI inflows is validated.

5.1. Firm-level analysis

In Table 3, firm-level explanatory variables are introduced.[20] The model is estimated for the aggregate data and the eight regions separately. Moreover, for the aggregate data and each world region, the model is estimated with two different specifications: the first with infrastructure as a single variable (for the definition of infrastructure, see Section 4.3) and the second with communication infrastructure, physical infrastructure, and financial infrastructure included separately. These two specifications show the extent to

[18] There are two other variables in the dataset representing telecommunication problems faced by firms: whether firms currently communicate with clients and suppliers by email and telecommunications obstacles to firm operations. The Enterprise Survey stopped collecting data on the first variable after 2017. Because we use data beyond 2017 for nearly 50 countries, we exclude this variable from the analysis. The second variable is excluded because of missing data for almost half the observations in the aggregate dataset.

[19] The ICC at the regional level is given by $\text{ICC} = (\sigma_\xi^2)/(\sigma_\xi^2 + \sigma_\nu^2 + \sigma_\varepsilon^2)$ and country level by $\text{ICC} = (\sigma_\nu^2 + \sigma_\xi^2)/(\sigma_\xi^2 + \sigma_\nu^2 + \sigma_\varepsilon^2)$, where σ_ε^2 is the variance of ε_{ijk}, and σ_ξ^2 and σ_ν^2 are variances of ξ_k and ν_{jk}, respectively.

[20] Some other firm-level variables—for instance, capital intensity (K/L), R&D expenses, and the number of skilled/unskilled workers—may also be important in determining the receipt of foreign investment by domestic firms. However, we could not include them in the model due to data constraints. In particular, the World Bank enterprise surveys do not collect data on R&D expenses, and more than 70% of the data are missing on firms' capital stock (book value of machinery, vehicles, equipment, buildings, and land) and the types of workers (skilled and unskilled).

Table 2
Estimation of the null model.

	All	CA	EAO	EE	LAC	MENA	SA	SSE	SSW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	-1.999 * **	-2.992 * **	-1.444 * **	-1.786 * **	-2.302 * **	-3.857 * **	-3.422 * **	-1.176 * **	-2.126 * **
	(0.082)	(0.331)	(0.261)	(0.360)	(0.108)	(0.755)	(0.241)	(0.243)	(0.610)
LR Chi2	6041.69 * **	109.71 * **	349.88 * **	229.58 * **	35.33 * **	278.09 * **	210 * **	376.58 * **	219.30 * **
ρ_c	0.158 * **	0.106 * **	0.165 * **	0.068 * **	0.016 * **	0.129 * **	0.101 * **	0.110 * **	0.234 * **
ρ_r	0.174 * **								
Observations	101,657	10,073	11,974	15,590	18,553	9619	13,310	11,491	11,047
No. of countries	134	8	18	22	31	9	6	20	20

Note: Note: * **p < 0.01, * *p < 0.05, *p < 0.1. Standard errors are in parentheses. All regressions include sector and year dummies.

which infrastructural obstacles as a whole and individual infrastructural obstacles affect IFDI. To eliminate the endogeneity issue for the different measures of infrastructure, as discussed in Section 4.1, they are instrumented with their (within-country) sector-region averages (as in Dollar et al. (2005) and Lall and Mengistae (2005)).[21] We use a GSEM with a logit framework to estimate the model. To address the potential multicollinearity issue, correlations between explanatory variables are reported in Appendix Table A7, which shows no notably high correlation.

Across specifications, the coefficient for the log of age is negative and significant (except for SA), and the coefficients for size and FDI agglomeration are positive and significant. The negative coefficients for the log of age imply that FIFs are generally younger firms (SA being the exception). The positive coefficients for size (medium and large) mean that FIFs are more likely to be larger than the country and sector averages. This is an expected result because MNEs tend to be large firms with vast assets, and foreign investors, more broadly, prefer to invest in large firms (Kumar, 1982). FDI agglomeration has a positive impact on IFDI, meaning that the presence of other FIFs in the same sector in a given region of a country attracts further foreign investment (Belkhodja et al., 2017; Ferrer, 1998; Guimarães et al., 2000; Head et al., 1995). The coefficients for infrastructure are negative and significant (except for CA), implying that infrastructure-related obstacles, broadly defined, discourage IFDI. This result is in line with previous literature (Bhupatiraju, 2020; Kinda, 2010).

Communication and financial infrastructure challenges (in the second specification of the aggregate data model and across regions) appear to deter IFDI. The coefficient for physical infrastructure is positive and significant in the aggregate data model, EE, and LAC and negative and significant in SA. A positive (and significant) coefficient for physical infrastructure suggests that, in those regions, foreign investors invest more heavily in firms that are more likely to face infrastructural challenges in electricity and transportation (or the most profitable opportunities are in regions where infrastructure challenges remain). By contrast, the negative coefficient for SA suggests that poor infrastructure discourages foreign investment. Given that EE and LAC are regions dominated by upper-middle-income countries, it may well be that foreign investors' main choice in these regions is between very good physical infrastructure and mediocre (but not necessarily bad) physical infrastructure. By contrast, in SA, a low-income region, foreign investors may be resigned to modest-to-low quality in terms of physical infrastructure but draw the line at very poor infrastructure. Kinda (2010) and Bhupatiraju (2020) also found a positive relationship between physical infrastructural challenges and IFDI. They argue that the return on investment in countries with weak infrastructure—an indicator of a lower level of development—is higher, and that attracts foreign investors.[22] However, the difference in the coefficients between middle-income and low-income regions suggests that perhaps it is less about the level of development and more about significant unexploited opportunities in countries (and within-country regions) that may have previously fared poorly in comparison to better-endowed neighbors. Another potential explanation is that governments are willing to offer additional incentives and concessions to firms to encourage them to locate in areas with inferior infrastructure, but these incentives are most effective when the deficiency is minor to moderate (as might be the case in upper-middle-income regions) but less so when the deficiency is substantial (as might be the case in a low-income region).

The coefficient for institutional infrastructure is negative and significant (in both specifications) for CA, EE, and LAC, implying that problematic institutional settings (crime, corruption, and limited protection of property rights) discourage IFDI. However, given that these are upper-middle-income regions that typically have only modest levels of corruption and moderate-to-excellent property rights protection, the negative coefficient likely indicates that countries (or within-country regions) that cannot provide these protections stand out and attract less FDI. By contrast, the absence of a significant coefficient for institutional infrastructure in other regions may be an indication that, because institutional challenges are more pervasive, a poor record in a particular country (or within-country region) might prove to be much less of a deterrent to foreign investment.

[21] Dollar et al. (2005) and Lall and Mengistae (2005) argue that sector-region averages of these endogenous variables are partly exogenous because they represent an investment climate that is, on average, valid for all firms in the particular sector in a given region. Kinda (2010), Bhupatiraju (2020), and Aterido et al. (2007) used this method of instrumenting.

[22] Countries with physical infrastructure challenges may have less bargaining power, and markets in those countries are likely to be less developed and less competitive. Thus, MNEs or foreign investors in those countries may have significant control over prices as well as access to other avenues for obtaining rents.

Table 3
Firm-level data with instrumental variable (IV) approach.

	All		CA		EAO		EE		LAC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(age)	-0.308***	-0.348***	-0.351***	-0.405***	-0.451***	-0.469***	-0.566***	-0.577***	-0.43***	-0.476***
	(0.022)	(0.022)	(0.077)	(0.079)	(0.073)	(0.074)	(0.054)	(0.054)	(0.049)	(0.049)
Medium	0.834***	0.697***	0.856***	0.73***	0.634***	0.582***	0.986***	0.947***	0.816***	0.672***
	(0.03)	(0.031)	(0.118)	(0.12)	(0.091)	(0.092)	(0.079)	(0.079)	(0.071)	(0.073)
Large	1.94***	1.695***	1.644***	1.418***	1.928***	1.77***	2.258***	2.202***	2.044***	1.8***
	(0.032)	(0.034)	(0.13)	(0.133)	(0.092)	(0.096)	(0.081)	(0.083)	(0.073)	(0.076)
FDI Agglom	0.018***	0.018***	0.093***	0.089***	0.014***	0.014***	0.075***	0.075***	0.029***	0.028***
	(0.001)	(0.001)	(0.01)	(0.01)	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)
Infrastructure	-0.136***		-0.053		-0.192***		-0.057*		-0.06**	
	(0.012)		(0.048)		(0.038)		(0.03)		(0.024)	
Communication		-0.623***		-0.835***		-0.382***		-0.139*		-0.597***
		(0.027)		(0.111)		(0.069)		(0.074)		(0.065)
Physical		0.036***		0.063		0.002		0.072**		0.063***
		(0.012)		(0.049)		(0.038)		(0.03)		(0.023)
Financial		-0.199***		-0.084**		-0.264***		-0.192***		-0.157***
		(0.011)		(0.042)		(0.036)		(0.028)		(0.023)
Institution	-0.081***	-0.085***	-0.153**	-0.165***	-0.007	-0.008	-0.22***	-0.211***	-0.157***	-0.152***
	(0.014)	(0.014)	(0.061)	(0.061)	(0.044)	(0.044)	(0.039)	(0.039)	(0.028)	(0.028)
Factor	-0.016	-0.009	-0.014	-0.032	0.072*	0.078*	-0.072**	-0.06*	-0.087***	-0.084***
	(0.013)	(0.013)	(0.051)	(0.052)	(0.043)	(0.043)	(0.034)	(0.034)	(0.029)	(0.029)
Admin	0.151***	0.136***	0.208***	0.189***	0.183***	0.174***	0.102***	0.105***	0.176***	0.163***
	(0.011)	(0.011)	(0.051)	(0.051)	(0.035)	(0.036)	(0.029)	(0.029)	(0.024)	(0.024)
Ln(Av. Wage)	0.065***	0.058***	0.187***	0.178***	0.093***	0.095***	0.031	0.033	-0.002	-0.007
	(0.011)	(0.015)	(0.061)	(0.064)	(0.028)	(0.028)	(0.032)	(0.031)	(0.034)	(0.035)
Constant	-2.924***	-2.488***	-2.676***	-3.342***	-0.872**	-0.927**	-1.082**	-0.991*	-2.9***	-2.064***
	(0.296)	(0.322)	(0.416)	(0.649)	(0.35)	(0.407)	(0.432)	(0.509)	(0.226)	(0.378)
LR Chi^2	4338***	4620***	95.5***	100.1***	202.2***	189.9***	150.6***	137.1***	25.5***	26.4***
ρ_c	0.144***	0.147***	0.132***	0.145***	0.160***	0.144***	0.045***	0.044***	0.012***	0.015***
ρ_r	0.139***	0.151***								
Observations	101,657		10,073		11,974		15,590		18,553	
No. of countries	134		8		18		22		31	

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Ln(age)	-0.408***	-0.466***	-0.202	-0.227	-0.072	-0.129**	0.221***	0.164**
	(0.072)	(0.073)	(0.156)	(0.157)	(0.051)	(0.052)	(0.069)	(0.07)
Medium	0.595***	0.488***	0.953***	0.627**	0.804***	0.627***	0.788***	0.601***
	(0.119)	(0.12)	(0.259)	(0.266)	(0.065)	(0.067)	(0.07)	(0.073)
Large	1.707***	1.498***	1.921***	1.357***	1.631***	1.31***	1.723***	1.353***
	(0.12)	(0.123)	(0.256)	(0.269)	(0.078)	(0.082)	(0.091)	(0.096)
FDI Agglom	0.117***	0.115***	0.203***	0.178***	0.007***	0.006***	0.025***	0.026***
	(0.009)	(0.009)	(0.024)	(0.023)	(0.002)	(0.002)	(0.003)	(0.003)
Infrastructure	-0.107**		-0.386***		-0.202***		-0.202***	
	(0.047)		(0.09)		(0.028)		(0.031)	
Communication		-0.768***		-1.351***		-0.739***		-0.848***
		(0.1)		(0.201)		(0.061)		(0.07)
Physical		-0.013		-0.224**		0.019		0.037
		(0.048)		(0.09)		(0.03)		(0.034)
Financial		-0.105**		-0.142*		-0.214***		-0.233***
		(0.042)		(0.078)		(0.023)		(0.027)
Institution	-0.031	-0.044	-0.097	-0.169*	-0.044	-0.053	0.016	0.005
	(0.052)	(0.052)	(0.099)	(0.099)	(0.03)	(0.039)	(0.034)	(0.034)
Factor	-0.023	-0.002	-0.047	-0.054	-0.061**	-0.056*	0.052	0.068*
	(0.052)	(0.052)	(0.089)	(0.09)	(0.03)	(0.031)	(0.034)	(0.035)
Admin	0.126***	0.113***	0.27***	0.253***	0.173***	0.153***	0.12***	0.095***
	(0.04)	(0.04)	(0.071)	(0.071)	(0.026)	(0.026)	(0.028)	(0.028)
Ln(Av. Wage)	-0.004	-0.001	0.059	0.0798	0.026	0.006	0.048**	0.029
	(0.056)	(0.057)	(0.073)	(0.077)	(0.029)	(0.029)	(0.022)	(0.023)
Constant	-3.055***	-2.21***	-4.225***	-3.54***	-1.849***	-0.859**	-4.259***	-3.168***
	(0.693)	(0.847)	(0.638)	(0.881)	(0.305)	(0.422)	(0.62)	(0.61)
LR Chi^2	117.7***	124.4***	32.2***	40.7***	161.4***	196.9***	124.3***	112.3***
ρ_c	0.094***	0.100***	0.080***	0.080***	0.095***	0.112***	0.191***	0.163***
ρ_r								
Observations	9,619		13,310		11,491		11,047	
No. of countries	9		6		20		20	

Note: ***, **, * indicate $p < 0.01$, $p < 0.05$, $p < 0.1$ respectively. Standard errors are in parentheses. All regressions include sector and year dummies. Models are estimated using the GSEM framework.

The coefficient for factor is not significant in the aggregate data model. However, that coefficient is negative and significant in EAO, EE, LAC, and SSE, indicating its importance in those regions. In particular, a negative and significant coefficient indicates that problems related to factors of production (i.e., constrained access to skilled labor and/or land) discourage IFDI. However, the coefficient for that variable is positive and significant for SSW (although only weakly significant in the second specification), implying that a lack of access to production factors encourages IFDI. This result may be more incidental than real. Since FDI in that region is known to be directed mostly at resource exploitation, access to production factors may simply be negatively correlated with the amount of resource wealth available for exploitation.[23]

Administrative obstacles are positively associated with IFDI in all regions and the aggregate data model. At first blush, this is counterintuitive. However, it may indicate that seeking foreign affiliation (through full or partial ownership) may be one of the strategies domestic firms use to overcome these challenges. It may well be that FIFs (in the context of government policies specifically aimed at improving their business environment) have more leverage in overcoming these obstacles. The coefficient for (the log of) average wages is positive and significant in the aggregate data model, CA, EAO, and the first specification of SSW. A positive and significant coefficient implies higher wages in the sectors with FIFs or higher wages offered by FIFs. To a certain extent, particularly in the developing country context, a higher average wage may be more of an effect than a cause of foreign investment. Even when foreign investors invest in a particular firm within a sector or a within-country region in order to exploit cheap labor, they may, in fact, still find it prudent to offer a higher wage than the (within-country) region or sector average in order to retain workers, protect privileged technology, and induce higher productivity (for the same regression results without the IV approach, see Appendix Table A8).[24]

The intraclass correlation coefficients (ICC) at the country and region levels (ρ_c and ρ_r) are 0.144 and 0.139, respectively, in the first specification and 0.147 and 0.151, respectively, in the second specification (both are significant at the 1% level)—implying that country- and regional-level contexts, although small, have non-negligible effects on IFDI. This further confirms that the multilevel model provides a more comprehensive explanation of foreign investment choices than the firm-level (or single-level) model.

5.2. Firm-, country-, and regional-level analysis

We now introduce macro-level variables (country and regional variables) into the analysis to account for country-level effects and regional contexts, along with firm-level variables, in explaining IFDI. The endogenous firm-level variables are instrumented with their within-country sector-region averages as before. The results reported in Table 4 show that the effects of firm-level variables are the same as in Table 3, except for average wages. Results for (the log of) average wages indicate additional significant coefficients in the second specifications for MENA and SSW. (For results with only firm- and country-level variables, see Appendix Table A9).

With regard to macro variables, the coefficient for KAOPEN (capital account openness) is significant in the aggregate data model, where it has a negative coefficient. It is similarly negative and significant for three of the middle-income regions (EE, LAC, and MENA), insignificant for CA, SSE, and SSW, weakly significant (but positive) in one of the two equations for EAO, and strongly significant, positive, and large for SA. These results suggest that, more typically, open capital accounts discourage, rather than encourage, IFDI in the developing country context. This is not altogether surprising. Open capital accounts are more important for portfolio investment than FDI because countries with closed capital accounts typically make provisions for accommodating FDI.[25] However, an open capital account brings an increased risk of financial crises that may discourage FDI. It is also not surprising that this question is relevant mostly to middle-income regions because open capital accounts are more common in those regions. The positive association with FDI for SA, a region where the capital account is mostly moderately open, can be explained by government efforts in the form of incentive programs for foreign investors, such as tax holidays, subsidies, and improved infrastructural facilities, to attract FDI.[26]

GDP per capita seems to have a negative association with IFDI. That is true of both specifications for CA, MENA, and SA estimates. A negative coefficient for per capita GDP suggests that when foreign investors decide to invest, they prefer lower-income countries in those regions. Of course, this belies the broad evidence from the global distribution of FDI implied in Figure 1, which indicates that low-income countries receive very little FDI relative to middle- and high-income countries. A potential explanation of this puzzle is that investors choose the lower-income country if it offers advantages (in terms of profile and policy) similar to those of other, richer countries in that region because it can bring them higher bargaining power

[23] This region contains several countries that are known to be rich in resources but weak in human capital. These include: the Central African Republic, the Democratic Republic of the Congo, Guinea, Liberia, and Sierra Leone.

[24] There are no significant differences in results between Table 3 and Appendix Table A8 (i.e., results when we use the IV approach vs. when we do not use the IV approach). This may be due to the large size of the dataset. However, we report the endogeneity-corrected results in Table 3 to ensure that there is no question about the validity of the methodology.

[25] China is a perfect example of that archetype.

[26] The fact that this effect does not apply to East Asia may be a consequence of the fact that, in the post–Asian financial crisis era, these countries have taken precautions to reduce perceived risk through a combination of reduced capital account openness and increased reserve coverage.

and, potentially, higher profits in the context of lower wages. However, lower income is unlikely to trump an inferior profile more broadly.

Overall, inflation hurts IFDI. In other words, higher inflation discourages IFDI. Coskun (2001) and Trevino et al. (2002) found similar results. However, it is unimportant for EAO, LAC, and SA. Labor participation does not have a significant impact on IFDI in the aggregate data model. A similar result was found by ElShazly (2020) for developing countries. However, it has a negative impact in MENA and a positive impact in SSW—regions where the labor force participation rate is, respectively, lower and higher than the global average. A negative relationship is indicated between the rate of taxation on profits and IFDI in the aggregate data model. However, that effect seems relevant to MENA and SSE and not to other regions. The relationship is, in fact, positive in SA (which is likely due to the impact of India, which is the most attractive country for FDI because of its size but is one of the countries in that region with a higher tax rate on corporate profits).

The rate of unemployment does not have a significant impact on IFDI in the aggregate data model. However, it has a strong negative impact in the LAC and MENA regions and a weakly negative impact in EE and SSW. This result suggests that, in those regions, countries with lower unemployment rates are more likely to attract FDI or, alternatively, IFDI has helped reduce unemployment. The trade-to-GDP ratio (TRGDP) positively impacts IFDI in the aggregate data model, but that result is not confirmed in any region-level equation. A positive coefficient suggests that countries with a higher ratio of trade to GDP attract more FDI. This result is similar to the findings by Sahoo (2012) for South Asia and Liargovas and Skandalis (2012) for 36 developing countries.

The WGI has a positive effect on IFDI overall, according to the aggregate data model. The implication is that good institutional quality attracts FDI. That result is replicated more specifically for the CA, MENA, and SSE regions. When the WGI is interacted with firms' size (medium and large), the aggregate data model suggests that a high WGI is associated with investment in large firms, but that result is not uniform across regions. A high WGI is associated with a preference for investment in small firms (rather than medium-size and large firms) in SSE and small and medium-sized firms rather than large firms in EAO and SA. It is associated with a preference for investment in large firms in EE and medium-size firms in SSW.

To take the regional context into account, we initially considered three variables: the density of regional economic integration agreements (the average number of regional integration agreements to which each country in the region is a signatory), the average degree of economic integration among countries,[27] and the level of intraregional trade relative to the regions' GDP (IRTRGDP). The first two variables were dropped because of their insignificant coefficients in the estimated results. However, the result of IRTRGDP is positive and significant in the aggregate data model, implying an overall positive impact of intraregional trade on IFDI, but that result is not uniform across regions. The relative volume of intraregional trade is negatively related to foreign participation in CA, a region where FDI is concentrated in resource extraction industries for which intraregional trade offers few direct advantages. However, the coefficient is positive and significant for LAC and SA, which are regions that do not necessarily have particularly high levels of intraregional trade. Intraregional trade is most important for FIFs interested in producing for the regional market, and both regions have large regional markets and substantial productive capacity in certain countries—attributes that enhance the value of intraregional trade. The positive coefficients suggest that much can be gained in those regions (in terms of attracting FDI) by continuing to expand intraregional trade.

The ICC values are smaller than in the previous estimates—implying that country- and regional-level variables in the model explain some of the unobserved variations in IFDI from the previous results (Tables 2 and 3).

5.3. Firm-, country-, and regional-level analysis with majority-owned FIFs

In this section, we conduct a full hierarchical analysis similar to the one in Section 5.2 (three-level) on the sample of all domestic firms and FIFs with 50% or more foreign equity ownership (majority-owned FIFs). That is, we omit the FIFs with foreign equity ownership of 10–49%. The total number of FIFs (those with a foreign equity share of 10% or more) is 10,266, of which those with a foreign equity share of 10–49% are 2431, and those with a share of 50% or more are 7835. This subtraction leads to a loss of 23.7% of FIFs and 2.39% of the aggregate data. A foreign equity share of 50% or more gives foreign investors presumptive control of firm-level decision-making. Hence, we carry out this additional analysis to ascertain whether any noticeable difference emerges in comparison to Table 4 results. The estimated results are reported in Table 5, and, except for the significance levels of a few coefficients, they are very similar to the results in Table 4 (the differing results are shown in boldface). Only two changes are found in the results for firm-level variables (i.e., a significant coefficient for *ln (age)* in the first specification of SSE and a significant coefficient for *factor* in both specifications of the aggregate data model) and seven changes in the results for country-level variables (i.e., a significant coefficient

[27] The density of regional economic integration agreements is calculated by adding up the number of regional economic integration agreements (regardless of their level) to which each country is a signatory in a particular region and then averaging it over the number of countries in that region. To calculate the average degree of economic integration agreements, economic integration is assigned a value from 1 to 6 based on its level: (1) multilateral free trade area is assigned a value of 1; (2) customs union is assigned a value of 2; (3) common market is assigned a value of 3; (4) customs and monetary union is assigned a value of 4; (5) economic union is assigned a value of 5; and (6) economic and monetary union is assigned a value of 6. In the next step, each country's score is calculated by multiplying the number of economic integration agreements by the corresponding level value and then determining the total. For example, if a country belongs to three different free trade areas, two different customs unions, and two different economic unions, its score is $(3 \times 1) + (2 \times 2) + (2 \times 5) = 17$. Finally, the variable is calculated by taking the average country score of that region.

Table 4
Firm, country, and regional variables with IV approach.

	All		CA		EAO		EE		LAC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(age)	-0.311***	-0.349***	-0.369***	-0.416***	-0.453***	-0.464***	-0.577***	-0.586***	-0.427***	-0.472***
	(0.022)	(0.023)	(0.077)	(0.078)	(0.073)	(0.074)	(0.054)	(0.054)	(0.049)	(0.05)
Medium	0.835***	0.704***	0.847***	0.714***	0.645***	0.588***	0.946***	0.897***	0.885***	0.727***
	(0.03)	(0.031)	(0.125)	(0.127)	(0.091)	(0.092)	(0.127)	(0.127)	(0.089)	(0.09)
Large	1.933***	1.688***	1.62***	1.395***	1.943***	1.773***	1.949***	1.884***	2.11***	1.858***
	(0.033)	(0.034)	(0.139)	(0.142)	(0.092)	(0.096)	(0.13)	(0.131)	(0.089)	(0.091)
FDI Agglom	0.018***	0.018***	0.087***	0.081***	0.014***	0.014***	0.074***	0.075***	0.03***	0.029***
	(0.001)	(0.001)	(0.01)	(0.01)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)
Infrastructure	-0.137***		-0.056		-0.199***		-0.054*		-0.062**	
	(0.012)		(0.048)		(0.038)		(0.03)		(0.024)	
Communication		-0.635***		-0.832***		-0.383***		-0.136*		-0.614***
		(0.027)		(0.111)		(0.069)		(0.074)		(0.065)
Physical		0.036***		0.062		-0.006		0.072**		0.062***
		(0.012)		(0.049)		(0.038)		(0.03)		(0.023)
Financial		-0.197***		-0.088**		-0.258***		-0.188***		-0.158***
		(0.011)		(0.042)		(0.036)		(0.028)		(0.023)
Institution	-0.079***	-0.084***	-0.157***	-0.167***	-0.007	-0.008	-0.205***	-0.198***	-0.162***	-0.159***
	(0.014)	(0.014)	(0.06)	(0.061)	(0.044)	(0.044)	(0.039)	(0.039)	(0.028)	(0.028)
Factor	-0.018	-0.012	-0.019	-0.034	0.074*	0.076*	-0.072**	-0.06*	-0.081***	-0.078***
	(0.013)	(0.013)	(0.051)	(0.051)	(0.043)	(0.043)	(0.034)	(0.034)	(0.029)	(0.029)
Admin	0.153***	0.138***	0.212***	0.192***	0.184***	0.175***	0.101***	0.103***	0.174***	0.163***
	(0.011)	(0.011)	(0.051)	(0.051)	(0.036)	(0.036)	(0.029)	(0.029)	(0.024)	(0.024)
Ln(avwage)	0.067***	0.055***	0.227***	0.221***	0.087***	0.087***	0.044	0.045	0.030	0.028
	(0.011)	(0.011)	(0.056)	(0.056)	(0.028)	(0.028)	(0.035)	(0.036)	(0.038)	(0.038)
KAOPEN	-0.124**	-0.127**	-0.283	-0.255	0.282*	0.253	-0.185*	-0.185*	-0.13**	-0.136**
	(0.049)	(0.05)	(0.182)	(0.183)	(0.162)	(0.159)	(0.109)	(0.107)	(0.052)	(0.053)
GDPPC	-0.008**	-0.004	-0.18***	-0.184***	-0.215**	-0.21	0.041**	0.042	-0.007**	-0.008
	(0.015)	(0.015)	(0.039)	(0.039)	(0.172)	(0.168)	(0.038)	(0.038)	(0.016)	(0.017)
Inflation	-0.015***	-0.013**	-0.035**	-0.032**	-0.138*	-0.121	-0.055*	-0.049*	-0.001	-0.001
	(0.006)	(0.006)	(0.015)	(0.015)	(0.083)	(0.082)	(0.029)	(0.029)	(0.009)	(0.009)
Labor parti.	-0.012	-0.015*	0.027	0.028	-0.025	-0.024	0.004	0.003	-0.002	-0.005
	(0.008)	(0.008)	(0.022)	(0.022)	(0.027)	(0.026)	(0.018)	(0.018)	(0.01)	(0.01)
Profit tax	-0.014***	-0.011**	-0.025	-0.021	0.037	0.032	-0.042**	-0.043**	-0.002	-0.001
	(0.005)	(0.005)	(0.024)	(0.024)	(0.045)	(0.044)	(0.02)	(0.02)	(0.008)	(0.008)
Unemployment	-0.01	-0.008	-0.023	-0.027	-0.047	-0.061	-0.027*	-0.022	-0.06***	-0.069***
	(0.008)	(0.008)	(0.053)	(0.053)	(0.123)	(0.121)	(0.014)	(0.014)	(0.018)	(0.019)
TRGDP	4.834***	5.283***	26.723	48.344	3.034	3.133	-3.693	-8.337	-0.439	1.219
	(1.255)	(1.263)	(57.592)	(57.316)	(2.538)	(2.482)	(21.634)	(21.994)	(2.080)	(2.049)
WGI	0.124***	0.098**	0.266**	0.231**	0.527	0.5	-0.086	-0.106	0.063	0.062
	(0.04)	(0.04)	(0.114)	(0.115)	(0.341)	(0.335)	(0.174)	(0.174)	(0.055)	(0.056)
WGI*Medium	-0.021	-0.017	0.003	-0.013	-0.097	-0.097	0.014	0.02	-0.05	-0.041
	(0.013)	(0.013)	(0.074)	(0.075)	(0.072)	(0.072)	(0.045)	(0.045)	(0.041)	(0.041)
WGI*Large	0.019	0.033**	-0.053	-0.052	-0.15**	-0.138*	0.137***	0.142***	-0.04	-0.04
	(0.014)	(0.015)	(0.081)	(0.081)	(0.072)	(0.073)	(0.045)	(0.045)	(0.041)	(0.041)
IRTRGDP	0.018**	0.024***	-0.821***	-0.777***	0.118	0.112	0.024	0.024	0.076***	0.056**
	(0.007)	(0.007)	(0.241)	(0.24)	(0.086)	(0.085)	(0.037)	(0.037)	(0.024)	(0.024)
Constant	-1.668***	-0.748	0.061	0.448	-0.706	0.115	-1.123	-0.674	-2.566***	-1.413*
	(0.617)	(0.632)	(1.945)	(1.979)	(2.683)	(2.626)	(1.356)	(1.352)	(0.805)	(0.826)
LR Chi^2	3405***	3620***	501.4***	569.3***	142.8***	136.0***	40.2***	40.9***	16.2***	17.5***
ρ_c	0.139***	0.141***	0.100***	0.100***	0.129***	0.123***	0.035***	0.034***	0.016***	0.017***
ρ_r	0.143***	0.153***								
Observations	101,657		10,073		11,974		15,590		18,553	
No. of countries	134		8		18		22		31	

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Ln(age)	-0.412***	-0.474***	-0.209	-0.23	-0.059	-0.112**	0.201***	0.155**
	(0.072)	(0.074)	(0.157)	(0.158)	(0.051)	(0.052)	(0.07)	(0.07)
Medium	0.583***	0.47***	0.919***	0.585**	0.732***	0.564***	0.976***	0.761***
	(0.121)	(0.123)	(0.264)	(0.27)	(0.067)	(0.069)	(0.106)	(0.109)
Large	1.702***	1.474***	1.855***	1.251***	1.575***	1.261***	1.836***	1.412***
	(0.122)	(0.126)	(0.267)	(0.28)	(0.079)	(0.083)	(0.132)	(0.137)

(*continued on next page*)

Table 4 (*continued*)

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
FDI Agglom	0.114***	0.111***	0.181***	0.182***	0.006***	0.006***	0.026***	0.026***
	(0.009)	(0.01)	(0.025)	(0.025)	(0.002)	(0.002)	(0.003)	(0.003)
Infrastructure	-0.107**		-0.403***		-0.215***		-0.203***	
	(0.048)		(0.092)		(0.029)		(0.032)	
Communication		-0.817***		-1.352***		-0.727***		-0.851***
		(0.101)		(0.204)		(0.061)		(0.07)
Physical		-0.002		-0.201**		0.01		0.035
		(0.049)		(0.093)		(0.031)		(0.034)
Financial		-0.107**		-0.157**		-0.222***		-0.23***
		(0.043)		(0.079)		(0.023)		(0.027)
Institution	-0.041	-0.051	-0.101	-0.15	-0.041	-0.049	0.014	0.003
	(0.053)	(0.053)	(0.101)	(0.101)	(0.03)	(0.03)	(0.034)	(0.034)
Factor	-0.035	-0.018	-0.036	-0.062	-0.062**	-0.056*	0.052	0.065*
	(0.052)	(0.053)	(0.09)	(0.092)	(0.03)	(0.031)	(0.035)	(0.035)
Admin	0.123***	0.105**	0.271***	0.246***	0.176***	0.155***	0.116***	0.092***
	(0.041)	(0.041)	(0.072)	(0.073)	(0.026)	(0.026)	(0.028)	(0.028)
Ln(avwage)	-0.053	-0.066**	0.136	0.091	0.009	-0.013	0.047**	0.046**
	(0.06)	(0.06)	(0.09)	(0.091)	(0.027)	(0.028)	(0.022)	(0.022)
KAOPEN	-0.615*	-0.748**	6.939***	6.121**	-0.008	0.007	-0.173	-0.163
	(0.313)	(0.317)	(2.647)	(2.615)	(0.102)	(0.12)	(0.217)	(0.21)
GDPPC	-0.368**	-0.393**	-4.093**	-3.42*	0.002**	0.053	-0.027**	-0.011
	(0.185)	(0.188)	(1.872)	(1.846)	(0.113)	(0.134)	(0.233)	(0.218)
Inflation	0.102**	0.145***	0.063	-0.009	-0.047***	-0.048***	-0.049**	-0.04*
	(0.047)	(0.048)	(0.078)	(0.078)	(0.01)	(0.011)	(0.022)	(0.021)
Labor parti.	-0.23***	-0.29***	-0.269***	-0.192*	-0.02	-0.021	0.109***	0.1***
	(0.068)	(0.069)	(0.102)	(0.099)	(0.016)	(0.019)	(0.028)	(0.026)
Profit tax	-0.485***	-0.542***	0.01	0.047	-0.045***	-0.045***	-0.003	0
	(0.133)	(0.134)	(0.031)	(0.031)	(0.014)	(0.016)	(0.015)	(0.014)
Unemployment	-0.683***	-0.787***	0.293	0.041	-0.028	-0.04	-0.085	-0.071
	(0.195)	(0.198)	(0.235)	(0.23)	(0.024)	(0.027)	(0.054)	(0.053)
TRGDP	9.254	8.673	-14.640	-8.660	-1.310	-1.762	3.967	9.765
	(9.598)	(6.522)	(9.932)	(9.954)	(2.334)	(2.704)	(17.287)	(15.926)
WGI	2.302***	2.621***	0.772*	0.675*	0.242***	0.228**	0.227	0.185
	(0.627)	(0.638)	(0.411)	(0.409)	(0.077)	(0.088)	(0.14)	(0.131)
WGI*Medium	-0.026	-0.018	-0.152	-0.161	-0.14***	-0.138***	0.108**	0.089**
	(0.089)	(0.09)	(0.188)	(0.192)	(0.028)	(0.029)	(0.043)	(0.043)
WGI*Large	0.073	0.084	-0.353*	-0.302	-0.154***	-0.143***	0.055	0.018
	(0.086)	(0.087)	(0.188)	(0.192)	(0.036)	(0.037)	(0.054)	(0.055)
IRTRGDP	-0.787	-0.648	0.003***	0.004***	-0.002	-0.004	0.079	0.086
	(0.788)	(0.799)	(0.001)	(0.001)	(0.016)	(0.017)	(0.096)	(0.091)
Constant	32.063***	37.752**	18.647*	14.696	0.997	2.149	-10.684***	-9.202**
	(5.804)	(5.874)	(9.551)	(9.35)	(1.577)	(1.841)	(2.191)	(2.095)
LR Chi^2	20.4***	22.9***	80.9***	85.5***	22.5***	34.5***	59.8***	58.3***
ρ_c	0.023***	0.026***	0.069***	0.070***	0.018***	0.029***	0.150***	0.133***
ρ_r								
Observations	9,619		13,310		11,491		11,047	
No. of countries	9		6		20		20	

Note: ***, **, * indicate $p < 0.01$, $p < 0.05$, $p < 0.1$ respectively. Standard errors are in parentheses. All regressions include sector and year dummies. Models are estimated using the GSEM framework.

of KAOPEN in the second specification of EAO, an insignificant coefficient of the unemployment rate in the first specification of EE, significant coefficients in both specifications of SSE, significant coefficients of TRGDP in both specifications of MENA, and an insignificant coefficient of WGI*Large in the first specification of SA). The ICCs at the country and regional levels are also similar to those in Table 4. We conclude, therefore, that the omission of minority-owned FIFs (those with a foreign equity share of 10–49%) from the sample does not substantively change the results. This may be because the number of firms (minority-owned FIFs) omitted from the redefined sample is relatively small.

In summary, the overall results indicate that determinants at all three levels—firm, country, and global region—are important in explaining IFDI. The results for firm-level variables tend to be consistent across regions, but the significance of country-level variables varies considerably across regions. Specifically, firm-level characteristics are more likely to be consistently significant across regions (and with the same sign), whereas country-level characteristics tend to vary across regions in terms of both the direction of the effect (positive or negative) and the statistical significance. Finally, regional variations, which

Table 5
Firm, country, and regional variables with IV approach when FIFs are described as firms with foreign-owned equity of 50% or more.

	All		CA		EAO		EE		LAC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(age)	-0.426***	-0.461***	-0.506***	-0.546***	-0.751***	-0.755***	-0.7***	-0.714***	-0.537***	-0.583***
	(0.025)	(0.025)	(0.088)	(0.09)	(0.087)	(0.088)	(0.059)	(0.059)	(0.054)	(0.054)
Medium	0.838***	0.71***	0.783***	0.672***	0.564***	0.509***	1***	0.957***	0.822***	0.665***
	(0.034)	(0.035)	(0.134)	(0.136)	(0.106)	(0.107)	(0.086)	(0.086)	(0.079)	(0.08)
Large	1.962***	1.728***	1.605***	1.4***	1.865***	1.691***	2.27***	2.21***	2.088***	1.822***
	(0.037)	(0.038)	(0.147)	(0.151)	(0.109)	(0.113)	(0.089)	(0.09)	(0.08)	(0.083)
FDI Agglom	0.017***	0.017***	0.097***	0.092***	0.014***	0.014***	0.081***	0.081***	0.034***	0.033***
	(0.001)	(0.001)	(0.011)	(0.011)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)
Infrastructure	-0.141***		-0.023		-0.195***		-0.063*		-0.058**	
	(0.013)		(0.055)		(0.044)		(0.033)		(0.026)	
Communication		-0.595***		-0.726***		-0.353***		-0.152*		-0.638***
		(0.031)		(0.124)		(0.082)		(0.081)		(0.072)
Physical		0.042***		0.095*		0.019		0.076**		0.08***
		(0.013)		(0.055)		(0.044)		(0.032)		(0.025)
Financial		-0.219***		-0.091*		-0.297***		-0.211***		-0.18***
		(0.012)		(0.047)		(0.043)		(0.031)		(0.025)
Institution	-0.09***	-0.094***	-0.161**	-0.171**	-0.051	-0.049	-0.187***	-0.179***	-0.176***	-0.174***
	(0.015)	(0.015)	(0.069)	(0.069)	(0.051)	(0.051)	(0.042)	(0.042)	(0.03)	(0.03)
Factor	**-0.038****	**-0.029***	-0.031	-0.042	0.078*	0.081*	-0.077**	-0.063*	-0.115***	-0.11***
	(0.015)	**(0.015)**	(0.058)	(0.058)	(0.049)	(0.05)	(0.037)	(0.037)	(0.031)	(0.032)
Admin	0.146***	0.134***	0.185***	0.167***	0.183***	0.176***	0.077**	0.08**	0.193***	0.182***
	(0.012)	(0.013)	(0.058)	(0.058)	(0.041)	(0.041)	(0.032)	(0.032)	(0.026)	(0.026)
Ln(avwage)	0.093***	0.086***	0.247***	0.237***	0.162***	0.17***	0.06	0.062	0.018	0.012
	(0.014)	(0.014)	(0.06)	(0.062)	(0.042)	(0.043)	(0.04)	(0.04)	(0.041)	(0.041)
KAOPEN	-0.123**	-0.126	-0.370	-0.325	0.595***	**0.536****	-0.353**	-0.349**	-0.142***	-0.144***
	(0.049)	(0.05)	(0.243)	(0.204)	(0.223)	**(0.215)**	(0.14)	(0.138)	(0.053)	(0.052)
GDPPC	-0.022	-0.019	-0.233***	-0.232***	-0.446	-0.421	0.026	0.027	-0.005	-0.007
	(0.016)	(0.016)	(0.045)	(0.045)	(0.296)	(0.285)	(0.049)	(0.049)	(0.018)	(0.017)
Inflation	-0.025***	-0.024***	-0.039**	-0.036**	-0.172*	-0.096	-0.07**	-0.062*	-0.002	-0.002
	(0.006)	(0.006)	(0.017)	(0.017)	(0.106)	(0.102)	(0.033)	(0.033)	(0.009)	(0.009)
Labor parti.	0.004	0.015*	0.01	0.012	-0.021	-0.021	0.001	-0.002	-0.006	-0.009
	(0.008)	(0.008)	(0.024)	(0.024)	(0.035)	(0.034)	(0.024)	(0.024)	(0.011)	(0.011)
Profit tax	-0.015**	-0.012**	-0.019	-0.015	0.074	0.061	-0.045*	-0.044*	0.001	0.001
	(0.006)	(0.006)	(0.027)	(0.027)	(0.062)	(0.059)	(0.026)	(0.026)	(0.009)	(0.008)
Unemployment	-0.008	-0.006	-0.026	-0.032	-0.003	-0.024	**-0.014**	-0.008	-0.045**	-0.052***
	(0.009)	(0.009)	(0.058)	(0.058)	(0.167)	(0.16)	**(0.017)**	(0.017)	(0.018)	(0.018)
TRGDP	2.011***	2.019***	0.007	0.009	0.009	0.007	0.006	0.009	-0.021	0.020
	(0.203)	(0.303)	(0.015)	(0.015)	(0.009)	(0.009)	(0.016)	(0.016)	(0.025)	(0.023)
WGI	0.085**	0.072**	0.379***	0.336***	-0.744	-0.674	-0.053	-0.031	-0.072	-0.073
	(0.034)	(0.032)	(0.128)	(0.129)	(0.462)	(0.444)	(0.21)	(0.21)	(0.065)	(0.064)
WGI*Medium	0.026	0.03	0.011	0.028	-0.183	-0.189	-0.053	-0.06	0.057	0.049
	(0.023)	(0.023)	(0.085)	(0.086)	(0.109)	(0.114)	(0.052)	(0.052)	(0.054)	(0.054)
WGI*Large	-0.035	0.034**	0.088	0.085	-0.010**	-0.013***	0.183***	0.19***	0.051	0.05
	(0.024)	(0.015)	(0.092)	(0.093)	(0.005)	(0.004)	(0.051)	(0.051)	(0.052)	(0.052)
IRTRGDP	0.018**	0.016**	0.088*	0.080*	-0.02	-0.024	0.014	0.014	0.749***	0.064***
	(0.008)	(0.008)	(0.046)	(0.046)	(0.046)	(0.044)	(0.045)	(0.045)	(0.017)	(0.022)
Constant	-3.252***	-2.291***	-3.755**	-3.255*	-0.336	0.548	-0.381	0.116	0.484	-1.221
	(0.655)	(0.67)	(1.843)	(1.881)	(3.099)	(2.971)	(2.446)	(2.447)	(4.32)	(4.394)
LR Chi^2	3412***	3626***	511.1***	563.7***	146.3***	152.0***	40.9***	40.9***	16.5***	19.4***
ρ_c	0.137***	0.138***	0.100***	0.099***	0.129***	0.123***	0.035***	0.034***	0.016***	0.017***
ρ_r	0.143***	0.153***								
Observations	99,238		9,939		11,503		15,350		18,207	
No. of countries	134		8		18		22		31	

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Ln(age)	-0.519***	-0.575***	-0.317	-0.327	**-0.17*****	-0.214***	0.281***	0.226***
	(0.088)	(0.09)	(0.209)	(0.211)	**(0.057)**	(0.058)	(0.083)	(0.084)
Medium	0.546***	0.438***	0.983***	0.743**	0.81***	0.641***	0.822***	0.632***
	(0.148)	(0.15)	(0.349)	(0.355)	(0.071)	(0.073)	(0.087)	(0.09)
Large	1.6***	1.378***	1.761***	1.267***	1.615***	1.308***	1.859***	1.498***
	(0.154)	(0.158)	(0.347)	(0.369)	(0.089)	(0.093)	(0.111)	(0.116)
FDI Agglom	0.105***	0.104***	0.119***	0.118***	0.006***	0.005***	0.02***	0.02***
	(0.011)	(0.011)	(0.031)	(0.031)	(0.002)	(0.002)	(0.004)	(0.004)

(*continued on next page*)

Table 5 (*continued*)

Infrastructure	-0.142**		-0.416***		-0.199***		-0.276***	
	(0.058)		(0.118)		(0.031)		(0.037)	
Communication		-0.723***		-1.026***		-0.685***		-0.902***
		(0.122)		(0.242)		(0.067)		(0.083)
Physical		-0.013		-0.238*		0.032		-0.023
		(0.059)		(0.121)		(0.033)		(0.04)
Financial		-0.15***		-0.156**		-0.227***		-0.267***
		(0.051)		(0.072)		(0.025)		(0.032)
Institution	-0.083	-0.084	-0.11	-0.156	-0.044	-0.053	0.009	0.001
	(0.064)	(0.064)	(0.129)	(0.129)	(0.032)	(0.032)	(0.039)	(0.04)
Factor	0.021	0.042	-0.002	-0.022	-0.058*	-0.059*	0.013	0.069*
	(0.063)	(0.063)	(0.115)	(0.116)	(0.033)	(0.033)	(0.041)	(0.041)
Admin	0.12**	0.100**	0.281***	0.262***	0.181***	0.162***	0.091***	0.073**
	(0.049)	(0.049)	(0.094)	(0.094)	(0.028)	(0.028)	(0.032)	(0.033)
Ln(avwage)	-0.103	-0.119**	0.186*	0.158	0.036	0.015	0.129***	0.109***
	(0.075)	(0.056)	(0.112)	(0.113)	(0.03)	(0.031)	(0.03)	(0.03)
KAOPEN	-0.290**	-0.424**	4.385***	4.239***	-0.028	-0.017	-0.096	-0.088
	(0.144)	(0.210)	(1.587)	(1.602)	(0.115)	(0.127)	(0.212)	(0.207)
GDPPC	-0.537**	-0.55**	-2.15*	-1.972*	0.027	0.091	-0.307	-0.301
	(0.268)	(0.273)	(1.179)	(1.187)	(0.131)	(0.144)	(0.218)	(0.205)
Inflation	0.12*	0.16**	0.085	0.076	-0.048***	-0.05***	-0.035*	-0.029*
	(0.065)	(0.067)	(0.258)	(0.26)	(0.011)	(0.012)	(0.021)	(0.016)
Labor parti.	-0.231***	-0.187**	-0.298*	-0.195**	-0.023	-0.024	0.081***	0.074***
	(0.087)	(0.088)	(0.165)	(0.098)	(0.019)	(0.02)	(0.027)	(0.025)
Profit tax	-0.553***	-0.598***	0.060	0.07	-0.053***	-0.055***	0.005	0.006
	(0.186)	(0.189)	(0.113)	(0.113)	(0.016)	(0.018)	(0.016)	(0.015)
Unemployment	-0.721**	-0.806***	0.072	-0.021	**-0.058****	**-0.074****	-0.045	-0.034
	(0.278)	(0.283)	(0.577)	(0.576)	**(0.026)**	**(0.029)**	(0.054)	(0.053)
TRGDP	**0.462*****	**0.499*****	-0.254	-0.221	-0.004	-0.004	-0.005	-0.005
	(0.161)	**(0.164)**	(0.216)	(0.216)	(0.007)	(0.008)	(0.012)	(0.011)
WGI	2.71***	3.003***	0.785*	0.647*	0.322***	0.325***	0.321	0.296
	(0.906)	(0.924)	(0.472)	(0.390)	(0.091)	(0.099)	(0.234)	(0.226)
WGI*Medium	0.131	0.141	-0.164	-0.178	0.136***	0.133***	-0.02	0.002
	(0.131)	(0.132)	(0.684)	(0.683)	(0.048)	(0.049)	(0.053)	(0.054)
WGI*Large	0.289**	0.272**	**-0.106**	-0.124	-0.139**	-0.136**	0.059	0.102
	(0.236)	(0.238)	**(0.768)**	(0.769)	(0.063)	(0.064)	(0.068)	(0.07)
IRTRGDP	-0.236	-0.531	0.021***	0.034***	-0.004	0.002	-0.024	-0.028
	(0.936)	(0.938)	(0.001)	(0.002)	(0.016)	(0.017)	(0.099)	(0.095)
Constant	35.647***	41.821***	6.672	6.389	1.463	2.632	-6.356	-4.629
	(9.795)	(9.909)	(9.91)	(9.902)	(1.954)	(2.117)	(4.907)	(4.858)
LR Chi^2	22.3***	22.9***	80.8***	85.1***	21.8***	34.3***	59.2***	58.1***
ρ_c	0.023***	0.026***	0.068***	0.070***	0.018***	0.029***	0.146***	0.133***
ρ_r								
Observations	9,372		13,223		11,084		10,560	
No. of countries	9		6		20		20	

Note: ***, **, * indicate $p < 0.01$, $p < 0.05$, $p < 0.1$ respectively. Standard errors are in parentheses. All regressions include sector and year dummies. Models are estimated using the GSEM framework.

this study uniquely considers, are significant with respect to one variable (intraregional trade). The significance of that variable also varies across regions.[28]

6. Conclusions

Decisions made by firms to invest in countries other than their own depend on both firm- and country-level factors in the host countries. In the context of new approaches to production, such as regional supply chains, regional factors may also be important in determining FDI investment destinations. Thus, this paper analyzes firm-, country-, and regional-level determinants of IFDI using data from 134 countries in a three-level hierarchical modeling framework. Moreover, countries are clustered into eight distinct world regions to determine how these determinants vary across regions.

First, we find evidence in favor of the multilevel modeling approach in the form of non-negligible intraclass correlation coefficients (ICCs) and an LR χ^2 test that is strongly significant. When only firm-level analysis is considered, the infrastructural constraint is found to be detrimental to IFDI more broadly, and this is confirmed for communication constraints (lack of access to websites) and financial constraints (lack of access to a formal financial market). However, the constraints imposed by physical infrastructure (electricity and transportation problems) are found to have varying effects across regions. Among other obstacles faced by firms, institutional obstacles and limited access to

[28] We note, of course, that regional-level coefficient estimates of the regional variable are derived only from survey data for countries with two years of data (since the region is singular, only changes across time add new information), while the aggregate data model utilizes all of the data (since regions are not singular, every survey in the same region adds new information) and thus has a great deal more statistical credibility.

factors (land or skilled labor) typically discourage FDI across regions, but administrative obstacles are positively related to the stock of FDI. It appears that FDI is often a way to deal with administrative constraints—likely because most countries favor FIFs in implementing administrative protocols. The (regional and sectoral) average wage is positively correlated with FDI participation, suggesting that FIFs pay their workers better than local firms. However, that difference was not significant for most regions.

Without exception, the country-level variables suggest that country effects are region-specific. Among them, the degree of openness of the capital account, per capita GDP, inflation, and the rate of taxation on profits appear to discourage foreign participation in some regions but generate the opposite effect (or remain irrelevant) in other regions. The regional variable, intraregional trade relative to GDP, is positively associated with IFDI in the aggregate data model, but, like country-level variables, this relationship is not consistent across regions. It is positively related to foreign participation in two regions (Latin America and the Caribbean and South Asia) but has the opposite association in Central Asia.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

See Tables A1-A9 and Figs. A1 and A2.

Table A1
List of countries and corresponding year when firms were interviewed.

Countries	Year	Countries	Year	Countries	Year
Central Asia (1)		Slovak Republic	2013 & 2019	Bhutan	2009 & 2015
Armenia	2013 & 2019	Slovenia	2013 & 2019	India	2014
Azerbaijan	2013 & 2019	Ukraine	2019	Nepal	2009 & 2013
Georgia	2013 & 2019			Pakistan	2007 & 2013
Kazakhstan	2019	*Latin America and the Caribbean (4)*		Sri Lanka	2011
Kyrgyz Republic	2019	Antigua and Barbuda	2011		
Russian Federation	2012 & 2019	Argentina	2010 & 2017	*Sub-Sahara East (7)*	
Tajikistan	2013 & 2019	Bahamas	2011	Botswana	2006 & 2010
Uzbekistan	2019	Barbados	2011	Burundi	2014
		Belize	2011	Djibouti	2013
East Asia and Oceania (2)		Bolivia	2017	Eritrea	2009
Cambodia	2016	Brazil	2009	Eswatini (Swaziland)	2016
China	2013 & 2019	Chile	2006 & 2010	Ethiopia	2011 & 2015
Fiji	2009	Colombia	2010 & 2017	Kenya	2013 & 2018
Indonesia	2009 & 2015	Costa Rica	2010	Lesotho	2009 & 2016
Laos	2018	Dominica	2011	Madagascar	2013
Malaysia	2015	Dominican Republic	2010 & 2016	Malawi	2009 & 2014
Micronesia	2009	Ecuador	2017	Mauritius	2008
Mongolia	2012	El Salvador	2016	Mozambique	2018
Myanmar	2014 & 2016	Grenada	2011	Namibia	2015
Papua New Guinea	2015	Guatemala	2010 & 2018	Rwanda	2019
Philippines	2009 & 2015	Guyana	2011	South Africa	2007
Samoa	2009	Honduras	2016	South Sudan	2014
Solomon Islands	2015	Jamaica	2011	Tanzania	2006 & 2013
Thailand	2016	Mexico	2006 & 2010	Uganda	2006 & 2013
Timor Leste	2009 & 2015	Nicaragua	2016	Zambia	2013 & 2019
Tonga	2009	Panama	2006 & 2010	Zimbabwe	2011 & 2016
Vanuatu	2009	Paraguay	2017		
Vietnam	2015	Peru	2010 & 2017	*Sub-Sahara West (8)*	
		St. Kitts and Nevis	2011	Angola	2006 & 2010
Eastern Europe (3)		St. Lucia	2011	Benin	2009 & 2016
Albania	2019	St. Vincent and the Grenadines	2011	Burkina	2006 & 2009
Belarus	2018	Suriname	2010 & 2018	Cameroon	2009 & 2016
Bosnia and Herzegovina	2013 & 2019	Trinidad and Tobago	2011	Cape Verde	2006 & 2009
Bulgaria	2013 & 2019	Uruguay	2010 & 2017	Central African Republic	2011
Croatia	2009 & 2013	Venezuela	2006 & 2010	Chad	2009 & 2018
Czech Republic	2019			Cote d'Ivoire	2009 & 2016
Estonia	2013 & 2019	*Middle East and North Africa (5)*		Democratic Republic of Congo	2010 & 2013
Greece	2018	Algeria	2007	Gabon	2008
Hungary	2013 & 2019	Egypt	2016 & 2019	The Gambia	2018

(*continued on next page*)

Table A1 (*continued*)

Countries	Year	Countries	Year	Countries	Year
Kosovo	2013 & 2019	Israel	2013	Ghana	2013
Latvia	2013 & 2019	Jordan	2013 & 2019	Guinea	2016
Lithuania	2019	Lebanon	2013 & 2019	Liberia	2009 & 2017
Moldova	2013 & 2019	Morocco	2013 & 2019	Mali	2016
Montenegro	2013 & 2019	Tunisia	2014 & 2019	Niger	2009 & 2017
North Macedonia	2013 & 2019	Turkey	2019	Nigeria	2009 & 2014
Poland	2013 & 2019	Yemen	2013	Senegal	2007 & 2014
Portugal	2019			Sierra Leone	2009 & 2017
Romania	2013 & 2019	*South Asia (6)*		Togo	2009 & 2016
Serbia	2013 & 2019	Bangladesh	2013		

Table A2
List of variables and descriptions.

Variable	Definitions
Micro Variables	
FDI	Dummy variable; 0 = domestic firms, and 1 = foreign-invested firms
Ln(age)	Log of age of the firm
Size	Firm size: small (base) = 0 – 19 employees; medium = 20 – 99; large = 100 or more
Agglomeration	Number of foreign-invested firms in the same sector and region
Telecom. problem	Access to website for business
Electricity problem	Business obstacle: Electricity
Transport problem	Business obstacle: Transport
Financial	Business obstacle: finance
Crime	Business obstacle: crime, theft, and disorder
Corruption	Business obstacle: corruption
Property rights	Is the judicial system fair in upholding property rights
Wage	Sector-region average wage per employee. (It is converted to USD using the exchange rate and then expressed in logs).
Skill	Business obstacle: skilled workforce problem
Land problem	Business obstacle: access to land
Labor regulation	Business obstacle: labor regulations
Licensing and permits	Business obstacle: licensing and permits
Custom and trade	Business obstacle: customs and trade regulations
Tax administration	Business obstacle: tax administration
Macro Variables	
LGDPPC	Log of GDP per capita in current USD
Tax Rate	Total tax rate as a percentage of commercial profit
Inflation	Growth rate of the GDP deflator
TRGDP	Total trade relative to GDP. This is the sum of exports and imports divided by GDP
KAOPEN	"Extent and intensity" of capital controls measuring financial openness
Labor Participation	The proportion of the working-age population that is economically active
Unemployment	Unemployment rate
WGI	World Governance Indicators
Regional Variable	
IRTRGDP	Intra-regional trade relative to GDP. To compute this variable, first, the sum of intra-regional merchandise and service trade for each country for each of the previous five years (to the survey year) is divided by 2 (since each country's exports and imports are counted twice) and averaged over five years for each country and year. Then, the results are summed up for each year within regions. The sum of regional GDP for each year is computed in the same way (i.e., the sum of the previous five-year average GDP for each country and year in a given region is calculated and then summed up for each year within regions). Finally, regional trade is divided by regional GDP.

Table A3
World Governance Indicators.

Variables	Indicators
Voice and accountability	Citizens' perception regarding their freedom to participate in selecting their government, freedom of speech, and freedom of the press
Political stability and absence of violence	Perceptions of political instability and related violence, and terrorism
Government Effectiveness	Perceptions of the quality and independence of public and civil services, as well as effective policy formulation and the credibility of the government's commitment to such policies
Regulatory quality	Perceptions of how the government can stimulate private sector development through sound policies and regulations
Rule of law	Perceptions of the quality of contract enforcement, property rights, the police, and the courts, as well as the possibility of crime and violence
Control of corruption	Perceptions of how public power is exercised for private gain as well as the capture of the state by elites and private interests

Table A4
Distribution of firms across sectors.

	Observation	Percentage	Cumulative
Food	13741	13.52	13.52
Textile, garments and leather	10221	10.05	23.57
metals, machinery, and instrument	9188	9.04	32.61
petroleum and chemicals	10972	10.79	43.40
wood and furniture, paper and printing, non-metallic product, and electronics	7243	7.12	50.53
other manufacturing	13869	13.64	64.17
retail and wholesale	21020	20.68	84.85
hotel and restaurants, and other services	7893	7.76	92.61
construction and transport	7510	7.39	100.00
Total	101657	100.00	

Table A5
Principal components of all index variables (micro-level).

Variables	Physical infrastructure	Infrastructure	Institution	Factor	Admin
Website		0.144			
Electricity	0.707	0.582			
Transportation	0.707	0.587			
Financial		0.544			
Corruption			0.700		
Crime			0.699		
Property rights			-0.146		
Skilled labor				0.707	
Land				0.707	
Labor regulations					0.498
Licensing & permits					0.524
Customs & trade					0.456
Tax administration					0.519
Eigen value	1.393	1.689	1.387	1.254	2.207
Explained (%)	69.69	0.423	46.23	62.71	55.20

Table A6
Principal component of World Governance Index.

Variables	WGI
Voice and accountability	0.396
Political Stability and Absence of Violence	0.394
Government Effectiveness	0.464
Regulatory Quality	0.447
Rule of Law	0.469
Control of Corruption	0.231
Eigenvalue	4.009
Explained proportion %	66.82

Table A7
Correlations between explanatory variables.

		With physical, communication, and financial infrastructure													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Communication	1.000													
2	Physical	0.043	1.000												
3	Financial	0.107	0.371	1.000											
4	Institution	0.014	0.446	0.357	1.000										
5	Factor	-0.029	0.404	0.378	0.476	1.000									
6	Admin	-0.053	0.487	0.379	0.580	0.545	1.000								
7	GDPPC	-0.232	-0.112	-0.107	-0.096	-0.004	-0.020	1.000							
8	Inflation	0.000	0.021	0.044	0.012	0.048	0.025	0.012	1.000						
9	Lab parti.	-0.039	-0.041	-0.022	-0.121	0.002	-0.052	0.265	0.057	1.000					
10	Profit tax	0.132	0.119	0.054	0.116	0.050	0.107	-0.336	-0.007	-0.087	1.000				
11	Un. rate	-0.070	-0.087	0.015	-0.005	-0.011	-0.038	0.084	-0.059	-0.290	-0.241	1.000			
12	TTRGDP	-0.075	-0.024	-0.039	-0.027	0.001	0.019	0.359	0.034	0.182	0.018	-0.196	1.000		
13	KAOPEN	-0.121	-0.060	-0.072	-0.017	-0.004	-0.009	0.457	-0.115	0.224	-0.213	0.051	0.071	1.000	
14	WGI	-0.214	-0.131	-0.135	-0.117	-0.008	-0.040	0.612	-0.009	0.110	-0.141	0.230	0.145	0.454	1.000

		With overall infrastructure										
		1	2	3	4	5	6	7	8	9	10	11	12
1	Infrastructure	1.0200											
2	Institution	0.4386	1.000										
3	Factor	0.4459	0.476	1.000									
4	Admin	0.5519	0.580	0.545	1.000								
5	GDPPC	-0.1654	-0.096	-0.004	-0.020	1.000							
6	Inflation	0.0374	0.012	0.048	0.025	0.012	1.000						
7	Labor part.	-0.0484	-0.121	0.002	-0.052	0.265	0.057	1.000					
8	Profit tax	0.1269	0.116	0.050	0.107	-0.336	-0.007	-0.087	1.000				
9	Unem. rate	-0.067	-0.005	-0.011	-0.038	0.084	-0.059	-0.290	-0.241	1.000			
10	TTRGDP	-0.043	-0.027	0.001	0.019	0.359	0.034	0.182	0.018	-0.196	1.000		
11	KAOPEN	-0.089	-0.017	-0.004	-0.009	0.457	-0.115	0.224	-0.213	0.051	0.071	1.000	
12	WGI	-0.178	-0.117	-0.008	-0.040	0.612	-0.009	0.110	-0.141	0.230	0.145	0.454	1.000

Table A8
Firm-level data without instrumental variable approach.

	All		CA		EAO		EE		LAC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(age)	-0.310***	-0.346***	-0.351***	-0.400***	-0.451***	-0.462***	-0.566***	-0.576***	-0.430***	-0.476***
	(0.022)	(0.022)	(0.077)	(0.079)	(0.073)	(0.073)	(0.054)	(0.054)	(0.049)	(0.049)
Medium	0.833***	0.701***	0.856***	0.728***	0.634***	0.576***	0.986***	0.949***	0.816***	0.672***
	(0.030)	(0.031)	(0.118)	(0.119)	(0.091)	(0.092)	(0.079)	(0.079)	(0.071)	(0.073)
Large	1.939***	1.698***	1.644***	1.416***	1.928***	1.757***	2.258***	2.203***	2.044***	1.799***
	(0.032)	(0.034)	(0.130)	(0.133)	(0.092)	(0.096)	(0.081)	(0.083)	(0.073)	(0.076)
FDI Agglom	0.018***	0.018***	0.093***	0.087***	0.014***	0.014***	0.075***	0.075***	0.029***	0.028***
	(0.001)	(0.001)	(0.010)	(0.010)	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)
Infrastructure	-0.135***		-0.053		-0.192***		-0.057*		-0.060**	
	(0.012)		(0.048)		(0.038)		(0.030)		(0.024)	
Communication		-0.627***		-0.841***		-0.384***		-0.137*		-0.599***
		(0.027)		(0.111)		(0.069)		(0.074)		(0.065)
Physical		0.038***		0.064		0.003		0.072**		0.063***
		(0.012)		(0.049)		(0.038)		(0.030)		(0.023)
Financial		-0.197***		-0.085**		-0.261***		-0.191***		-0.157***
		(0.011)		(0.042)		(0.036)		(0.028)		(0.023)
Institution	-0.082***	-0.086***	-0.153**	-0.165***	-0.007	-0.008	-0.220***	-0.213***	-0.157***	-0.153***
	(0.014)	(0.014)	(0.061)	(0.061)	(0.044)	(0.044)	(0.039)	(0.039)	(0.028)	(0.028)
Factor	-0.016	-0.009	-0.014	-0.031	0.072*	0.076*	-0.072**	-0.060*	-0.087***	-0.084***
	(0.013)	(0.013)	(0.051)	(0.052)	(0.043)	(0.043)	(0.034)	(0.034)	(0.029)	(0.029)
Admin	0.152***	0.137***	0.208***	0.190***	0.183***	0.173***	0.102***	0.105***	0.176***	0.165***
	(0.011)	(0.011)	(0.051)	(0.051)	(0.035)	(0.036)	(0.029)	(0.029)	(0.024)	(0.024)
Ln(Av. Wage)	0.067***	0.056***	0.187***	0.175***	0.092***	0.095***	0.029	0.033	-0.002	-0.007
	(0.000)	(0.011)	(0.061)	(0.063)	(0.028)	(0.028)	(0.031)	(0.031)	(0.034)	(0.035)
Constant	-2.668***	-1.770***	-2.676***	-2.053***	-0.872**	-0.225	-1.082**	-0.715	-2.900***	-2.106***
	(0.151)	(0.157)	(0.416)	(0.432)	(0.350)	(0.356)	(0.432)	(0.436)	(0.226)	(0.238)
LR Chi^2	5098.66	4598.90	91.84	100.77	213.61	198.97	145.89	131.04	24.47	25.67
ρ_c	0.194***	0.206***	0.134***	0.145***	0.150***	0.144***	0.046***	0.044***	0.013***	0.015***
ρ_r	0.141***	0.148***								
Observations	101657		10,073		11,974		15,590		18,553	
No. of countries	134		8		18		22		31	

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17	18
Ln(age)	-0.408***	-0.466***	-0.202	-0.237	-0.072	-0.128**	0.221***	0.169**
	(0.072)	(0.073)	(0.156)	(0.157)	(0.051)	(0.052)	(0.069)	(0.070)
Medium	0.595***	0.488***	0.953***	0.608**	0.804***	0.631***	0.788***	0.607***
	(0.119)	(0.120)	(0.259)	(0.265)	(0.065)	(0.067)	(0.070)	(0.072)
Large	1.707***	1.498***	1.921***	1.317***	1.631***	1.308***	1.723***	1.363***
	(0.120)	(0.123)	(0.256)	(0.268)	(0.078)	(0.082)	(0.091)	(0.096)
FDI Agglom	0.117***	0.115***	0.203***	0.196***	0.007***	0.006***	0.025***	0.026***
	(0.009)	(0.010)	(0.024)	(0.024)	(0.002)	(0.002)	(0.003)	(0.003)
Infrastructure	-0.107**		-0.386***		-0.202***		-0.202***	
	(0.047)		(0.090)		(0.028)		(0.031)	
Communication		-0.768***		-1.382***		-0.742***		-0.858***
		(0.100)		(0.202)		(0.061)		(0.070)
Physical		-0.013		-0.210**		0.020		0.038
		(0.048)		(0.090)		(0.030)		(0.034)
Financial		-0.105**		-0.144*		-0.215***		-0.233***
		(0.042)		(0.078)		(0.023)		(0.027)
Institution	-0.031	-0.044	-0.097	-0.162	-0.044	-0.052	0.016	0.004
	(0.052)	(0.052)	(0.099)	(0.100)	(0.030)	(0.035)	(0.034)	(0.034)
Factor	-0.023	-0.002	-0.047	-0.058	-0.061**	-0.055*	0.052	0.066*
	(0.052)	(0.052)	(0.089)	(0.090)	(0.030)	(0.031)	(0.034)	(0.035)
Admin	0.126***	0.113***	0.270***	0.243***	0.173***	0.151***	0.120***	0.096***
	(0.040)	(0.040)	(0.071)	(0.071)	(0.026)	(0.026)	(0.028)	(0.028)
Ln(Av. Wage)	-0.004	-0.001	0.059	0.078	0.026	0.005	0.048**	0.029
	(0.056)	(0.057)	(0.073)	(0.073)	(0.029)	(0.029)	(0.022)	(0.022)
Constant	-3.055***	-2.218***	-4.225***	-3.008***	-1.849***	-0.802**	-4.259***	-2.947***
	(0.693)	(0.722)	(0.638)	(0.661)	(0.305)	(0.330)	(0.620)	(0.602)
LR Chi^2	142.54	146.71	125.59	147.94	195.67	223.40	154.33	134.54
ρ_c	0.094***	0.100***	0.067***	0.074***	0.090***	0.112***	0.178***	0.163***
ρ_r								
Observations	9,619		13,310		11,491		11,047	
No. of countries	9		6		20		20	

Note: ***, **, * indicate $p < 0.01$, $p < 0.05$, $p < 0.1$ respectively. Standard errors are in parentheses. All regressions include sector and year dummies.

Table A9
Firm-level and country-level data with IV approach.

	All		CA		EAO		EE		LAC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(age)	-0.313***	-0.349***	-0.373***	-0.42***	-0.46***	-0.471***	-0.579***	-0.588***	-0.429***	-0.474***
	(0.022)	(0.023)	(0.077)	(0.079)	(0.073)	(0.074)	(0.054)	(0.054)	(0.049)	(0.05)
Medium	0.827***	0.698***	0.85***	0.721***	0.65***	0.594***	0.945***	0.896***	0.881***	0.724***
	(0.03)	(0.031)	(0.125)	(0.127)	(0.091)	(0.092)	(0.127)	(0.127)	(0.089)	(0.09)
Large	1.923***	1.68***	1.624***	1.402***	1.954***	1.785***	1.95***	1.885***	2.105***	1.854***
	(0.033)	(0.034)	(0.139)	(0.142)	(0.093)	(0.096)	(0.13)	(0.131)	(0.089)	(0.091)
FDI Agglom	0.018***	0.018***	0.091***	0.085***	0.014***	0.014***	0.074***	0.074***	0.03***	0.029***
	(0.001)	(0.001)	(0.01)	(0.01)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)
Infrastructure	-0.139***		-0.055		-0.201***		-0.055*		-0.061**	
	(0.012)		(0.048)		(0.038)		(0.03)		(0.024)	
Communication		-0.627***		-0.825***		-0.381***		-0.136*		-0.612***
		(0.027)		(0.112)		(0.069)		(0.074)		(0.065)
Physical		0.034***		0.062		-0.006		0.072**		0.063***
		(0.012)		(0.049)		(0.038)		(0.03)		(0.024)
Financial		-0.198***		-0.086**		-0.261***		-0.188***		-0.158***
		(0.011)		(0.042)		(0.036)		(0.028)		(0.023)
Institution	-0.079***	-0.084***	-0.159***	-0.167***	-0.008	-0.008	-0.203***	-0.196***	-0.161***	-0.159***
	(0.014)	(0.014)	(0.061)	(0.061)	(0.044)	(0.044)	(0.039)	(0.039)	(0.028)	(0.028)
Factor	-0.017	-0.011	-0.017	-0.033	0.075*	0.078*	-0.072**	-0.06*	-0.08***	-0.078***
	(0.013)	(0.013)	(0.051)	(0.052)	(0.043)	(0.043)	(0.034)	(0.034)	(0.029)	(0.029)
Admin	0.152***	0.137***	0.208***	0.188***	0.186***	0.176***	0.101***	0.103***	0.172***	0.161***
	(0.011)	(0.011)	(0.051)	(0.051)	(0.036)	(0.036)	(0.029)	(0.029)	(0.024)	(0.024)
Ln(Av wage)	0.065***	0.057***	0.226***	0.217***	0.085***	0.089***	0.045	0.045	0.03	0.026
	(0.011)	(0.011)	(0.056)	(0.056)	(0.028)	(0.028)	(0.035)	(0.036)	(0.038)	(0.038)
KAOPEN	-0.103**	-0.107**	-0.344*	-0.311*	0.253	0.224	-0.21*	-0.212**	-0.122**	-0.128**
	(0.047)	(0.048)	(0.181)	(0.182)	(0.16)	(0.157)	(0.11)	(0.108)	(0.052)	(0.053)
GDPPC	-0.007**	-0.004	-0.219***	-0.221***	-0.167**	-0.16	0.058**	0.058	-0.009**	-0.009
	(0.014)	(0.014)	(0.041)	(0.04)	(0.169)	(0.165)	(0.04)	(0.04)	(0.017)	(0.017)
Inflation	-0.015***	-0.013**	-0.034**	-0.031**	-0.132	-0.116	-0.056*	-0.05*	-0.001	-0.001
	(0.006)	(0.006)	(0.015)	(0.015)	(0.082)	(0.08)	(0.029)	(0.029)	(0.009)	(0.009)
Labor parti.	-0.011	-0.012	0.021	0.022	-0.025	-0.024	0.003	0.002	-0.005	-0.008
	(0.008)	(0.008)	(0.022)	(0.022)	(0.026)	(0.025)	(0.018)	(0.018)	(0.01)	(0.011)
Profit tax	-0.012**	-0.009*	-0.015	-0.012	0.03	0.025	-0.033	-0.034	-0.001	-0.001
	(0.005)	(0.005)	(0.024)	(0.024)	(0.045)	(0.044)	(0.021)	(0.021)	(0.008)	(0.009)
Unemploy. rate	-0.007	-0.003	-0.032	-0.037	-0.06	-0.075	-0.025*	-0.02	-0.063***	-0.072***
	(0.008)	(0.008)	(0.052)	(0.053)	(0.121)	(0.118)	(0.014)	(0.014)	(0.018)	(0.019)
TRGDP	4.847***	5.277***	26.723	48.341	3.034	3.133	-3.693	-8.337	-0.438	1.219
	(0.082)	(1.262)	(57.592)	(57.315)	(2.538)	(2.482)	(21.634)	(21.994)	(2.079)	(2.049)
WGI	0.1***	0.074*	0.315***	0.275**	0.437	0.409	-0.11	-0.128	0.063	0.061
	(0.038)	(0.038)	(0.114)	(0.115)	(0.336)	(0.329)	(0.176)	(0.175)	(0.056)	(0.057)
WGI*Medium	-0.019	-0.014	0.005	-0.01	-0.092	-0.092	0.014	0.019	-0.048	-0.04
	(0.013)	(0.013)	(0.074)	(0.075)	(0.072)	(0.072)	(0.045)	(0.045)	(0.041)	(0.041)
WGI*Large	0.024*	0.037**	-0.048	-0.045	-0.127	-0.114	0.136***	0.141***	-0.038	-0.038
	(0.014)	(0.015)	(0.081)	(0.081)	(0.092)	(0.073)	(0.045)	(0.045)	(0.041)	(0.041)
Constant	-2.296***	-1.392**	-2.114	-1.676	0.529	1.222	-1.261	-0.823	-2.247***	-1.18
	(0.612)	(0.625)	(1.8)	(1.842)	(2.218)	(2.173)	(1.346)	(1.349)	(0.803)	(0.825)
LR Chi^2										
ρ_c	0.124***	0.124***	0.121***	0.138***	0.135***	0.128***	0.035***	0.034***	0.016***	0.016***
ρ_r	0.142***	0.155***								
Observations	101,657		10,073		11,974		15,590		18,553	
No. of countries	134		8		18		22		31	

	MENA		SA		SSE		SSW	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Ln(age)	-0.409***	-0.471***	-0.197	-0.21	-0.06	-0.113**	0.196***	0.15**
	(0.072)	(0.074)	(0.157)	(0.158)	(0.051)	(0.052)	(0.07)	(0.07)
Medium	0.583***	0.469***	0.913***	0.582**	0.728***	0.562***	0.972***	0.761***
	(0.121)	(0.123)	(0.263)	(0.269)	(0.067)	(0.069)	(0.107)	(0.109)
Large	1.698***	1.469***	1.843***	1.243***	1.574***	1.264***	1.83***	1.412***
	(0.123)	(0.126)	(0.267)	(0.28)	(0.079)	(0.083)	(0.132)	(0.137)
FDI Agglom	0.114***	0.111***	0.167***	0.17***	0.006***	0.006***	0.026***	0.027***
	(0.009)	(0.01)	(0.024)	(0.025)	(0.002)	(0.002)	(0.003)	(0.003)
Infrastructure	-0.105**		-0.403***		-0.216***		-0.204***	
	(0.048)		(0.091)		(0.029)		(0.032)	
Communication		-0.819***		-1.332***		-0.725***		-0.841***
		(0.101)		(0.203)		(0.061)		(0.07)
Physical		0.001		-0.202**		0.010		0.034
		(0.049)		(0.093)		(0.031)		(0.034)
Financial		-0.106**		-0.154*		-0.222***		-0.23***

(*continued on next page*)

Table A9 (*continued*)

		(0.043)		(0.079)		(0.023)		(0.027)
Institution	-0.042	-0.053	-0.111	-0.155	-0.041	-0.05	0.015	0.003
	(0.053)	(0.053)	(0.1)	(0.1)	(0.03)	(0.03)	(0.034)	(0.034)
Factor	-0.035	-0.018	-0.034	-0.063	-0.062**	-0.056*	0.053	0.067*
	(0.052)	(0.053)	(0.09)	(0.092)	(0.03)	(0.031)	(0.035)	(0.035)
Admin	0.124***	0.105**	0.27***	0.246***	0.177***	0.156***	0.115***	0.092***
	(0.041)	(0.041)	(0.072)	(0.072)	(0.026)	(0.026)	(0.028)	(0.028)
Ln(Av wage)	-0.053	-0.066***	0.136	0.090	0.009	-0.013	0.046**	0.047**
	(0.06)	(0.06)	(0.09)	(0.091)	(0.027)	(0.028)	(0.022)	(0.022)
KAOPEN	-0.669**	-0.816**	3.379	2.316	-0.004	0.008	-0.168	-0.159
	(0.319)	(0.322)	(2.087)	(2.084)	(0.101)	(0.119)	(0.212)	(0.207)
GDPPC	-0.341*	-0.358*	-1.558**	-0.729	0.020**	0.056	-0.026**	-0.017
	(0.186)	(0.189)	(1.469)	(1.467)	(0.114)	(0.135)	(0.225)	(0.212)
Inflation	0.098**	0.14***	0.033	-0.042	-0.046***	-0.048***	-0.047**	-0.039*
	(0.047)	(0.048)	(0.076)	(0.078)	(0.01)	(0.011)	(0.021)	(0.02)
Labor parti.	-0.242***	-0.305***	-0.125	-0.044	-0.019	-0.022	0.104***	0.097***
	(0.07)	(0.07)	(0.078)	(0.078)	(0.016)	(0.019)	(0.027)	(0.025)
Profit tax	-0.472***	-0.526***	0.039	0.076***	-0.042***	-0.043**	-0.004	-0.001
	(0.133)	(0.134)	(0.028)	(0.029)	(0.014)	(0.017)	(0.014)	(0.014)
Unemploy. rate	-0.666***	-0.767***	-0.007	-0.263	-0.027	-0.039	-0.088*	-0.073
	(0.194)	(0.197)	(0.192)	(0.195)	(0.023)	(0.027)	(0.053)	(0.052)
TRGDP	379.360	538.673	-18.640*	-8.660	-1.310	-1.762	3.961	9.765
	(429.611)	(431.522)	(9.932)	(9.954)	(2.334	(2.704)	(17.293)	(15.927)
WGI	2.253***	2.564***	0.31	0.183	0.231***	0.225**	0.209	0.175
	(0.624)	(0.634)	(0.353)	(0.351)	(0.077)	(0.089)	(0.136)	(0.128)
WGI*Medium	-0.025	-0.017	-0.166	-0.177	-0.14***	-0.139***	0.111**	0.091**
	(0.089)	(0.09)	(0.188)	(0.191)	(0.028)	(0.029)	(0.043)	(0.043)
WGI*Large	0.073	0.084	-0.36*	-0.315*	-0.154***	-0.144***	0.061	0.024
	(0.086)	(0.087)	(0.188)	(0.191)	(0.036)	(0.037)	(0.054)	(0.055)
Constant	29.295***	35.638***	4.203	-0.012	0.671	2.293	-10.365***	-8.836***
	(6.328)	(6.431)	(7.1)	(7.114)	(1.7)	(1.967)	(1.998)	(1.917)
LR Chi^2								
ρ_c	0.031***	0.037***	0.072***	0.077***	0.019***	0.030***	0.162***	0.141***
ρ_r								
Observations	9,619		13,310		11,491		11,047	
No. of countries	9		6		20		20	

Note: ***, **, * indicate $p < 0.01$, $p < 0.05$, $p < 0.1$ respectively. Standard errors are in parentheses. All regressions include sector and year dummies. Results are computed using GSEM framework that does not produce LR Chi^2 statistics. Hence, it is computed using different procedure.

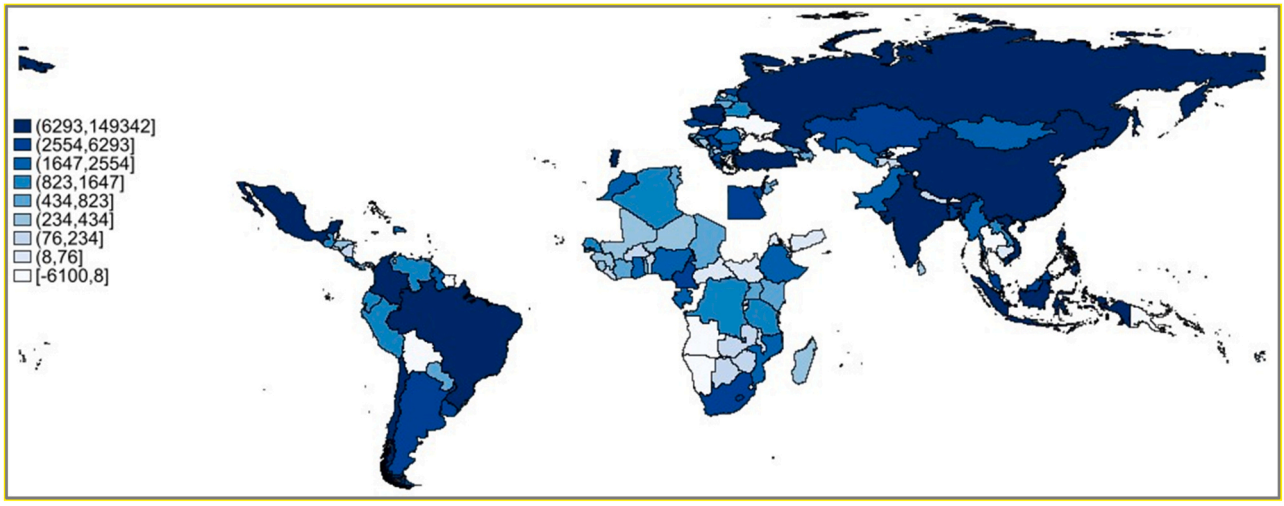

Fig. A1. Country-wise distribution of FDI flow in 2020
Source: (UNCTAD (2021)). Note: Numbers in the brackets with different colors on the left side of the figure are ranges of FDI flow in million US$.

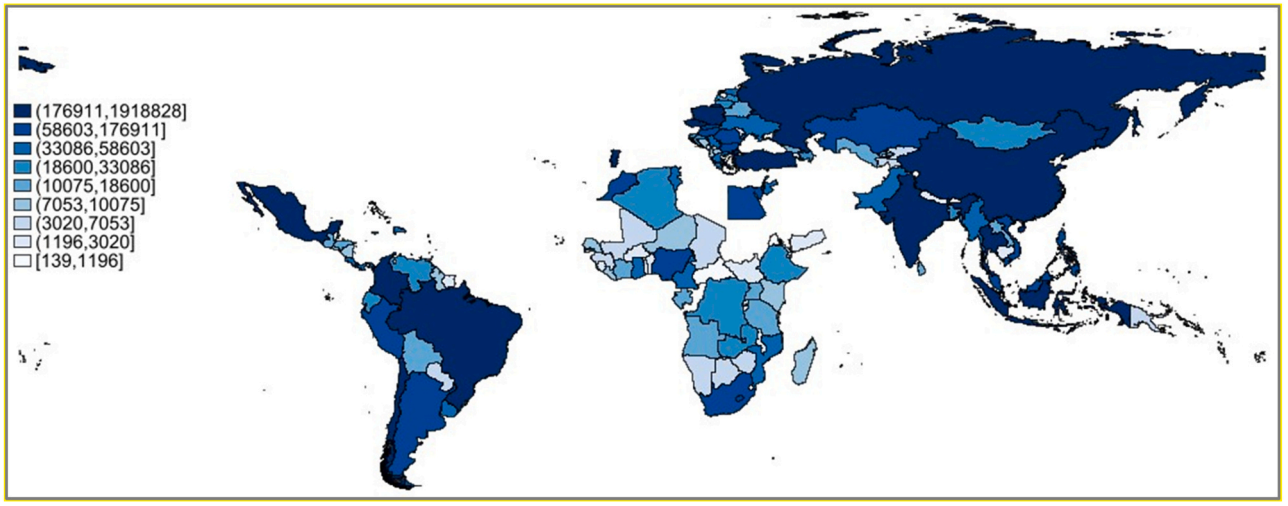

Fig. A2. Country-wise distribution of FDI stock in 2020
Source: (UNCTAD (2021)). Note: Numbers in the brackets with different colors on the left side of the figure are ranges of FDI stock in million US$.

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