Do Global Value Chains Pull Greenfield FDI Inflows into Emerging Markets? Theory and Evidence

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Abstract

Can Emerging Markets and Developing Economies (EMDEs) with scarce endowments seeking greater foreign direct investment (FDI) inflows stand to benefit from further global value chain (GVC) integration? We formally investigate this question and make two contributions to the literature: First, we develop a theoretical model that characterizes the advantage of multinational corporations to invest in countries that participate more in GVCs. Second, we test our theoretical predictions using bilateral Greenfield FDI flows data for a panel of 143 source and 109 host countries spanning the time-period 2003 to 2019. Our empirical results show that host country GVC participation promotes FDI inflows to EMDEs and that GVC positioning matters with downstream specialisation increasing the influx of FDI. We also find that host country financial development strongly complements the effect of GVC participation in attracting FDI.

Keywords: Global Value Chains; Greenfield Foreign Direct Investment; Gravity Model; Emerging Markets and Developing Economies
JEL Classification: O16, O19, F10, F14, F23

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1 Motivation and Contribution

One of the stylized facts associated with the rise of Global Value Chains (GVCs) is the concomitant rise in cross-border foreign direct investment (FDI) flows. Although traditionally, trade and FDI have long been considered as alternate strategies for firm internationalization, the rising production fragmentation across countries in GVCs has resulted in the evolution of a strong complementary relationship between trade and FDI flows (Cadestin et al., 2018). Thus, higher flows of FDI have occurred in tandem with the greater degree of participation of countries in GVCs across the world (Figure 1).

[Insert Figure 1 here]

Quite similar to the integral role of services in the spread of GVCs, as many value chains have tended to involve multinational corporations (MNCs), GVCs tend to be increasingly associated with FDI flows with subsidiaries supplying inputs to their parent firms. In this context, trade in intermediates happens through intra-firm transactions with production stages located in different countries (Martínez-Galán and Fontoura, 2019). Some estimates suggest that about 80 per cent of global trade in terms of gross exports is linked to the international production networks of MNCs, either through intra-firm trade transactions or through non-equity modes of international production.

Considering that FDI inflows remain an important source of external financing for many emerging markets and developing economies (EMDEs) across the world, can EMDEs with scarce endowments seeking greater FDI inflows stand to benefit from further GVC integration? Put differently, to what extent are FDI inflows from source countries influenced by the degree of GVC integration in the host countries? We tackle this question both theoretically and empirically in this paper. We contribute to the related literature by investigating whether MNCs opt to invest in countries with high levels of GVC participation as this can facilitate access to global markets and integration in the global economy.

One of the important challenges in trying to understand the nexus between our focal variables of interest is the issue of potential reverse causality. In other words, could GVC integration be a consequence rather than a driver of higher FDI inflows? As Amador and Cabral (2014, p. 14) note: "although it is difficult to set clear borderlines, the flows of FDI and intra-firm trade are mostly a consequence of the expansion of GVCs and not exactly drivers for its expansion." We take this as our starting point and explore the nexus between GVC integration and Greenfield FDI inflows, which to the best of our knowledge has not received the attention it deserves in the related literature. In this light, we make a novel attempt in this paper to address this challenge and build a case rooted in theory and empirics for why higher GVC participation by countries along the supply chain can act as a pull-factor for attracting Greenfield FDI inflows.

Our paper makes a unique contribution to understanding the relationship between FDI and GVCs in the following ways. First, we use a theoretical model featuring the allocation decision of FDI to EMDEs to rationalize how greater GVC participation acts as an important motivating factor in pulling Greenfield FDI inflows into EMDEs. Using the seminal framework

of Antras and Helpman (2004), we show that a higher share of intermediate inputs from the host country, indicative of host country GVC participation, lowers the offshoring productivity cut-off of MNCs. Since more firms undertake FDI based on lower offshoring productivity cut-off, we propose that investments flow more to countries with a higher degree of GVC participation. Second, we take our theory to data by empirically testing our model's theoretical predictions by constructing a large panel dataset on bilateral Greenfield FDI flows for 143 source countries and 109 host countries covering 2003 to 2019 utilizing a theoretically consistent gravity framework. Third, our empirical strategy relies on adopting a variety of estimating techniques to address possible endogeneity issues and offer extensive robustness checks to verify the veracity of our key results.

To preview our main empirical findings, we find strong evidence in favor of the hypothesis that host country GVC participation is a significant determinant of FDI inflows from source countries. Further, we also find robust empirical evidence that underlines the importance of a country's positioning in the GVC in determining FDI flows, viz. a country with downstream specialization tends to attract greater FDI flows. Finally, our results also demonstrate the complementary effects played by host country factors like financial development in boosting FDI inflows through its effect on GVC participation.

The remainder of the paper is structured as follows. Section 2 lays out the theoretical framework, while Section 3 elaborates the empirical strategy adopted to test the theoretical predictions of the model. Section 4 furnishes the empirical results, along with robustness checks. Section 5 concludes.

2 Model

2.1 Theoretical setup

In this section, we use a simplified version of Antras and Helpman (2004); Larch and Navarro (2021) to formally study the role of GVCs in attracting FDI inflows to EMDEs[1]. Our model abstracts from global sourcing and focuses on firm's decision concerning vertical integration. To keep the model simple and tractable, our world comprises two countries; the source country and the host country. Firms produce final goods to cater to world demand (that includes both source and host countries). Their production process consists of two inputs: a) headquarter services b) intermediate inputs. Firms secure headquarter services from the source country on account of the comparative advantage. The final goods firm's overarching question is regarding the second stage of production, i.e., manufacturing the intermediate inputs home (source country) or offshore manufacturing abroad (host country)[2].

[1]Studies like Harms and Méon (2018) and Gopalan et al. (2018) finds greenfield FDI (not M&A) to have a strong effect on capital stock of EMDEs. M&As represent a rent accruing to previous owners and may not necessarily contribute to expanding the host country's capital stock. In the context of our focus on EMDEs as host countries, we refer to greenfield FDI as 'FDI' in our theoretical model.

[2]Our model only considers vertical integration premise as global sourcing lies beyond the framework of our study.

2.1.1 Consumers

The world is populated by consumers with identical preferences whose utility function is given by

$$U = x_0 ln x_0 + \sum_{s=1}^{S} \gamma_s ln X_s, \sum_{s=1}^{J} \gamma_s = 1 \tag{1}$$

where x_0 is the consumption of the homogenous good. X_s is a Constant Elasticity of Substitution (CES) aggregate of varieties $x_s(i)$ in sector s denoted by:

$$X_s = \left[\int_{i \in I_s} x_s(i)^{\alpha_s} di \right]^{\frac{1}{\alpha_s}}, 0 < \alpha_s < 1 \tag{2}$$

where elasticity of substitution between any two varieties is given by $\sigma_s = \frac{1}{1-\alpha_s}$. The consumer maximises Eq. (1) subject to the below budget constraint:

$$p_0 x_0 + \sum_{s=1}^{S} \int_{i \in I_s} p_s(i) q_s(i) di \leq E \tag{3}$$

where E denotes the world expenditure on consumption and the sector s price index is given by $P_s = \left[\int_{i \in I_s} p_s(i)^{1-\sigma_s} di \right]^{\frac{1}{\sigma_s}}$. The first order conditions from the consumer's optimisation problem yields the below demand function of variety i in sector s:

$$x_s(i) = \gamma_s E X_s^{-\alpha_s} x_s(i)^{\alpha_s} \tag{4}$$

2.1.2 Firms

As in Antras and Helpman (2004), the firm bears a sunk cost of entry to start producing a variety in sector s. After payment of the sunk cost, the firm draws its productivity level ω from a known distribution $G(\omega)$. After seeing the productivity level, the final goods firm decides whether to exit the market or start production. If the firm stays, it must decide where to locate the manufacturing production (domestic manufacturing, d or offshore, o). Firms face additional fixed establishment costs depending on where they choose to manufacture the intermediate inputs. Such fixed costs in sector s are denoted by $w^d f_s^c$ where $c \in \{d, o\}$. The production function of final goods follows a Cobb-Douglas functional form as below:

$$x_s(i) = \omega \left(\frac{q_{h,s(i)}}{1-\eta_s} \right)^{1-\eta_s} \left(\frac{q_{m,s(i)}}{\eta_s} \right)^{\eta_s} \tag{5}$$

where $q_{h,s(i)}$ and $q_{m,s(i)}$ denote headquarter services and intermediate inputs, respectively. η_s measures the intensity of intermediate inputs in the production function. When firms offshore manufacturing intermediate inputs to the host country, η_s indicates the degree of the host country GVC participation as the model universe comprises only the source and host countries.

The inputs to production are produced only with labour services[3]. Hence, we have

$$q_{k,s(i)} = l_{k,s}(i), k = h, m \tag{6}$$

The firm's revenue in producing variety i is given by:

$$r_s(i) = p_s(i)q_s(i) \tag{7}$$

Substituting Eqs. (4) and (5) in Eq. (7), we can re-write the firm revenue function as:

$$r_s(i) = \gamma_s E X_s^{-\alpha_s} \left[\omega \left(\frac{q_{h,s(i)}}{1-\eta_s} \right)^{1-\eta_s} \left(\frac{q_{m,s(i)}}{\eta_s} \right)^{\eta_s} \right]^{\alpha_s} \tag{8}$$

The homogeneous sector output x_o has constant returns to technology. Hence, we have:

$$x_o = A_{0,c} l_0, c \in \{d, o\} \tag{9}$$

where $A_{0,c} > 0$ denotes labour productivity in location c.

Assumption 1: All firms are assumed to be based in the source country. The firms use headquarter services from the source country alone due to comparative advantage.

Assumption 2: Fixed establishment cost of manufacturing the intermediate inputs are larger in the host country (offshoring). This implies:

$$f^o > f^d \tag{10}$$

Assumption 3: The productivity of source country workers is higher than the host county. $A_{0,d} > A_{0,o}$. Consequently, wages in the source country are higher than the host country, i.e. $w^d > w^o$.

Producer's problem: The objective of the firm is to maximise the below profit function:

$$\pi_s^c = r_s(i) - w^d q_{h,s(i)} - w^c q_{m,s(i)} - w^d f_s^c \tag{11}$$

where $c = \{d, o\}$ pertains to the location of the intermediate input manufacturing plant. The first order conditions with respect to the choice variables $q_{h,s}(i)$ and $q_{m,s}(i)$ are given below:

$$q_{h,s}(i) = \frac{\alpha_s(1-\eta_s)}{w^c} r_s(i), c = \{d, o\} \tag{12}$$

$$q_{m,s}(i) = \frac{\alpha_s \eta_s}{w^o} r_s(i) \tag{13}$$

Plugging the FOCs to the revenue function in Eq. (8), we derive the optimal revenue function

[3]Expanding the production of intermediate inputs to include imported goods as a factor of production would essentially imply $q_{m,s(i)}$ as the sum of foreign and domestic value-added in sector s.

of locating intermediate input production in location c as:

$$r_s^{c*}(\omega) \equiv (\frac{\alpha_s \omega}{X_s})^{\sigma_s - 1} (\gamma_s E)^{\sigma_s} \left[\left(w^d \right)^{1-\eta_s} (w^c)^{\eta_s} \right]^{1-\sigma_s}, c \in \{d, o\} \tag{14}$$

with optimal headquarter services and intermediate inputs as below:

$$q_{h,s}^*(i) = \frac{\alpha_s(1-\eta_s)}{w^d} r_s^{c*}(\omega) \tag{15}$$

$$q_{m,s}^*(i) = \frac{\alpha_s \eta_s}{w^c} r_s^{c*}(\omega) \tag{16}$$

Using the optimal inputs function, we can also derive the optimal output and price as:

$$x_s^*(i) = (\omega \alpha_s \gamma_s E)^{\sigma_s} X_s^{1-\sigma_s} \left[\left(w^d \right)^{1-\eta_s} (w^c)^{\eta_s} \right]^{-\sigma_s} \tag{17}$$

$$p_s^*(i) = \frac{(w^d)^{1-\eta_s} (w^c)^{\eta_s}}{(\omega \alpha_s)} \tag{18}$$

Replacing the expressions in Eq. (11) with the optimum, we get the firm profits associated manufacturing location c as:

$$\pi_s^c = \frac{r_s^{c*}(\omega)}{\sigma_j} - w^d f_s^c \tag{19}$$

Offshoring premium: For simplicity, we assume the existence of only one differentiated sector and drop the index s in the remaining section of the theoretical model. Dividing the optimal revenue in Eq. (14) associated with domestic manufacturing (d) to offshoring (o) yields the below expression:

$$r^{o*}(\omega) = \left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} r^{d*}(\omega) \tag{20}$$

Thus, the revenue premium of firms who offshore with productivity ω can be derived as:

$$r^{o,prem}(\omega) \equiv r^{o*}(\omega) - r^{d*}(\omega) = \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right] r^{d*}(\omega) \tag{21}$$

Analogously, we can derive the offshoring profit premium using Eqs. (19) and (20) as:

$$\pi^{o,prem}(\omega) \equiv \pi^{o*}(\omega) - \pi^{d*}(\omega) = \frac{r^{d*}(\omega)}{\sigma_j} \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right] - w^d (f^o - f^d) \tag{22}$$

Let us denote $\overline{\omega}$ and $\overline{\omega^o}$ as the average productivity of firms who undertake domestic man-

ufacturing and offshoring, respectively.

$$\overline{\omega^o} = \left[\frac{1}{1-G(\overline{\omega^{o*}})}\int_{\omega^{o*}}^{\infty}\omega^{\sigma-1}g(\omega)d\omega\right]^{\frac{1}{\sigma-1}} \tag{23}$$

$$\overline{\omega} = \left[\frac{1}{1-G(\underline{\omega}^*)}\int_{\underline{\omega^*}}^{\infty}\omega^{\sigma-1}g(\omega)d\omega\right]^{\frac{1}{\sigma-1}} \tag{24}$$

where $\underline{\omega}^*$ and $\overline{\omega^{o*}}$ are the productivity cut-offs for firms to engage in domestic manufacturing and offshoring, respectively.

Domestic manufacturing productivity cut-off: Firms with average productivity level $\overline{\omega}$ will choose to engage in domestic manufacturing if $\pi^d(\overline{\omega}) > 0$. Hence, the cut-off productivity $\underline{\omega^*}$ is determined by:

$$\pi^d(\underline{\omega}^*) = 0 \implies r^d(\underline{\omega}^*) = \sigma w^d f^d \tag{25}$$

The average firm revenue as a function of cut-off revenue in domestic manufacturing is given by:

$$\frac{r^d(\overline{\omega})}{r^d(\underline{\omega})^*} = \left(\frac{\overline{\omega}}{\underline{\omega}^*}\right)^{\sigma-1} \tag{26}$$

Using Eqs. (19), (25) and (26), we can derive the below cut-off profit condition for firms to engage in domestic manufacturing.

$$\pi^d(\overline{\omega}) = w^d f^d\left[\left(\frac{\overline{\omega}}{\underline{\omega}^*}\right)^{\sigma-1} - 1\right] \tag{27}$$

[Insert Figure 2 here]

Fig. 2 shows firm profits as a function of realised productivity ω. Firms with productivity $\omega \in [\underline{\omega}^*, \overline{\omega^{o*}}]$ undertake intermediate inputs production domestically. On the other hand, firms with productivity level $\omega \in [\underline{\omega}^* \infty]$, offshore. From Fig. 2, we can decipher that average per-period profit $\overline{\pi}$ is a sum of average domestic manufacturing profit and average offshoring profit premium. Hence, we have:

$$\overline{\pi} = \pi^d(\overline{\omega}) + \zeta^* \pi^{o,prem}(\overline{\omega^o}) \tag{28}$$

where $\zeta^* \equiv \frac{1-G(\omega^{o*})}{1-G(\omega^*)}$ refers to the fraction of firms that offshore manufacturing of intermediate products abroad.

Offshoring productivity cut-off: Firms will opt for offshoring only if the profit premium from offshoring is positive. Hence, the zero cut-off profit condition for offshoring is given as:

$$\pi^{o,prem}(\omega^{o*}) = 0 \tag{29}$$

Substituting Eqs. (22) and (25) using $\omega = \omega^{o*}$ in Eq. (29), we get:

$$r^{o*}(\omega^{o*}) = \sigma w^d (f^o - f^d) \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right]^{-1} \tag{30}$$

Dividing the above with revenue of firm at cut-off productivity for domestic manufacturing (see Eq. (25)), we derive:

$$\frac{r^{o*}(\omega^{o*})}{r^{d*}(\underline{\omega}^*)} = \frac{\sigma w^d (f^o - f^d) \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right]^{-1}}{\sigma w^d f^d} = w^d \left(\frac{f^o}{f^d} - 1 \right) \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right]^{-1} \tag{31}$$

Analogous to Eq. (26), we can also show that:

$$\frac{r^{o*}(\omega^{o*})}{r^{d*}(\underline{\omega}^*)} = \left(\frac{\omega^{o*}}{\underline{\omega}^*} \right)^{\sigma-1} \tag{32}$$

Using Eqs. (31) and (32), we can derive the offshoring to domestic manufacturing productivity cut-off spread as:

$$\left(\frac{\omega^{o*}}{\underline{\omega}^*} \right)^{\sigma-1} = w^d \left(\frac{f^o}{f^d} - 1 \right) \left[\left(\frac{w^d}{w^o} \right)^{\eta(\sigma-1)} - 1 \right]^{-1} \tag{33}$$

Since $w^d > w^o$ (see assumption 3), rise in η causes the equilibrium spread between offshoring to domestic manufacturing productivity in Eq. (33) to narrow. In Fig. 2, the slope of offshoring profit function $\pi^o(\omega)$ pertains to $\eta = \eta^{baseline}$. The slope of $\pi^0(\omega)$ becomes steep as η rises. The dotted profit line corresponds to the share of intermediate inputs at $\eta = \eta^g$ where $\eta^g > \eta^{baseline}$. The new equilibrium offshoring productivity cut-off equal ω_g^{o*}. Such a lower cut-off enables more firms to offshore manufacturing abroad. Since η indicates the degree of host country GVC participation as explained previously, we have the below proposition:

Proposition: *All else equal, investments will flow more to countries with a higher degree of GVC participation on account of lower offshoring productivity cut-off.*

3 Empirical Framework

In this section, we assess our formal theoretical proposition empirically on how GVC participation impacts FDI inflows. To that end, we employ an augmented gravity model, which has not only been used extensively in the FDI literature but is also theoretically consistent (Anderson, 2011). Taking a cue from this literature, our empirical strategy relies on employing the Poisson Pseudo-Maximum Likelihood (PPML) estimator proposed by Silva and Tenreyro (2006). To be sure, a rich literature utilizing gravity models have established that the PPML estimator provides consistent coefficient estimates in the presence of heteroscedasticity and measurement error[4]. Instead of log-linearising the gravity model like in other studies (See for instance Martínez-Galán and Fontoura (2019)), we estimate the following equation through PPML procedure as our baseline model:

$$fdi_{sh,t} = exp\left(\alpha log(GVC_{h,t-1}^{participation}) + \beta GDP_{s,t} + \boldsymbol{\gamma' G_{sh}} + \boldsymbol{\kappa' X_{sh,t}} + \boldsymbol{\delta' X_{h,t}} + \chi_s + \vartheta_h + \eta_t\right) + \xi_{sh,t} \quad (34)$$

where,

- $fdi_{sh,t} = \frac{FDI_{sh,t}}{GDP_{h,t}}$ is the value of greenfield FDI from source country (s) to the host country (h) divided by the host country GDP in year t; and
- $GVC_{h,t-1}^{participation}$ measures the GVC participation of the host country in year $t-1$. The proposition in the theoretical setup implies that firms invest more in countries with a higher degree of GVC participation. A finding of $\alpha > 0$ will provide empirical support for this hypothesis.
- $GDP_{s,t}$ is the nominal GDP of the source country that proxy for its market size[5].
- Vectors $\boldsymbol{G_{sh}}$ and $\boldsymbol{X_{sh,t}}$ in Equation 34 proxy the bilateral trade costs.
  - $\boldsymbol{G_{sh}}$ consists of time invariant gravity variables like the log of population-weighted distance between the capitals of the origin and destination countries ($log(Distance_{sh})$), dummy variables that indicate whether country s and country h share a common language ($ComLang_{sh}$), common border ($Contig_{sh}$), common colonial power ($ComCol_{sh}$) and common legal origin ($ComOrigin_{sh}$) (Brouwer et al., 2008; Buelens and Tirpák, 2017; Feng et al., 2019; Mercado, 2018) .
  - $\boldsymbol{X_{sh,t}}$ comprises of time variate bilateral macro variables like bilateral nominal exchange rate ($ExchangeRate_{sh,t}$), difference in real GDP per capita ($GDPcapitaDiff_{sh,t}$)

[4] An additional benefit of using the PPML estimator is that it also helps tackle the issue of zero FDI values in the gravity dataset, which typically tends to be a significant issue in most studies using FDI data. However, our sample comprises only five zero-valued greenfield FDI observations, and hence we do not anticipate this to be a significant problem to deal with.

[5] We do not include host country GDP as an explanatory variable as bilateral FDI is already normalised by host country GDP.

that are known to impact FDI flows (Hattari and Rajan, 2009; Choi et al., 2020; Fajgelbaum et al., 2015).

- $\boldsymbol{X_{h,t}}$ comprises of a parsimonious list of host country specific variables that are commonly found to determine FDI inflows. $\boldsymbol{X_{h,t}}$ consists of variables like real GDP growth ($GDPgrowth_{h,t}$), rule of law ($RuleOfLaw_{h,t}$), education spending ($EduSpending_{h,t}$), trade openness ($Openness_{sh,t}$) and inflation ($Inflation_{h,t}$) (Borensztein et al., 1998; Carstensen and Toubal, 2004; Aizenman et al., 2013; Amendolagine et al., 2019; Yeyati et al., 2003). We highlight the expected signs of the aforementioned covariate coefficients in Table 1.

[Insert Table 1 here]

- χ_s, ϑ_h and η_t control for source country, host country and year fixed effects, respectively. This is possible largely because of the bilateral structure of our FDI data which allows us to control for push factors at the global or country level that could possibly affect FDI inflows from a common source country. Further, the bilateral structure also allows us to control for fixed effects between country pairs, which can account for both the multilateral resistance (third-country effect) and unabsorbed country characteristics.

- Lastly, $\xi_{sh,t}$ is the stochastic error term.

Consistent with gravity literature on bilateral FDI, all the regressors enter Equation 34 contemporaneously. However, to avoid any potential reverse causality concerns from bilateral FDI inflows to GVC participation, we consider the variable of interest GVC participation to be lagged by a year.

We also estimate ťorefmodel1using GVC participation measures such as backward and forward participation to investigate the role of forward/backward linkages in attracting FDI inflows. A country can have a high degree of GVC participation through either upstream or downstream specialisation. To understand whether the GVC position of a country (upstream specialisation versus downstream specialisation) plays a role in determining the FDI inflow to a country, we also analyse the below empirical model

$$fdi_{sh,t} = exp\left(\alpha GVC_{h,t-1}^{position} + \boldsymbol{\delta'}\boldsymbol{X_{h,t}} + \boldsymbol{\kappa'}\boldsymbol{X_{sh,t}} + \boldsymbol{\gamma'}\boldsymbol{G_{sh}} + \chi_s + \vartheta_h + \eta_t\right) + \xi_{sh,t} \qquad (35)$$

A finding of $\alpha > 0$ will indicate that upstream specialisation would result in greater FDI inflow to a country whereas $\alpha < 0$ would show downstream specialisation to result in greater FDI inflow to a country.

3.1 Data on Foreign Direct Investment

Our primary source of cross-border greenfield FDI data is from fDi Markets of the Financial Times, a comprehensive cross-border greenfield investment flows database. Several studies have reaffirmed the quality of this greenfield FDI dataset (Desbordes and Wei, 2017; UNCTAD,

2020; Aizenman et al., 2018). The dataset reports the name, location of the investor and the destination, size and sector of the project. We aggregate the data by the source and host country of the investor and investment project. We drop high-income host countries from the sample to keep our focus on EMDEs, defined as middle and low-income countries classified by the World Bank. The final aggregated FDI data set is a panel of 18,539 source-host-year observations from 2660 source-host pairs including 143 source countries and 109 host countries. Our large, bidirectionally disaggregated sample reduces aggregation bias and multicollinearity in our analysis[6]. As a robustness check, we also collect available bilateral FDI data from alternative sources such as the UNCTAD FDI database which contains information on aggregate FDI flows and stocks measured using a balance of payment concept for 206 economies from 2003 to 2012.

3.2 Data on Global Value Chains

The data on GVC measures are obtained from UNCTAD-Eora database (Casella et al., 2019) which consists of data on GVC participation of countries for 190 countries from 1990 to 2018. The database offers a decomposition of countries exports into domestic and foreign value added. We are particularly interested in 'indirect domestic value added' (IVA) and 'foreign value added' (FVA). IVA corresponds to the domestic value added in intermediates (goods or services) exported to a partner economy which is subsequently re-exported to a third economy as embodied in other products. Put differently, IVA pertains to forward GVC participation (upstream specialisation). On the other hand, FVA represents the value added of imported inputs to produce intermediate or final goods/services to be exported. FVA pertains to backward GVC participation (downstream specialisation). As a robustness check, we additionally collect data from OECD TiVA that reports both domestic and foreign value added content of gross exports for 64 economies from 2005 to 2015.

Following the framework and definitions by Koopman et al. (2010), we construct the following four popular GVC measures using the value added data: GVC participation, backward participation, forward participation and GVC position. GVC participation of country h in year t can be defined as

$$GVC^{participation_{h,t}} = \frac{IVA_{h,t} + FVA_{h,t}}{Exports_{h,t}} \tag{36}$$

Backward and forward participation are defined as:

$$Forward_{h,t}^{participation} = \frac{IVA_{h,t}}{Exports_{h,t}} \tag{37}$$

$$Backward_{h,t}^{participation} = \frac{FVA_{h,t}}{Exports_{h,t}} \tag{38}$$

In addition to participation, we also construct the GVC position index that measures a

[6]We acknowledge that fDi Markets data comprise project estimates that maybe subject to measurement errors. There is not much we can do to tackle this issue.

country's position in the value chains. The GVC position of country h in year t is defined as:

$$GVC^{position_{h,t}} = \ln(1 + \frac{IVA_{h,t}}{Exports_{h,t}}) - \ln(1 + \frac{FVA_{h,t}}{Exports_{h,t}}) \tag{39}$$

When $GVC^{position} > 0$, the country partakes in economic activities that lie closer upstream to the raw materials. Similarly, if $GVC_{position} < 0$, the country lies closer downstream to the finished final product. Figure 3 depicts the positioning of the GVCs nearer to raw materials or final products based on backward (downstream) and forward (upstream) participation.

[Insert Figure 3 here]

3.3 Controls

The data on nominal GDP, the rule of law index, education spending as a percentage of government spending, trade openness and inflation are collected from the World Bank World Development Indicators database. Gravity data on distance, common language, contiguity, common colonizer, common legal origin are collected from the USITC Dynamic Gravity dataset. The US dollar exchange rate data of approximately 190 economies from the Bank of International Settlements are used to calculate the bilateral pairwise exchange rate. To analyse the role of financial development in the effect of GVC participation uncertainty on FDI, we measure financial development by the financial development index constructed by the IMF that summarises how developed financial institutions and markets are concerning depth, access and efficiency. Table 2 shows the summary statistics of the variables used in our analysis.

[Insert Table 2 here]

4 Empirical Results

Before we discuss the empirical results, we show a simple scatterplot between Greenfield FDI inflows and GVC participation in Figure 4. As the figure shows, there appears to be a strong positive association between countries with larger GVC participation attracting greater Greenfield FDI inflows.

[Insert Figure 4 here]

We investigate this relationship more formally using the gravity model outlined earlier in Section 4.1. Section 4.2 provides an extensive list of robustness checks for our baseline results. Finally, in Section 4.3, we empirically test the theoretical extension examining the role of financial development in complementing the effect of GVC participation on FDI.

4.1 Baseline Results

The results from the PPML estimation of the baseline model (Equation 34) are reported in Table 3. Column (1) shows the results from the baseline model estimation. We find that

the GVC coefficient is both positive and highly statistically significant, consistent with our theoretical predictions. Increased GVC participation of the host country is associated with an increase in FDI inflows from the source country. We can also observe that the GVC coefficient is economically significant with a one percent increase in GVC participation of the host country being associated with an approximately 2 percent increase in FDI inflows (as a share of GDP).

We next decompose GVC participation into backward and forward integration to verify which matters more in attracting Greenfield FDI. The results from column (2) and column (3) are suggestive that backward integration matters relatively more than forward integration in attracting FDI to a host country. The economic magnitude of backward participation suggests a matching increase in terms of the magnitude of FDI inflows as a response to higher backward participation in the host country. Put differently, a one percent rise in backward participation is estimated to increase FDI by nearly one percent. On the other hand, forward participation appears to play an insignificant role (with a negative sign) in pulling Greenfield FDI to the host country.

Finally, we check if and how the GVC positioning affects Greenfield FDI inflows. As shown in Column (4), the results reveal that the GVC position coefficient is both negative and significant, suggesting that downstream specialisation (backward participation) attracts greater FDI inflows compared to forward participation as such. This is yet another significant result from a policy point of view, which also appears to be consistent with the observations in World Bank (2020) — that FDI inflows to EMDEs are linked to more backward GVC (manufacturing) integration and lower forward integration, as countries that focus on manufacturing may lower their exports of raw agricultural goods and intermediate services.

[Insert Table 3 here]

The signs of most control variables are consistent with our priors as well as the related literature. Focusing on the statistically significant covariates, we can find that nominal GDP of the source country is significant and positive. This is intuitive as the market size of the source country increases the bilateral outflow from the source country. Except for common language and common colony, all the other coefficients of the gravity variables like distance, contiguity and common legal origin are significant and have the expected signs. Among the host country-specific variables, the coefficients of education spending to GDP, trade openness and inflation are significant. Countries that spend more on education tend to have better quality human capital, and MNCs would prefer to invest in countries with better talent pools leading to higher FDI inflows (Amendolagine et al., 2019; Carstensen and Toubal, 2004; Noorbakhsh et al., 2001). Similarly, a positive and significant coefficient for trade openness implies countries that are more open to trade tend to attract more greenfield FDI (Yeyati et al., 2003). Finally, higher inflation, which serves as a proxy of macroeconomic instability, discourages FDI inflows (Choi et al., 2020). It is worth noting that the significance and the signs of the control variables remain robust across the different regressions from columns (1) through (5).

4.2 Robustness Checks

In this section, we conduct several robustness checks to verify the sensitivity of our baseline findings. First, we start by tackling reverse causality concerns. Next, we re-estimate our baseline model using different methodologies to verify if our baseline results still hold. Third, we also use alternative data sources to estimate our relationships of interest, viz. bilateral FDI and GVC participation. Finally, we check for the consistency of our estimates when we account for income and regional heterogeneity in our sample.

4.2.1 Reverse Causality

One of the fundamental empirical challenges in estimating our baseline model is whether the GVC participation of the host country tends to be endogenous. In particular, the source of endogeneity in question arises from the issue of whether FDI inflows are a driver rather than a consequence of GVC participation. We attempt to tackle this issue in two distinct ways. First, we re-estimate our model using a Blundell-Bond system-GMM estimator that can potentially address this concern. Second, we reverse our regression model and test whether FDI inflows drive GVC participation instead. We believe that such a reverse estimation provides an intuitive robustness check as to whether reverse causality is indeed an issue to contend with. It is pertinent to note here that a similar approach was adopted by Chinn and Ito (2006) in one of their seminal works on estimating the relationship between financial development and financial openness where they reverse their baseline regression model.

First, to our knowledge, there are no existing studies that offer a discussion of a possible list of instruments for GVC participation. In the absence of credible instruments, one of the potential alternatives could be using a Blundell-Bond system-GMM estimator to mitigate potential reverse causality concerns between GVC participation and FDI inflows. The use of system-GMM in dynamic gravity models has been quite well-established and accepted in the related literature (de Mello-Sampayo, 2009; Olivero and Yotov, 2012). Especially when the dependent variable exhibits path dependency, fixed effects applied to dynamic panels introduce 'Nickell bias,' which can be addressed through a system-GMM estimator. To that end, we re-estimate Equation 34 using a system-GMM estimator which allows us to use lagged levels of endogenous variables as instruments in the equation in first differences and the lagged differences as instruments for the equation in levels. By rule of thumb, we restrict the number of lags by three periods to avoid too many instruments, leading to 545 instruments used in estimation. Further, we undertake a Hansen test of the differenced equation to check the validity of the instruments and find over-identification not to be a pertinent issue in the model specification. The results of our estimation are summarized in Panel A of Table 4. We find that our baseline results go through and remain strongly consistent, especially with respect to the positive and significant GVC coefficient. The lagged dependent variable also appears to be positive and statistically significant, with the coefficient being close to zero, denoting persistence but with a high speed of adjustment.

As a further robustness check, we undertake a reverse model estimation where we regress

FDI inflows on GVC participation. A standard country panel framework is utilized as the bilateral framework cannot be preserved when GVC participation is the dependent variable. While the bilateral variables including trade costs, distance, common language, contiguity and common legal origin disappear from the model, we incorporate instead additional determinants of GVC participation such as rule of law, nominal exchange rate, population, capital-GDP ratio and IMF financial development index in the panel estimation based on recent literature (See for instance, Fernandes et al. (2020)). The results of the reverse estimation are reported in Panel B of Table 4. Interestingly, we find the FDI-GDP ratio coefficient to be statistically insignificant. This result is consistent with the intuition of our theoretical model. As we have argued in this paper thus far, we find more evidence supporting the notion that Greenfield FDI inflows into EMDEs appear to be driven by the host country's GVC participation and not the other way around. Put differently, Greenfield FDI inflows do not appear to be a significant determinant of GVC participation.

[Insert Table 4 here]

4.2.2 Methodological and Data Robustness

In this section, we consider two more types of robustness checks. The first pertains to employing different methodological variants to re-estimate our empirical model (Table 5). These include using different variants of fixed effects, dropping the zero observations, re-estimating using a simple ordinary least squares (OLS) estimation, and using different transformations of the dependent variables. The second involves using different definitions and data sources to construct alternative versions of bilateral FDI flows as well as GVC participation (Table 6).

Following the large empirical literature on bilateral FDI (Choi et al., 2020) which suggest different versions of fixed effects in a gravity context, we re-run our baseline model with source-host country fixed effects to control for any country pair specific time invariant factors as well as source country-time fixed effects to control for any macroeconomic shocks or policy changes affecting the source country. The source-host country fixed effects would implicitly control for the gravity variables like distance, common language, contiguity, common colony and common legal origin. The estimated results of Equation 34 (see column (1)) shows that lagged GVC participation emerges as a significant and positive determinant of bilateral FDI inflows in this alternate framework of fixed effects[7].

We also estimate Equation 34 using an ordinary least squares (OLS) method by dropping the zero-valued bilateral FDI observations from the sample. The results are reported under column (2) in Table 5. Yet again, we find that the coefficient of the lagged GVC participation continues to be consistently positive and statistically significant.

[Insert Table 5 here]

[7]We also tried other lags of the GVC participation measure and found that the 5 year average works for selected specifications such as when we use manufacturing-specific FDI as the dependent variable. Results are available upon request.

Yet another robustness exercise we undertake is considering a variant of the dependent variable by using the log-transformed Greenfield FDI inflows instead of the FDI-to-GDP ratio. As Column (3) shows, GVC participation remains a significant determinant of FDI inflows to EMDEs. Additionally, we also use greenfield FDI inflows to manufacturing industry-to-GDP ratio as the dependent variable. From column (4), we see that effect of the lagged GVC participation is significant and evidently more in the context of manufacturing FDI. A one percent increase in GVC participation of the host country causes an approximately 2.6 percent increase in manufacturing FDI inflows (as a share of GDP).

Finally, we construct a different measure of bilateral FDI by counting the number of projects and use this as the dependent variable instead. A measure based on the number of projects is possibly more consistent with our theory which models the entry choice of a new MNE. Hence, instead of focusing just on the scale of FDI per se, we consider the number of projects as the relevant measure in question. The PPML estimation accounts for observations with zero number of FDI projects. Columns (5) and (6) Equation 34 shows the results for FDI projects and manufacturing specific FDI projects as dependent variables, respectively. GVC participation has a significant and positive impact on the number of bilateral FDI projects (both total and manufacturing specific FDI projects). Columns (5) and (6) shows that the magnitude and significance of the coefficient are higher when total number of FDI projects is the dependent variable.

In Table 6, we show the robustness of our baseline results by using different data sources for FDI and GVC participation. Column (1) provides the estimation results of using UNCTAD's data to construct bilateral FDI flow data, while Column (2) furnishes the results using a different measure of GVC participation utilizing the OECD TIVA data. Both results show that GVC participation continues to be significant and positive in the way they influence greenfield FDI inflows.

[Insert Table 6 here]

4.2.3 Sub-sample Analysis

Our final set of robustness checks include exploring the sensitivity of our results to income and regional heterogeneity. In other words, will there be regional differences in the way GVC participation affects FDI inflows? Or will countries belonging to different income levels tend to experience differences in the way their GVC participation tends to influence Greenfield FDI inflows they attract? To test for these differences, we first repeat the baseline estimation separately for middle-income and low-income host countries. The results are reported in columns (1) and (2) respectively of Table 7. It is clear that our main conclusions established thus far remains unchanged while accounting for income heterogeneity, although interestingly we find that the elasticity of GVC participation is considerably larger for middle-income countries relative to lower-income countries.

Additionally, columns (1) and (2) of Table 7 also underline the role of backward and forward linkages in attracting FDI (see parts B and C). We find that forward participation matters only

for middle-income countries while it turns out to be statistically insignificant for lower-income countries. With regard to backward participation, we observe that it matters for both lower-and middle-income countries, but the economic and statistical significance of backward participation appears to be higher for middle-income countries. Finally, we find that both GVC participation and position (part D) matter for middle-income countries, albeit with a stronger focus on backward integration. In contrast, the storyline appears different for low-income countries (column 2) as we find their GVC positioning to be an irrelevant factor in attracting FDI. Backward participation is found to be only marginally significant (at 10 percent).

[Insert Table 7 here]

Next, we focus on regional samples by estimating the baseline model for the different regions in our sample. The results are reported from Columns (3) to (7) of Table 7. Akin to our results for different income samples, our main findings pertaining to the significance of GVC participation remain robust across regions, except Sub-Saharan Africa. As the GVC engagement rate of most countries in Sub-Saharan Africa is rather low especially in the manufacturing sectors (Van Biesebroeck and Mensah, 2019), our finding that GVC participation is not a significant determinant of FDI inflows in Africa seems intuitive. In terms of linkages, the forward participation coefficient is found to be significant only for emerging Asia and Emerging Europe. On the other hand, backward participation matters for the Middle East alone. Finally, GVC position proves to be a significant determinant in attracting FDI flows to Emerging Asia and the Middle east. The negative GVC position coefficient signifies downstream specialisation to attract FDI inflows, proving to be the case for the Middle East.

4.2.4 Role of Financial Development

Our last empirical relationship that we test for based on our theoretical model set out in Section 2 earlier is to understand the role of financial development in the way it influences the relationship between FDI inflows and GVC participation of host countries.

A growing literature has established the important role of financial development as a crucial determinant of FDI inflows to EMDEs. Studies have found that a sound financial system in the host country ameliorates investors' concerns about liquidity requirements and project failures, thereby creating a more conducive environment for investment and economic growth. Studies like Ang (2009); Medvedev (2012); Alfaro et al. (2009) find financial development to be an important pre-condition for FDI to have a positive impact on economic growth. While studies like Alfaro et al. (2009) have found financial development to increase the GVC participation of African countries, to our knowledge, there have been no studies that have explicitly examined the role of financial development in augmenting the positive impact of GVC participation on FDI.

A well-developed financial sector enables firms to source inputs for production efficiently, we formally investigate whether financial development would pique the interest of foreign investors

to invest more in countries that are more integrated in the GVC. To that end, we estimate the following equation:

$$fdi_{sh,t} = exp\left(\theta_1 FD_{h,t-1} + (\theta_2 + \theta_3 FD_{h,t-1}) log(GVC_{h,t-1}^{participation}) + \boldsymbol{\delta' X_{h,t}} + \boldsymbol{\kappa' X_{sh,t}} + \boldsymbol{\gamma' G_{sh}} + \chi_s + \vartheta_h + \eta_t\right) + \xi_{sh,t} \quad (40)$$

where $FD_{h,t}$ measure the financial development of the host country. We utilize the financial development index constructed by the IMF that measures the financial institutions and markets in terms of depth, access, and efficiency as a proxy for the financial development variable (Svirydzenka, 2016). We first estimate Equation 40 without the interaction term to determine the independent effect of financial development on FDI inflows. Consistent with the previous studies, column (1) of Table 8 shows the coefficient of financial development as positive and significant. Next, we estimate Equation 40 with the interaction term (column (2)). The positive and significant interaction term highlights the complementary role of financial development in amplifying the effect of GVC participation on FDI flows.

[Insert Table 8 here]

5 Conclusion

One of the important features of global integration today concerns the rapid rise in global value chains (GVCs) across the world. The expansion of GVCs have also been accompanied by both cross-border trade and foreign direct investment flows. While there is a growing academic interest in quantifying the potential development benefits of GVCs, there are hardly any studies attempting to systematically examine the nexus governing the relationship between FDI flows and GVCs, focusing on a large panel of EMDEs.

Given this context, we have examined the allocation decision of firms engaged in Greenfield FDI to emerging market and developing countries (EMDEs) based on the degree of global value chain (GVC) integration of the host countries. As production networks are largely coordinated by multinational corporations (MNCs), GVCs have known to be increasingly associated with FDI flows with subsidiaries supplying inputs to the parent firms. In this paper, we have formally investigated the claim that MNCs opt to invest in countries with high levels of GVC participation as this can facilitate access to global markets and integration in the global economy.

In doing so, we have made a two-fold contribution to the related literature: First, we used a FDI allocation theoretical framework to characterize the advantage of MNCs to invest in countries that participate more in GVCs. Put differently, our model has shown how greater GVC participation by the host country acts as a strong pull factor for MNCs in the source countries to undertake Greenfield FDI in the host countries. Second, we have tested our theoretical predictions empirically using bilateral Greenfield FDI flows data for a panel of 143 source and 109 host countries spanning the time-period 2003 to 2019.

Our findings show that host country GVC participation has emerged as a significant determinant of FDI inflows from source countries. We find this result robust to a battery of

sensitivity checks. Further, we also find that a country with downstream specialization tends to attract greater FDI flows, reiterating the importance of GVC positioning as a determinant of FDI inflows. Finally, our findings also show that other host country factors like financial development complement the effect of GVC participation in attracting FDI.

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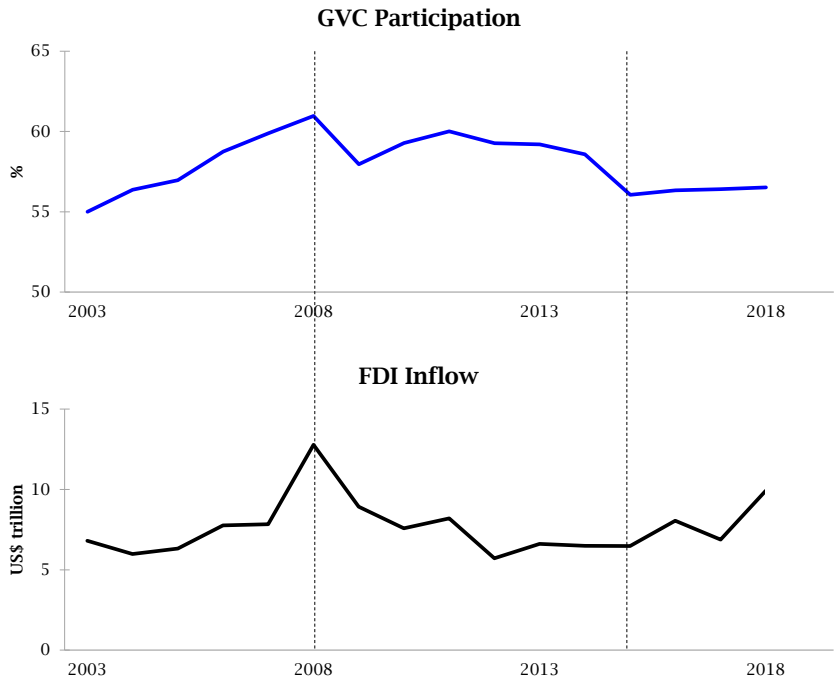

Figure 1: World GVC participation and greenfield FDI inflows comovement

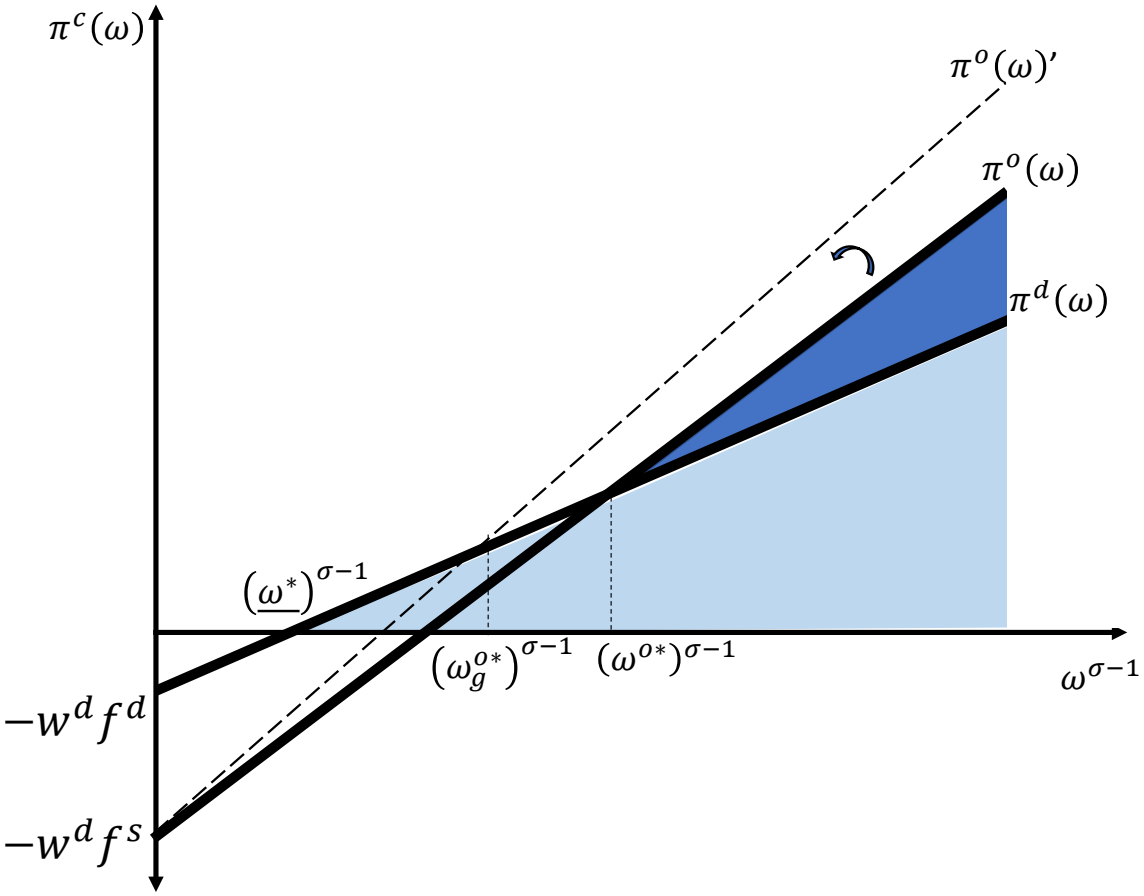

Figure 2: Firm profits

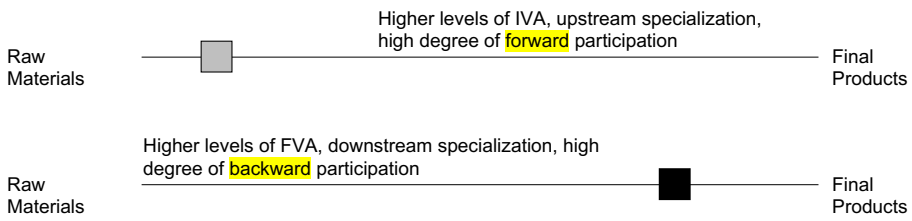

Figure 3: Position in GVCs

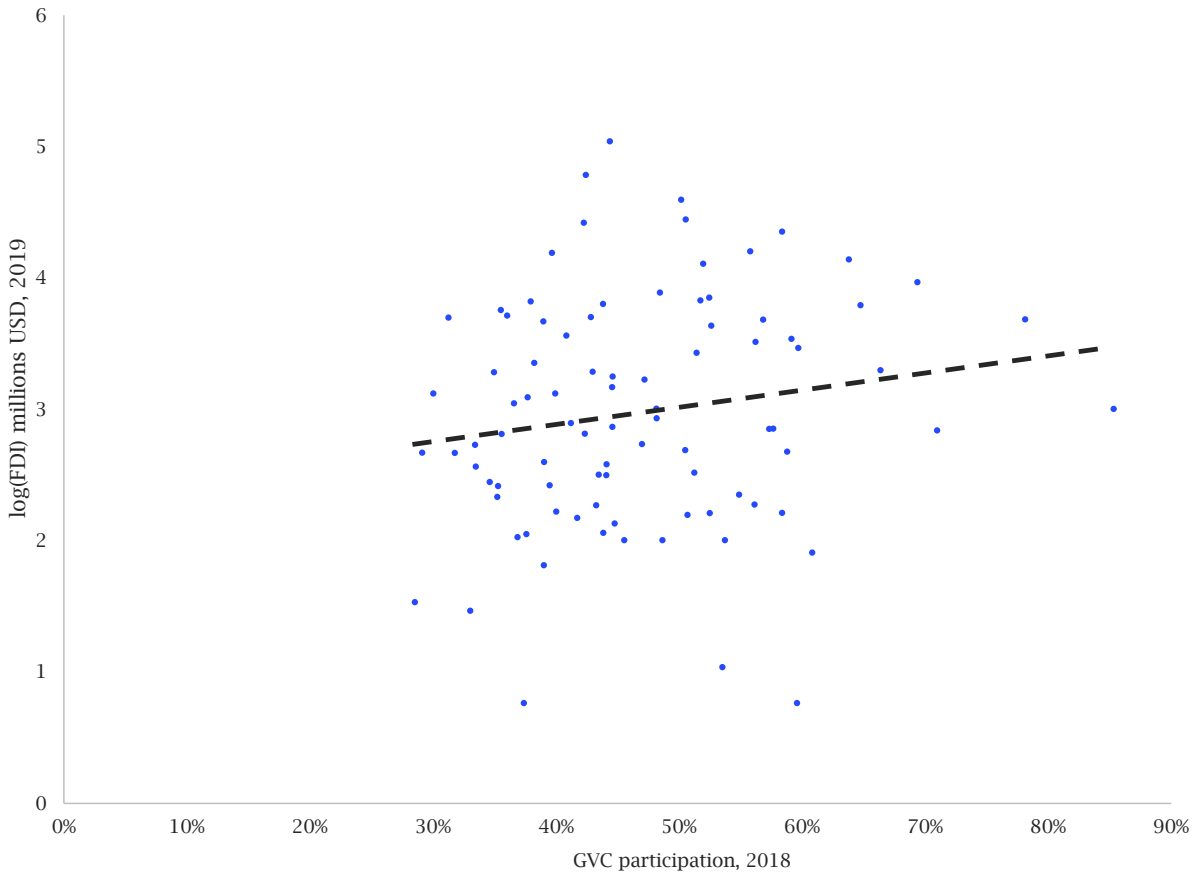

Figure 4: World GVC Participation and greenfield FDI inflows

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Table 1: Expected signs of control variables

Name of variable	Symbol	Expected sign	Source
GDP of source country	$log(GDP_{s,t})$	(+)	Brouwer et al. (2008)
Distance between source and host	$log(Distance_{sh})$	(–)	Buelens and Tirpák (2017)
Common Language	$ComLang_{sh}$	(+)/(-)	Davies et al. (2018)
Contiguity	$Contig_{sh}$	(-)	Carril-Caccia et al. (2019)
Common colonizer	$ComCol_{sh}$	(+)	Mercado (2018); Feng et al. (2019)
Common legal origin	$ComOrigin_{sh}$	(+)	Buelens and Tirpák (2017)
Pairwise exchange rate between source and host	$ExchangeRate_{sh,t}$	(–)	Hattari and Rajan (2009); Choi et al. (2020)
Difference between source and host GDP	$GDPcapitaDiff_{sh,t}$	(–)	Fajgelbaum et al. (2015)
GDP growth rate of host	$GDPgrowth_{h,t}$	(+)	Aizenman et al. (2013); Borensztein et al. (1998); Huanhuan (2020)
Rule of law of host country	$RuleOfLaw_{h_t}$	(+)	Amendolagine et al. (2019)
Education spending of host country	$EduSpending_{h_t}$	(+)	Carstensen and Toubal (2004); Amendolagine et al. (2019)
Openness of host country	$Openness_{h_t}$	(+)	Yeyati et al. (2003)
Inflation of host country	$Inflation_{h,t}$	(–)	Choi et al. (2020)

Table 2: Descriptive statistics

Statistic	Units	Min	25^{th} Percentile	Median	75^{th} Percentile	Max	Std. Dev.
FDI inflow	millions USD	0.004	13.70	59.00	243.41	40,000.00	1,337.90
GVC Participation of host country	—	0.22	0.42	0.48	0.57	4.33	0.14
GDP of source country	billions USD	0.51	268.76	709.15	2,416.93	21,374.40	4,117.88
GDP of host country	billions USD	0.14	32.77	109.71	349.55	14,342.90	1,801.79
Distance between source and host	km	66.83	2,275.15	5,173.10	9,053.44	19,747.16	4,205.74
Pairwise Exchange Rate between source and host	— pairwise_od	0.00	1.18	7.62	78.83	80,387.83	3,713.82
GDP growth rate of host country	%	−62.08	2.80	5.00	6.95	123.14	4.76
Rule of law of host country	Index	−2.61	−0.75	−0.43	−0.09	1.74	0.52
Education spending of host country	%	0.91	11.74	15.13	18.72	37.52	4.77
Openness of host country	%	0.17	47.51	65.17	97.76	348.00	38.77
Inflation of host country	%	−60.50	2.80	4.94	8.12	379.85	8.44
GVC position of host country	—	−0.32	−0.04	0.10	0.18	1.66	0.15
Financial Development	Index	0.04	0.17	0.30	0.42	0.75	0.16

Table 3: Baseline Results

	Dependent variable: log $\left(\frac{FDI_{sh,t}}{GDP_{h,t}}\right)$				
	GVC participation	Forward participation	Backward participation	GVC position	Without GVC measure
	(1)	(2)	(3)	(4)	(5)
$log(GVC_{h,t-1}^{participation})$	1.932***				
	(0.528)				
$log(Forward_{h,t-1}^{participation})$		-0.187			
		(0.284)			
$log(Backward_{h,t-1}^{participation})$			0.995***		
			(0.275)		
$GVC_{h,t-1}^{position}$				-2.154***	
				(0.181)	
$log(GDP_{s,t})$	0.396***	0.372***	0.367***	0.361***	0.338***
	(0.117)	(0.117)	(0.117)	(0.117)	(0.110)
$log(Distance_{sh})$	-0.233***	-0.232***	-0.233***	-0.233***	-0.248***
	(0.054)	(0.054)	(0.054)	(0.054)	(0.050)
$ComLang_{sh}$	-0.084	-0.090	-0.091	-0.096	-0.059
	(0.086)	(0.086)	(0.086)	(0.086)	(0.081)
$Contig_{sh}$	-0.459***	-0.469***	-0.484***	-0.480***	-0.471***
	(0.118)	(0.118)	(0.117)	(0.118)	(0.113)
$ComCol_{sh}$	0.009	0.014	0.025	0.013	0.076
	(0.129)	(0.129)	(0.129)	(0.129)	(0.121)
$ComOrigin_{sh}$	0.316***	0.315***	0.328***	0.325***	0.272**
	(0.116)	(0.116)	(0.116)	(0.116)	(0.109)
$ExchangeRate_{sh,t}$	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
$GDPcapitaDiff_{sh,t}$	-0.030	-0.033	-0.052	-0.041	-0.029
	(0.062)	(0.062)	(0.063)	(0.062)	(0.060)
$GDPgrowth_{h,t}$	-0.003	-0.005	-0.008	-0.006	-0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
$RuleOfLaw_{h_t}$	-0.134	-0.105	-0.186	-0.117	-0.095
	(0.177)	(0.177)	(0.179)	(0.177)	(0.173)
$EduSpending_{h_t}$	0.035***	0.039***	0.030***	0.037***	0.042***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)
$Openness_{h,t}$	0.010***	0.011***	0.009***	0.010***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Inflation_{h,t}$	-0.022***	-0.020***	-0.021***	-0.021***	-0.019***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
Source FE?	Yes	Yes	Yes	Yes	Yes
Host FE?	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes
Observations	8,160	8,160	8,160	8,160	8,805
Adjusted R^2	0.775	0.774	0.777	0.776	0.745

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors.

Table 4: Robustness check (I)

Panel A: GMM estimation of baseline model

	Dependent variable: $log\left(\frac{FDI_{sh,t}}{GDP_{h,t}}\right)$
$\log\left(\frac{FDI_{sh,t-1}}{GDP_{h,t-1}}\right)$	0.231***
	(0.027)
$log(GVC_{h,t-1}^{participation})$	0.681*
	(0.435)
Year FE?	Yes
Baseline controls?	Yes
Observations	4536
F-statistic	0.000
Hansen	0.777
Instruments	545

Panel B: Reverse regression: Cross country panel

	Dependent variable: $log\left(GVC_{h,t}^{participation}\right)$
$log(\frac{FDI_{h,t-1}}{GDP_{h,t-1}})$	-0.002
	(0.003)
$RuleOfLaw_{h,t}$	-0.057***
	(0.020)
$ExchangeRate_{h,t}$	0.0003
	(0.0003)
$Population_{h,t}$	0.001**
	(0.001)
$\frac{Capital_{h,t}}{GDP_{h,t}}$	-0.00004*
	(0.00002)
$FinancialDevelopment_{h,t}$	-0.165*
	(0.086)
Country FE?	Yes
Year FE?	Yes
R^2	0.049
Observations	467

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors

Table 5: Robustness check (II)

	Alternate Fixed effects	*OLS*	$FDI_{sh,t}$	$\frac{FDI^{mfg}_{sh,t}}{GDP_{h,t}}$	$FDIprojects_{sh,t}$	$FDIprojects^{mfg}_{sh,t}$
	(1)	(2)	(3)	(4)	(5)	(6)
$log(GVC^{participation}_{h,t-1})$	1.450**	1.377**	1.418*	2.642***	0.918***	0.762*
	(0.496)	(0.556)	(0.822)	(0.728)	(0.241)	(0.344)
Baseline model controls?	Yes	Yes	Yes	Yes	Yes	Yes
Source FE?	No	Yes	Yes	Yes	Yes	Yes
Host FE?	No	Yes	Yes	Yes	Yes	Yes
Year FE?	No	Yes	Yes	Yes	No	No
Source-time FE?	Yes	No	No	No	No	No
Host-Source FE?	Yes	No	No	No	No	No
Observations	8,160	8,160	8,160	3697	8,160	3697
Adjusted R^2	0.963	0.951	0.690	0.875	0.824	0.766

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors

Table 6: Robustness check (III)

	Dependent variable: log $\left(\frac{FDI_{sh,t}}{GDP_{h,t}}\right)$	
	Alternate FDI flow data source: UNCTAD	Alternate GVC data source: OECD
	(1)	(2)
$log(GVC^{participation}_{h,t-1})$	1.870***	1.822**
	(0.707)	(0.920)
Baseline model controls?	Yes	Yes
Source FE?	Yes	Yes
Host FE?	Yes	Yes
Year FE?	Yes	Yes
Observations	10,501	3,546
Adjusted R^2	0.679	0.696

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors

Table 7: Subsample analysis

	Dependent variable: log $\left(\frac{FDI_{sh,t}}{GDP_{h,t}}\right)$						
	Host countries						
	By income level		By region				
	Middle Income	Low Income	Emerging Asia	Emerging Europe	Latin America & Caribb.	Middle East	Africa
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Part A: GVC Participation							
$log(GVC_{h,t-1}^{participation})$	4.813***	3.854***	1.466**	14.384***	3.439***	4.747**	0.651
	(0.737)	(1.231)	(0.742)	(3.898)	(1.251)	(2.402)	(1.152)
Adjusted R^2	0.723	0.896	0.743	0.821	0.831	0.752	0.869
Part B: Forward Participation							
$log(Forward_{h,t-1}^{participation})$	1.264**	0.610	3.166***	6.025***	0.510	-0.826	0.488
	(0.563)	(0.777)	(0.746)	(1.759)	(0.679)	(1.145)	(0.906)
Adjusted R^2	0.714	0.891	0.745	0.833	0.834	0.756	0.869
Part C: Backward Participation							
$log(Backward_{h,t-1}^{participation})$	1.713***	1.131*	0.476	-0.191	0.650	1.209*	-0.350
	(0.238)	(0.593)	(0.356)	(0.829)	(0.411)	(0.657)	(0.487)
Adjusted R^2	0.724	0.895	0.743	0.812	0.830	0.757	0.868
Part D: GVC Position							
$GVC_{h,t-1}^{position}$	-3.951***	-2.792	3.883**	4.469	-1.204	-4.994*	0.551
	(1.174)	(2.182)	(1.664)	(3.037)	(1.646)	(2.902)	(1.920)
Adjusted R^2	0.716	0.893	0.743	0.817	0.831	0.759	0.869
Observations	6,857	999	2,134	1,026	1,814	1,312	1,763
Baseline model controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Host FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors

Table 8: Role of financial development

	Dependent variable: log $\left(\frac{FDI_{sh,t}}{GDP_{h,t}}\right)$	
	(1)	(2)
$log(GVC_{h,t-1}^{participation})$	2.131***	1.043
	(0.540)	(0.714)
$FinancialDevelopment_{h,t-1}$	2.872***	7.213***
	(1.060)	(2.149)
$log(GVC_{h,t-1}^{participation}) \times FinancialDevelopment_{h,t-1}$		6.523**
		(2.796)
Baseline model controls?	Yes	Yes
Source FE?	Yes	Yes
Host FE?	Yes	Yes
Year FE?	Yes	Yes
Adjusted R^2	0.778	0.778
Observations	8,137	8,137

Note: *p<0.1; **p<0.05; ***p<0.01, values reported in the parentheses are robust standard errors.