

Article

Do Bank Linkages Facilitate Foreign Direct Investment? An Analysis of Global Evidence

Xueting Liao¹, Cheng Yu^{2,3} and Lijuan Xie^{4,*} ¹ School of Business, Nanjing Normal University, Nanjing 210023, China; yusami@nnu.edu.cn² School of Economics, Fudan University, Shanghai 200433, China³ Institute of World Economics, Jiangsu Provincial Academy of Social Science, Nanjing 210004, China⁴ School of Business, Nanjing University, Nanjing 210093, China

* Correspondence: dg20020016@smail.nju.edu.cn

Abstract: Foreign direct investment (FDI) is essential for enhancing economic resilience and promoting sustainable development. However, inefficiencies in financial connectivity and capital allocation have hindered the facilitation of FDI. Bank linkages between countries in the global sectors of multinational enterprises (MNEs) offer potential solutions to these challenges. In this paper, we focus on whether sustainable FDI can benefit from consolidating bank linkages, which are measured for each pair of countries in each year as the number of bank pairs in both countries that are connected through cross-border syndicated lending. Using the gravity model, we provide empirical evidence based on cross-border data to support the following conclusions: (1) Bank linkages can sustainably enhance the host country's attractiveness to FDI through information, external financing, and international financial services channels. (2) This positive effect is pronounced in host countries with lower financial development, weaker institution quality, and higher investment risk while remaining insignificant for OECD countries. (3) Bank linkages exhibit a lagged impact on FDI, but newly established bank linkages are more conducive to inward FDI than those established earlier. In this paper, we offer some policy implications for emerging economies and suggest that emerging economies should continue to deepen their financial openness and strengthen international bank links through various means to attract more inward FDI.



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1. Introduction

From a sustainable development perspective, the involvement of financial institutions in facilitating FDI is crucial for promoting inclusive and sustainable economic growth. Well-developed bank linkages enhance information flow and enable MNEs to make better-informed decisions that consider the environmental and social impacts of their investments. Various theoretical models of MNE foreign investment decisions propose different factors determining FDI patterns. These factors include market size, geographical distance, cultural diversity, exchange rate changes, labor endowments, corporate tax rates, and financial distance [1–8]. These studies suggest that FDI decisions made by MNEs are complex, as various factors may influence FDI under different circumstances. Moreover, understanding interactions among critical factors may be crucial in explaining the nonlinear effects on FDI stocks or patterns. FDI is closely linked to the involvement of financial institutions, which provide essential financial services and support, whether through greenfield investments or cross-border mergers and acquisitions (M&A). Several studies have found that the financial development of home or host countries has a positive impact on FDI flows or cross-border M&A transactions [9–15]. Donaubaauer et al. (2020) [16] indicate that inward and outward FDI increases depend on developing financial markets in home and host countries. Generally, the necessary financial resources for FDI can be obtained from the host country's financial system. However, when the host country's financial system is

underdeveloped, it can also be accessed through financial linkages between financial institutions in the home and host countries. Additionally, financial linkages can enhance an MNE's access to information from the host country, reducing information asymmetry or friction [17]. Furthermore, the availability of international financial services through overseas branches of home-country banks can facilitate the operations of MNEs.

With the rapid advancement of globalization, many economies have opened their financial markets and relaxed capital account controls. Concurrently, global banks have significantly expanded their international activities in recent decades [18]. They have established new branches in numerous countries, providing various financial services and forming a complex network of bank linkages. Research has shown that these linkages play a crucial role in reducing transaction costs, alleviating financing constraints, and facilitating efficient resource allocation in the era of globalization [19]. Such linkages ultimately promote international trade and contribute to the co-movement of business cycles across economies [20]. Furthermore, they enhance resilience to economic shocks by diversifying funding sources, thereby strengthening economic stability. Poelhekke (2015) [21] utilized a comprehensive dataset on outward FDI from the Netherlands and found that banks' direct investment abroad stimulates the volume of non-financial FDI from the same source market. Caballero et al. (2018) [22] constructed a global network of banks based on syndicated loan data. They demonstrated that bank linkages effectively promote international trade, with a stronger effect observed when export risk increases. Similarly, Claessens and van Horen (2021) [23] discovered a positive correlation between the number of banks from the importing country, j , active in the exporting country, i , and exports from i to j . Both studies highlight that bank connections may significantly impact trade in emerging countries with less-developed financial systems or industries that are more exposed to export risk. On the other hand, some studies argued that financial linkages may undermine the monetary policy autonomy of certain countries, as suggested by the classical "trilemma paradox" theory, and accelerate the transmission of risks across economies [24]. This can result in excessive capital flows and the potential contagion of financial crises [25], which may further threaten the stability required for sustainable development, further exacerbating the instability of the host country's financial system [26].

Building on the insights of Caballero et al. (2018) [22] and Claessens and van Horen (2021) [23], we aimed to establish a connection between bank linkages and FDI. Our results showed that the formation of a new bank linkage, through the creation of a syndicated loan from country i to country j , can stimulate FDI flows from i to j . We controlled for factors such as the host country's financial development, financial crises, and traditional gravity model variables like GDP, distance, and exchange rates. Consistent with our theoretical analysis, we observed a stronger effect when country j is an emerging economy with limited financial development and elevated market risk. However, this effect tends to diminish over time. Our findings highlight that the primary mechanism through which international banking linkages influence FDI is by facilitating access to financial resources and reducing investment risks for MNEs.

The existing literature has explored the association between global banking investments and FDI flows, as well as the role of banking networks in reducing risk and information asymmetry [21,23,24]. Notably, there are still gaps in this field. First, there is a paucity of studies on this relationship. Financial linkages between countries extend beyond the establishment of global bank branches. In reality, various types of financial linkages exist between domestic financial institutions and their foreign counterparts, including syndicated lending, FX exchange services, interbank financial settlements, and letters of credit. Strengthening these relationships can help mitigate financing constraints, reduce financial service costs resulting from insufficient financial development in the host country, and alleviate information asymmetry and credit risk. These linkages can be seen as complementary to the functioning of the domestic financial system. Therefore, our paper introduces bank linkages as an additional factor in determining FDI, and to the best of our knowledge, this is the first study of its kind. Second, this paper not only makes a marginal

contribution to FDI determination theory but also highlights that the bank linkages between countries can substitute some functions of the financial systems of the host countries. Our findings may have policy implications for emerging economies that intend to promote economic growth by attracting more FDI.

The remainder of the paper is structured as follows: Section 2 presents the theoretical analysis and three hypotheses, while Section 3 provides the empirical strategy, variables, and data. Section 4 present the empirical results and the robustness tests. Lastly, Section 5 provides our conclusions and some policy implications.

2. Research Hypotheses

According to the eclectic theory of international production, host-country resource endowments, such as labor costs, market potential, and trade costs, are the key factors influencing MNE location choices. As a cross-border investment activity, FDI entails higher sunk costs, unfamiliar economic environments, and greater operational uncertainty compared to domestic investment [27]. This implies that MNEs not only need to acquire relevant information and secure necessary financing from the host country before making investments but also require essential institutional protection and services from the local market after the investment. As such, the financial system of the host country plays a crucial role in providing external financing [13] and facilitating global operations (including international trade), which ultimately impacts the choice of location for FDI. This paper argues that establishing bank linkages can enhance the operations of MNEs both before and after investment, effectively attracting more FDI to the host country. Specifically, there are three channels through which bank linkages can foster FDI.

(1) Information Channels. The real-option theory highlights that investors typically demand higher risk premiums and more information when investing with more significant sunk costs and irreversibility [28]. Compared to domestic investment, overseas investment is subject to more significant information friction due to larger initial project scales, shorter harvest periods, and less well-defined institutional environments. For instance, in the early stages of investment, MNEs are unable to integrate into the host country's information networks [29]. They tend to encounter substantial information asymmetry and communication difficulties resulting from differences in their geographical environment, language, culture, political institutions, and ideologies. Similar to social network linkages that facilitate information flow and match sellers to buyers across different countries [22], bank linkages can serve as bridges for investment by reducing information friction. Firstly, MNEs can leverage bank linkages to obtain more accurate information about potential investment opportunities and secure external financing from local banks or other financial markets. This information and financing are instrumental in deciding location, investment patterns, and entry strategies. Secondly, cross-border bank linkages reflect trust and mutual recognition between banks in the two countries. This factor helps alleviate suspicions towards the host country and enhances the confidence of MNEs in making cross-border investments.

(2) External Financing Channels. Although the literature acknowledges that MNEs can utilize internal funds for FDI projects [30], external financing is crucial for MNEs, particularly during certain stages like the start-up phase. Theoretically, MNEs can obtain external financing from the home country and the host country's financial markets. However, if the host country's financial development is limited, the business relationship between MNEs and the host country's financial system is immature. In that case, cross-border bank linkages can effectively alleviate credit restrictions. On the one hand, MNEs' overseas subsidiaries cannot access credit facilities in their home country, and information asymmetry makes it challenging for the host country to assess the default probability of loans to these MNEs accurately. The existence of bank linkages between two countries can foster information communication, mitigate credit risk, and reduce financing costs [31]. One example is the widely adopted model of international syndicated loans used in cross-border M&A, primarily initiated by banks from an MNE's home country. On the other hand, bank

linkages empower MNEs to explore more suitable financing methods and risk-hedging strategies. This optimization of financing patterns in the host country enables MNEs to obtain financing at a lower cost.

(3) International Finance Service Channels. Financial services such as FX exchange, remittance, international settlement, letters of credit, and overseas bond or stock issuance are essential for MNEs to engage in FDI projects. Therefore, a comprehensive financial system is essential for convenient and complex financial services. For instance, MNEs engaged in international trade frequently rely on “trade finance” instruments such as letters of credit (L/C), documentary collections (DCs), seller’s or buyer’s credit, and others. Niepmann and Schmidt–Eisenlohr (2017) [32] reported that L/Cs are used in 8% of U.S. exports, while Antràs and Foley (2015) [33] demonstrated that these instruments are widespread in new trade relationships. In practice, the application, issuance, payment, and authentication of L/Cs heavily rely on the banking relationships between countries. Therefore, the establishment of bank linkages not only provides comprehensive international financial services for MNEs but also facilitates the creation of a vast network connecting settlement institutions and commercial banks globally (It should be noted that establishing bank linkages through international syndicated loans may pose potential risks to emerging-market countries in attracting FDI by exacerbating the transmission of financial risks. However, such potential negative impacts may only occur in certain circumstances and would not disprove Hypothesis 1 in most cases).

Based on the above, we propose the following hypothesis.

Hypothesis 1. *The new establishment of bank linkages between home and host countries can facilitate FDI in the host country.*

It is widely accepted that the host country’s financial development level and institutional quality are essential for attracting FDI [13,34–36]. In particular, the existing literature extensively discusses the importance of well-functioning financial systems in host and home countries [9–14]. Through the three channels discussed, bank linkages facilitate FDI by addressing deficiencies in the host country’s financial system and institutional quality. Therefore, in countries with well-established financial markets and strong institutions, the importance of cross-border bank linkages may diminish, and vice versa. As we know, developing or emerging economies are more likely to have lower financial development and higher country risks. Thus, we propose Hypothesis 2.

Hypothesis 2. *The effect of bank linkages on FDI will be greater for economies with low levels of financial development and institutional quality and high country risk and for developing or emerging economies.*

Once a cross-border bank connection is established, MNEs can use the existing linkage to support their current and future investments. As a result, bank linkages may have a lagged impact on FDI, and there is no need to establish new connections unless the existing linkage becomes obsolete. However, compared to the newly established connections, existing bank linkages may not have a breakthrough or revolutionary effect in alleviating information friction, expanding financing channels, or enhancing financial services. Instead, they tend to provide a persistent effect that gradually weakens or diminishes over time. Therefore, we propose Hypothesis 3.

Hypothesis 3. *The effect of the existing bank linkages on FDI will be smaller compared to the newly established linkages.*

3. Materials and Methods

3.1. Variable Measurement

3.1.1. Dependent Variable

The data on FDI_{ijt} come from the OECD International Direct Investment Database, which provides the annual data on FDI positions (or stocks) and flows in millions of US dollars. We use stocks rather than the flow because the stocks are a closer proxy for MNCs' activity than flows for three reasons [3,37]. First, foreign investors decide the global allocation of production for capital stocks. Second, FDI stocks are financed by local capital markets. Therefore, they are a better measure of capital ownership. Third, stocks are much less volatile than flows, which are sometimes distorted by one or two major changes, especially in relatively small countries.

3.1.2. Core Explanatory Variable

The data on bank linkages ($al_{ij,t-1}$) come from Caballero et al.'s work (2018) [22] (<https://data.mendeley.com/datasets/x3rxb2rxzb>, accessed on 4 November 2024). Caballero et al. (2018) [22] constructed the variable by collecting all international and domestic syndicated lending data between banks from January 1, 1990, to December 31, 2014, from the Dealogic database. (Since only the type of borrower can be identified in the Dealogic database and not the type of lender, it is possible that the borrower of the syndicated loan data is not a bank. However, 60% of these data are long-term loans; the rest are revolving loans, large negotiable certificates of deposit, and various types of credit instruments). They argue that syndicated lending has three advantages: (1) Compared with overnight borrowing, it is longer term and more likely to establish a linkage between lenders and borrowers. (2) Compared with bilateral loans, the scale of syndicated lending is larger. Accordingly, the lenders usually require more information from the borrower, meaning there are closer ties between the two sides [38]. (3) The international syndicated lending market is large and active [22]. In addition, the direction of new syndicated lending across borders matters as it can reveal more information about the establishment of contacts between the two countries' banks. It should be noted that Caballero et al.'s (2018) [22] method still has a limitation. The bank linkage covers syndicated lending and other kinds of bank lending or transactions, such as FX exchange services, interbank financial settlements, and letters of credit. Therefore, such a measure may introduce potential biases. Although the data on cross-border interbank lending relationships may be a more appropriate proxy variable, they are difficult to obtain.

3.1.3. Control Variables

GDP_{it} and GDP_{jt} are measured by the real GDP at chained PPPs in millions of 2011 USD. HC_{jt} and FD_{jt} are measured by the secondary school enrolment rate and the ratio of private sector credit to nominal GDP, respectively. $ExchRate_{ijt}$ is measured by the nominal exchange rates of the host country's currency against that of the source country's. RTA_{ijt} is equal to one when there is a Free Trade Agreement or Regional Trade Agreement between the two countries, and zero otherwise. $Distance_{ij}$ is the geographic distance between country i and j ; $Border_{ij}$, $Language_{ij}$, $Colony_{ij}$, and $Currency_{ij}$ are equal to one when the two countries have a common border, common language, colonial relationship, and common official currency, and zero otherwise (respectively). $INST_{jt}$ is measured by the Worldwide Governance Indicators (WGIs) of the host country, pertaining to political stability, the absence of violence, rule of law, and control of corruption. Table 1 lists the definition of each variable and the sources of the data.

Table 1. Variable definitions and data sources.

Variable Type	Definition	Symbol	Explanations	Data Source
Dependent variables	FDI stocks	$\ln(1 + FDI_{ijt})$	The logarithm of (1+ FDI positions)	OECD International direct investment database
Explanatory variable	Bank linkages	al_{ijt-1}	The logarithm of the number of new linkages established through syndicated lending	Caballero et al. (2018) [22]
Control variables	GDP of source country	$\ln GDP_{it}$	The logarithm of the real GDP of the home country at chained PPPs	Penn World Table 9.1
	GDP of host country	$\ln GDP_{jt}$	The logarithm of the real GDP of the host country at chained PPPs	Penn World Table 9.1
	Human capital	$\ln HC_{jt}$	The logarithm of the secondary school enrolment rate of the host country	World Development Indicators (WDI)
	Financial development	$\ln FD_{jt}$	The logarithm of the ratio of private sector credit to nominal GDP of the host country	World Development Indicators (WDI)
	Geographic distance	$\ln Distance_{ij}$	The logarithm of the distance between capital cities of the home and host countries	CEPII database (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp , accessed on 4 November 2024)
	Common border	$Border_{ij}$	Equal to one when the home and host countries have a common border	CEPII database (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp , accessed on 4 November 2024)
	Common language	$Language_{ij}$	Equal to one when the home and host countries have a common language	CEPII database (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp , accessed on 4 November 2024)
	Common colonizer	$Colony_{ij}$	Equal to one when the home and host countries share a common colonizer	CEPII database (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp , accessed on 4 November 2024)
	Common currency	$Currency_{ij}$	Equal to one when the home and host countries have a common official currency	CEPII database (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp , accessed on 4 November 2024)
	Exchange rate	$\ln ExchRate_{ijt}$	The logarithm of the nominal exchange rates of the host country's currency against that of the home country	IMF IFS
FTA or RTA agreement	RTA_{ijt}	Equal to one when there is an FTA or RTA agreement between the source and host countries	Jose De Sousa's personal website (http://jdesousa.univ.free.fr/data.htm , accessed on 4 November 2024)	
Institutional quality of host country	$INST_{jt}$	First principal component of the three WGs related to political stability and absence of violence, the rule of law, and control of corruption	PRS group (https://www.prsgroup.com/explore-our-products/international-country-risk-guide/ , accessed on 4 November 2024)	

3.2. Model Construction

The gravity model has become the benchmark model for examining the factors influencing trade flows and FDI [3,39–41]. According to Anderson and van Wincoop (2003) [39], even multilateral-resistance terms in a gravity model can account for bilateral resistance, such as the barriers to FDI between host and home countries. We, therefore, follow previous studies [41,42] and include home- and host-country-specific and time-specific fixed effects in our model to approximate the effect of multilateral-resistance terms. The baseline model was set as follows:

$$\ln(1 + FDI_{ijt}) = \beta_0 + \beta_1 al_{ijt-1} + \delta_1 controls + \alpha_i + \eta_j + \lambda_t + \varepsilon_{ijt} \quad (1)$$

i and j denote the home and host countries. FDI_{ijt} denotes the FDI from country i to country j in period t . The dependent variable is $\ln(1 + FDI_{ijt})$, as some observations of FDI between certain countries have a value of zero. $al_{ijt-1} = \ln(1 + AL_{ijt-1} - AL_{ijt-2})$ is

the logarithm of the number of new linkages, and AL_{ijt-1} is the aggregate number of bank linkages between countries i and j . We lagged the key explanatory variable by one period because its effect takes some time to materialize. The use of this lag structure also helped us to reduce the concerns of endogeneity. α_i , η_j , and λ_t denote home- and host-country-specific and time-specific fixed effects. ε_{ijt} is the error term.

We include a set of control variables that are commonly used in gravity models. Specifically, GDP_{it} and GDP_{jt} are the GDPs of the home and host countries; HC_{jt} is the human capital level of the host country; FD_{jt} is the financial development of the host country; $ExchRate_{ijt}$ denotes the nominal exchange rate; $Distance_{ij}$ is geographic distance; RTA_{ijt} , $Border_{ij}$, $Language_{ij}$, $Colony_{ij}$, and $Currency_{ij}$ are dummy variables for regional trade agreements, common borders, common languages, colonial relationship, and common currency between the home and host countries; and $INST_{jt}$ refers to the institutional quality of the host country. Finally, the empirical model is specified as follows:

$$\begin{aligned} \ln(1 + FDI_{ijt}) &= \beta_0 + \beta_1 al_{ij,t-1} + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln HC_{jt} + \beta_5 \ln FD_{jt} + \beta_6 \ln ExchRate_{ijt} \\ &+ \beta_7 RTA_{ijt} + \beta_8 \ln Distance_{ij} + \beta_9 Border_{ij} + \beta_{10} Language_{ij} + \beta_{11} Colony_{ij} \\ &+ \beta_{12} Currency_{ij} + \beta_{13} INST_{jt} + \alpha_i + \eta_j + \lambda_t + \varepsilon_{ijt} \end{aligned} \quad (2)$$

4. Empirical Result

4.1. Descriptive Statistics

Caballero et al. (2018) [22] only provided the number of new instances of syndicated lending from 1990 to 2014, while the OECD Direct Investment Database only provided the FDI data on developed and some significant emerging economies. Therefore, our sample covers the direct investment in 64 countries made by 24 OECD countries, such as the United States, the United Kingdom, Canada, Australia, France, and Japan, from 1990 to 2015. We provide specific information about the home and host countries in Appendix A. Though this sample may be limited, we argue that the countries in our sample include the most important source and host countries in the world FDI map. Therefore, our sample generally represents global contexts. In order to mitigate the impact of the outliers, we minorized all of our continuous variables at the 1% level, leaving 18,177 observations made for 1344 country pairs.

Table 2 reports the descriptive statistics of each variable. During the sample period, the stocks of FDI varied considerably across the country pairs. As for bank linkages, a maximum of 4.74, a minimum of 0, and an average of 0.13 were observed. In addition, country pairs without new bank linkages or even no bank linkages account for a high ratio of the total sample.

Table 2. Statistical results for the main variable.

Var Name	Observed Value	Mean	SD	Min	Max
$\ln(1 + FDI_{ijt})$	18,177	6.93	2.85	0.25	14.10
$al_{ij,t-1}$	18,177	0.34	0.72	0	4.74
$\ln GDP_{it}$	18,177	12.77	1.44	8.35	15.77
$\ln GDP_{jt}$	18,156	11.92	1.54	7.01	15.79
$\ln HC_{jt}$	17,779	1.04	0.20	0.28	1.32
$\ln FD_{jt}$	15,291	4.15	0.74	−1.68	5.74
$\ln Distance_{ij}$	17,839	8.22	1.09	4.39	9.88
$Border_{ij}$	17,839	0.06	0.24	0	1
$Language_{ij}$	17,839	0.11	0.32	0	1
$Colony_{ij}$	17,839	0.05	0.23	0	1
$Currency_{ij}$	18,177	0.09	0.28	0	1
$\ln ExchRate_{ijt}$	18,019	1.76	1.91	0	9.81
RTA_{ijt}	18,177	0.46	0.50	0	1
$INST_{jt}$	17,686	8.13	1.70	1	12

4.2. Analysis of the Empirical Results

We report the regression results for model (2) after controlling for different fixed effects in Table 3. We found that al_{ijt-1} is always significant at the 1% confidence level regardless of whether control variables are used, meaning the formation of new bank linkages through syndicated lending between two countries in the previous year will increase FDI stocks in the host country (We also applied a negative binomial count model that obtained coefficients of similar magnitude and sign). In addition, the coefficient of al_{ijt-1} remains positively significant even after controlling for the host-year FE, source-year FE, and pairwise FE (columns 3 and 4). Therefore, one country can attract more inward FDI by expanding its bank linkages with other countries, while other conditions remain unchanged. The baseline results are in line with hypothesis 1.

Table 3. Baseline regression results.

Variable	(1)	(2)	(3)	(4)
al_{ijt-1}	0.342 *** (10.05)	0.135 *** (4.3)	0.183 *** (4.236)	0.029 * (1.670)
$\ln GDP_{it}$		0.087 (0.58)		
$\ln GDP_{jt}$		0.797 *** (8.58)		
$\ln HC_{jt}$		0.558 (0.8)		
$\ln FD_{jt}$		0.241 *** (3.93)		
$\ln Distance_{ij}$		−1.029 *** (−14.73)	−0.985 *** (−12.707)	
$Border_{ij}$		0.043 (0.19)	0.079 (0.541)	
$Language_{ij}$		0.611 *** (4.35)	0.613 *** (4.281)	
$Colony_{ij}$		1.066 *** (6.69)	0.998 *** (5.726)	
$Currency_{ij}$		0.001 (0.1)	0.085 (0.504)	
$\ln ExchRate_{ijt}$		−0.013 (−0.15)	0.034 (0.373)	
RTA_{ijt}		0.271 ** (2.41)	0.264 * (1.878)	
$INST_{jt}$		0.002 (0.15)		
Cons	6.799 *** (203.000)	4.195 * (2.27)	9.181 * (1.784)	6.938 * (1.785)
Host and source countries/Year	Yes	Yes	No	No
Host-year and Source-year FE	No	No	Yes	Yes
Pairwise FE	No	No	No	Yes
N	17798	14351	14315	14275
adj. R^2	0.690	0.807	0.813	0.932

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. t-statistics are in parentheses. Robust standard errors are clustered on $i \times j$. In order to deal with both autocorrelation and heteroskedasticity problems, following the method of Caballero et al. (2018) [22] and Claessens and van Horen (2021) [23], we used the Cluster-Robust Standard Errors in the whole paper.

The results regarding the control variables are reasonable and consistent with the standard gravity model concerning FDI.

The coefficients of the host country's GDP and financial development level are significantly positive, indicating that the larger the output of the host country and the more advanced the financial system, the greater the amount of inward FDI attracted [3]. The coefficient of distance between the two countries is significantly negative, indicating that

geographical distance inhibits FDI activities. Long distance makes it harder for MNEs to maximize control and minimize information asymmetry. The coefficient $Language_{ij}$ is significantly negative, indicating that a common language helps to reduce communication costs, including language barriers and training costs) [43,44]. Similarly, the colonial relationship and signing an FTA or RTA between countries helps reduce investment barriers, thus attracting more inward FDI [3]. However, the coefficients of $Border_{ij}$ and $lnExchRate_{ijt}$ are not significant. A common border does not have an important impact on FDI stocks, a finding that is consistent with the conclusions reached by Serwicka et al. (2022) [45]. Investment decisions may be more influenced by the global market and regional economic integration, such as the free-flow-of-production factor within the region, than factors related to a single country's borders. Additionally, the phenomenon of "exchange rate disconnects" may be attributed to increased government stability, which may erode the political capital of foreign companies. This factor diminishes the sensitivity of FDI to exchange rate fluctuations, making the impact of the exchange rate on FDI flows negligible in the short term [46]. As the institutional quality of the host country ($INST_{jt}$) may be correlated with its human capital and financial development, this factor is also insignificant in Table 3.

4.3. Heterogeneity Analysis

4.3.1. The Moderating Effect of Financial Development in the Host Country

In order to verify whether the level of financial development in the host country will have a moderating effect on the effect of bank linkages, we developed an interaction term, $al_{ijt-1} \times \ln FD_{jt}$, and added it to the baseline equation. The result is shown in the first column of Table 4. The coefficient of the interaction term is significantly negative. Thus, the higher the financial level of the host country, the smaller the impact of the bank linkages between the two countries on FDI. This result is in line with the previous theoretical analysis.

Table 4. Heterogeneity analysis: country differences.

Variable	(1)	(2)	(3)	(4)	(5)
	Interaction with FD	Interaction with ICRG	Interaction with INST	Host country is an OECD country	Host country is a non-OECD country
al_{ijt-1}	0.614 *** (3.077)	0.076 ** (2.295)	0.203 *** (6.09)	0.071 (1.318)	0.139 *** (4.549)
$al_{ijt-1} \times \ln FD_{jt}$	-0.104 ** (-2.142)				
$ICRG_{i,t} \times al_{ijt-1}$		0.022 (1.527)			
$ICRG_{j,t} \times al_{ijt-1}$		-0.017 ** (-2.154)			
$INST_{jt} \times al_{ijt-1}$			-0.095 *** (-2.91)		
Control variables	Yes	Yes	Yes	Yes	Yes
Host and source country FE	No	No	No	Yes	Yes
Year FE	No	No	No	Yes	Yes
Pair FE	Yes	Yes	Yes	No	No
N	17,798	14,351	14,260	14,351	14,315
adj. R ²	0.690	0.808	0.809	0.774	0.813

Note: *** $p < 0.01$, ** $p < 0.05$. Standard errors are clustered two-way by origin and by destination country.

4.3.2. The Moderating Effect of Investment Risk in the Host and Home Countries

As with financial development, we developed two interaction terms of bank linkages and country risk variables to determine whether the effect of bank linkages depends on the investment risk of the host or home country. We used the first principal component of the International Country Risk Guide (ICRG) index (the ICRG index is widely used to measure the degree of country risk provided by Caballero et al. (2018) [22,33] as a proxy of country risk because all of the components in the ICRG index are highly correlated and would be difficult to interpret if included individually.

The result is shown in the third column of Table 4. The coefficient of the interaction term between the host country's ICRG index and the bank linkage ($ICRG_{j,t} \times al_{ijt-1}$) is significantly negative, while the coefficient for the interaction term of the home country ($ICRG_{i,t} \times al_{ijt-1}$) is not significant. These findings indicate that bank linkages have a greater impact on FDI when the host country's investment risk is higher, whereas the risk of the home country does not matter. This result is consistent with the conclusion reached by Poelhekke (2015) [21], who found that the effect of banks' direct investment abroad in non-financial FDI from the same source market is stronger in countries with more corruption, weaker rule of law, and a more hazardous investment environment. We argue that this effect arises primarily because MNEs are familiar with institutional quality or risk in their home countries, making bank linkages more effective in alleviating the contract enforcement problem and information friction in the host country.

4.3.3. The Moderating Effect of Institution Quality in the Host Country

It is widely acknowledged that institutional frameworks can be sources of enhanced financial development and investment risk for the host country [47]. Therefore, we developed an interaction term for the institutional quality of the host country and bank linkages ($INST_{jt} \times al_{ijt-1}$) and added it to the baseline equation. Column 3 of Table 4 shows that the coefficient of the interaction term is also significantly negative, and such a result reconciles with columns 1 and 2 and is consistent with the existing literature [22,23,47].

4.3.4. The Influence of Whether the Host Country Has a Developed or Emerging Economy

A host country with an immature financial system and high investment risk is usually an emerging country. The results in the first three columns of Table 4 indicate that the bank linkages can be more effective in attracting FDI in emerging economies. So, we divided our sample into OECD countries and non-OECD countries, and the regression results for the subsample are listed in columns 4 and 5 of Table 4. The coefficient of bank linkages for OECD countries is insignificant, while the coefficient for non-OECD countries is significantly positive. Therefore, the establishment of new bank linkages is only effective for emerging economies. This conclusion is consistent with hypothesis 2 and the empirical results in columns 1–3.

4.4. Robustness Tests

4.4.1. Considering the Role of International Trade

It is necessary to isolate the role of international trade when identifying the impact of bank linkages on FDI because bank linkages will also affect the trade between two countries [22,23]. In addition, international trade is also determined by the control variables used in the equation [39,41], and a multicollinearity problem arises if we introduce the trade variable into the baseline equation directly. Therefore, we first took $\ln(1 + trade_{ijt})$ as the explained variable and al_{ijt-1} as a key explanatory variable and regressed them with the control variables, which are the same as those used in Equation (2), where $trade_{ijt}$ is the trade flow from country i to country j , and the data come from the UN-COMTRADE database. Then, we added the residual from the regression ($e_{trade_{ijt}}$) into the baseline equation.

The coefficient of al_{ijt-1} in column 1 of Table 5 is significantly positive, which means that bank linkages can facilitate trade between the two countries. The result is consistent with that obtained by Caballero et al. (2018) [22] and Claessens and van Horen (2021) [23]. The coefficient of $e_{trade_{ijt}}$ in column 2 is also significantly positive, indicating that international trade can promote FDI, and the complementary effect is greater than the substitution effect. After controlling for the impact of international trade, the coefficient of bank linkages was still significant, so our baseline regression result is robust.

Table 5. Regression results considering the effects of trade and relative banking linkages.

	(1) ln (1+trade _{ijt})	(2) ln (1+ FDI _{ijt})	(3) ln (1+ FDI _{ijt})	(4) al _{ijt-1}	(5) ln (1+ FDI _{ijt})
al _{ijt-1}	0.125 *** (6.316)	0.170 *** (5.706)			0.468 ** (2.08)
e _{tradeijt}		0.480 *** (9.764)			
al _{ijt-1} ^{re}			0.127 *** (4.309)		
IV				0.013 *** (3.35)	
Control variables	Yes	Yes	Yes	Yes	Yes
Host and source country/Year	Yes	Yes	Yes	Yes	Yes
N	38,709	13,919	12,447	12,809	12,809
Cluster	2112	1133	1086	1019	1019
adj. R ²	0.875	0.822	0.823		0.252
Kleibergen-Paap rank LM					5.626 **
Cragg-Donald Wald F					10.431
F					11.22

Note: *** $p < 0.01$, ** $p < 0.05$. Standard errors are clustered two-way by origin and by destination country.

4.4.2. Considering the Relative Effects of Bank Linkages

The FDI location choice of MNEs depends not only on factors like endowment or financial linkages between certain host countries and home countries but also on the comparative advantage of competing host countries in the era of globalization. Therefore, the relative levels of bank linkages among alternative host countries will be more important for inward FDI activities. We, therefore, redefined a key explanatory variable al_{ijt-1}^{re} as the ratio of the bank linkages in host country j over the average bank linkages of all alternative host countries weighted by the share of FDI of each host country, and the result can be expressed as the relative bank linkages between country i and j :

$$al_{ijt-1}^{re} = \frac{al_{ijt-1}}{1/n[\sum_{k=1}^n al_{ik,t-1} \times (FDI_{ik,t-1}/\sum_j FDI_{ik,t-1})]} \quad (3)$$

$al_{ik,t-1}$ and $FDI_{ik,t-1}$ represent the bank linkages and FDI stocks from country i to country k . The result in column 3 of Table 5 shows that the relative bank linkages positively impact FDI from country i to country j , which implies that the bank linkages could foster inward FDI into the host country, even when using the relative level of bank linkages.

4.4.3. Considering the Endogeneity of Bank Linkages

Theoretically, banks may simply strengthen their lending after the FDI is made. In other words, endogeneity issues such as the reverse causality between bank linkages and FDI and the issue of omitted variables still exist. Following the literature, the instrumental variables (IV) method was employed to address the endogeneity issue. Our strategy is inspired by De Bonis et al. (2015) [48], who used the deregulation of the banking market in 1936 as an instrumental variable to address the problem of bidirectional causality when examining the positive impact of bank linkages on corporate exports, as past events at regional banks may affect bank lending but not current corporate exports.

We developed an instrumental variable, *IV*, by interacting the 1973 financial reform index with the cubic trend term of time for two reasons: (1) as the financial regulatory reforms of 1973 precede the temporal scope of our study, they are unlikely to affect other factors during the current research period; (2) historical data exert a significant inter-generational influence on the formation of regional development patterns. The early establishment of banking regulatory frameworks influences subsequent decades of banking operations and international banking activities, including interbank cooperation and the provision of cross-border financial services. Column 4 of Table 5 provides the first-stage regression estimation results, where the coefficient is positively significant. The f-statistic

exceeds the critical value of 10, indicating that it meets the relevance condition and passes the weak instrument test. Column 5 presents the estimation results of the second-stage regression, with a significance coefficient of 0.468, confirming that bank linkages can promote an increase in FDI.

4.4.4. PPML Regression

According to Silva and Tenreyro (2006) [49], heteroscedasticity will lead to biased estimation when using a log-linear gravity model for empirical analysis because of Jensen's inequality ($E(\ln y) \neq \ln(E(y))$), even if the host-specific, home-specific, and time-fixed effects are controlled. They suggest using the poisson pseudo maximum likelihood (PPML) method, which is a kind of generalized linear model (GLM), to deal with this issue. This method has been widely used by scholars [39,40]. The PPML model was set as follows:

$$FDI_{ijt} = \exp \left\{ \alpha_0 + \beta_0 al_{ijt-1} + \sum_k \beta_k control_{ijt} + MRT_{ijt} \right\} + \varepsilon_{ijt} \quad (4)$$

The results are shown in Table 6. Column (1) is the baseline result of PPML estimation, consistent with the results in Table 2. Furthermore, the estimated results in columns (2)–(6) are similar to those in Table 5. These findings suggest that after considering heteroscedasticity and the estimation bias problem that Jensen's inequality may bring about, the previous empirical conclusions did not change, indicating that the empirical results in this article are robust.

Table 6. Regression results for the PPML method.

	(1) All Samples	(2) Interaction with FD	(3) Interaction with ICRG	(4) Interaction with INST	(5) Host Country Is an OECD Country	(6) Host Country Is a Non-OECD Country
al_{ijt-1}	0.016 *** (3.187)	0.033 ** (2.370)	0.038 *** (2.865)	0.044 *** (3.99)	0.000 (0.028)	0.018 *** (3.410)
$al_{ijt-1} \times \ln FD_{jt}$		−0.007 ** (−2.269)				
$ICRG_{i,t} \times al_{ijt-1}$			0.007 (1.255)			
$ICRG_{j,t} \times al_{ijt-1}$			−0.009 *** (−2.991)			
$INST_{jt} \times al_{ijt-1}$				−0.003 ** (−2.52)		
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Host and source country/Year	Yes	No	No	No	Yes	Yes
Pair	No	Yes	Yes	Yes	No	No
Host-year and Source-year	No	Yes	Yes	Yes	No	No
N	13,915	13,840	17,648	14,128	5601	8314
Pseudo R ²	0.1865	0.2419	0.1797	0.1728	0.1876	0.1720

Note: *** $p < 0.01$, ** $p < 0.05$. Standard errors are clustered two-way by origin and by destination country.

4.5. Lagged Effect of Bank Linkages

According to hypothesis 3, the formation of bank linkages can have a persistent effect on FDI, but this effect will fade over time. Traditionally, researchers test for such a persistent effect by introducing a lagged explanatory variable into the regression equation, but this method will reduce the number of observations of the sample. Therefore, according to the method developed by Caballero et al. (2018) [22], we developed the cumulative bank linkages variable ($cal_{ij,t-1}^n = \sum_{s=1}^n al_{ij,t-s}$) by summing up the bank linkages formed in previous periods and replaced $al_{ij,t-1}$ for regression. If the coefficient of $cal_{ij,t-1}^n$ decreases as n increases, it suggests that the effect of recently established bank linkages on FDI is greater than that of bank linkages established long ago. In other words, the benefit of a bank linkage decreases over time.

The empirical results are shown in Table 7. Cumulative variables of bank linkages have significant impacts on FDIs with different values of n , and the coefficients indeed become smaller with the extension of the lag period, which implies that newly established bank linkages are more helpful for inward FDI than the ones established previously.

Table 7. Heterogeneity analysis: country differences.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
al_{ijt-1}	0.147 *** (4.845)							
al^2_{ijt-1}		0.101 *** (5.003)						
al^3_{ijt-1}			0.081 *** (5.124)					
al^4_{ijt-1}				0.071 *** (5.256)				
al^5_{ijt-1}					0.063 *** (5.234)			
al^6_{ijt-1}						0.056 *** (5.130)		
al^7_{ijt-1}							0.051 *** (5.073)	
al^8_{ijt-1}								0.047 *** (4.958)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Host and source country/Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13,953	13,676	13,371	12,991	12,560	12,176	11,759	11,327
adj. R^2	0.812	0.809	0.809	0.809	0.809	0.809	0.808	0.807

Note: *** $p < 0.01$. Standard errors are clustered two-way by origin and by destination country.

5. Conclusions

Recent studies have demonstrated that financial linkages, especially bank linkages, will promote international trade, speeding up a country's integration into globalization. We propose that such bank linkages can also sustainably enhance the host country's attraction to FDI through information, external financing, and international financial services channels. Based on the measures developed by Caballero et al. (2018) [22], we found that the establishment of bank linkages indeed increases inward FDI. Baseline regression showed that a country can attract more inward FDI by expanding its bank linkages with other countries, with all other conditions remaining the same. After controlling for the impact of international trade and the relative effects of bank linkages, the coefficient of bank linkages was still significant. Moreover, this effect is larger in host countries with lower financial development and institutional quality and higher investment risk, while it is insignificant for OECD countries.

Further analysis also revealed that the coefficients indeed become smaller with the extension of the lag period, implying that newly established bank linkages are more conducive to inward FDI than those established earlier. The paper not only marginally contributes to the theory of FDI determination but also highlights that bank linkages between countries can substitute for some functions of host countries' financial systems. This underscores the potential of financial linkages to facilitate long-term cross-border financial cooperation and resilience. Our findings may have certain policy implications for countries with emerging economies that intend to promote economic growth by attracting more FDI. Countries with emerging economies should continue to deepen their financial openness and strengthen international bank linkages through various means. There should be a focus on encouraging capable host country banks to gradually establish international syndicated business-distribution networks and promote the development of secondary markets for international syndicated business. To consolidate the promotional effect of

bank linkages, countries with emerging economies should enhance various forms of peer cooperation, including correspondent banking, banking clubs, banking strategic alliances, and service outsourcing.

This study has several limitations. Firstly, we employed the measure of international bank linkages developed by Cabarello et al. (2018) [22], which mainly reflects the cross-border syndicated lending relationship. Some alternative measures of bank linkages between source and host countries can be developed and tested, and the sample can be enlarged. Secondly, although this study provides some hypotheses for how banking linkage can strengthen the FDI of host countries, it does not distinguish the role of three channels for the unavailability of the data. Finally, this study has examined the static and average roles of bank linkages at a country-pair level. Industry- or firm-level heterogeneity and the dynamic features of such factors should be investigated rigorously. These are all possible directions for future research.

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Appendix A

Table A1. List of Source and Host Countries.

Source Country		Host Country					
Australia (1990–2013)	150.29	Argentina (1990–2013)	183.21	India (1990–2013)	239.42	Spain (1990–2013)	25.67
Austria (1990–2013)	895.50	Australia (1990–2013)	359.83	Indonesia (1990–2013)	309.13	Sweden (1990–2013)	83.50
Belgium (2008–2012)	603.20	Austria (1990–2013)	11.33	Ireland (1990–2013)	178.96	Switzerland (1990–2013)	100.50
Canada (1990–2012)	306.78	Bahamas (1990–2013)	14.33	Israel (1990–2013)	16.13	Thailand (1990–2013)	261.71
Chile (2006–2013)	19.00	Belgium (1990–2013)	24.88	Italy (1990–2013)	1169.29	Trinidad and Tobago (1990–2013)	13.83
Denmark (1990–2012)	198.22	Brazil (1990–2013)	349.08	Japan (1990–2013)	81.50	Turkey (1990–2013)	1657.54
Finland (1990–2012)	79.74	Bulgaria (1990–2013)	53.96	Korea (1990–2013)	986.58	Ukraine (1992–2013)	144.41
France (1990–2012)	1035.43	Canada (1990–2013)	15.58	Latvia (1992–2013)	16.59	United Kingdom (1990–2013)	498.58
Germany (1990–2013)	3161.21	Chile (1990–2013)	114.71	Lithuania (1992–2013)	9.18	United States (1990–2013)	1165.79
Greece (2001–2012)	153.75	China (1990–2013)	298.08	Luxembourg (1999–2013)	82.33	Uruguay (1990–2013)	4.29
Iceland (1990–2012)	5.26	Colombia (1990–2013)	68.38	Malaysia (1990–2013)	89.58	Venezuela (1990–2013)	5.83
Ireland (1990–2012)	85.83	Costa Rica (1990–2013)	7.46	Mexico (1990–2013)	263.50	Argentina (1990–2013)	183.21
Israel (2006–2013)	144.75	Czech Republic (1993–2013)	159.57	Morocco (1990–2013)	29.67	Australia (1990–2013)	359.83
Italy (1990–2012)	649.57	Denmark (1990–2013)	197.54	Netherlands (1990–2013)	148.00	Austria (1990–2013)	11.33
Japan (1990–2013)	1297.13	Dominican Republic (1990–2013)	0.67	New Zealand (1990–2013)	36.17	Bahamas (1990–2013)	14.33
Luxembourg (1999–2012)	268.43	Ecuador (1990–2013)	11.58	Norway (1990–2013)	334.83	Belgium (1990–2013)	24.88
Mexico (1990–2012)	9.33	Egypt (1990–2013)	76.79	Pakistan (1990–2013)	4.21	Brazil (1990–2013)	349.08
Netherlands (1990–2012)	569.70	El Salvador (1990–2013)	15.42	Panama (1990–2013)	41.96	Bulgaria (1990–2013)	53.96
New Zealand (1990–2012)	0.83	Estonia (1992–2013)	59.36	Peru (1991–2013)	30.83		
Norway (1990–2012)	47.39	Finland (1990–2013)	52.71	Philippines (1990–2013)	89.83		
Portugal (1995–2013)	167.63	France (1990–2013)	156.25	Poland (1990–2013)	198.75		
		Germany (1990–2013)	55.83	Portugal (1990–2013)	67.33		
		Greece (1990–2013)	143.92	Romania (1990–2013)	83.17		
		Honduras (1991–2013)	0.09	Russia (1992–2013)	979.59		
		Hong Kong (1990–2013)	652.63	Singapore (1990–2013)	56.88		
		Hungary (1990–2013)	232.58	Slovenia (1993–2013)	196.48		
		Iceland (1990–2013)	143.58	South Africa (1998–2013)	488.56		

Note: The number refers to the annual average number of bank linkages in source countries and host countries during our sample period.

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