VNU Journal of Economics and Business, Vol. 4, No. 2 (2024) 80-91

VNU Journal of Economics and Business

Journal homepage: https://jeb.ueb.edu.vn

Original Article

Global bank linkages and foreign direct investment

Tran Manh Ha*, Doan Ngoc Thang

Banking Academy of Vietnam
No. 12 Chua Boc Street, Dong Da District, Hanoi, Vietnam

Received: January 29, 2024
Revised: March 29, 2024; Accepted: April 25, 2024

Abstract: This study explores the impact of bank networks on foreign direct investment (FDI) using data on country pairs. Global bank linkages are quantified by the number of connected bank pairs engaged in international lending between the source and host countries. The empirical analysis reveals a positive correlation between bank linkages and bilateral FDI stocks. We interpret this relationship as indicating that bank connections facilitate FDI by addressing information asymmetry stemming from factors such as uncertainty, global financial crises, or host country shocks. Our findings remain robust across various robustness checks. This research suggests that governments should promote cross-border bank investments to attract FDI.

Keywords: International banking; foreign direct investment; uncertainty.

1. Introduction

There is a growing consensus on international banking and its role in facilitating FDI. Banks can internationalize by forming foreign branches, acquiring foreign subsidiaries, purchasing foreign assets, or lending across countries directly. When the loans are large, they can also make foreign syndicated lending via bank consortiums to share risk. When expanding overseas through FDI, firms face fixed costs caused by information asymmetry (Antràs et al., 2009; Han et at., 2022). We argue that an international network of banks can mitigate these costs by alleviating the information asymmetry. Hence, the purpose of this paper is to examine the effect of bank linkages on outward FDI.

Bank connections play a crucial role in reducing the fixed expenses associated with FDI through various mechanisms e.g. by bridging the institutional disparities between the home and host countries (Poelhekke, 2015). Furthermore, banks offer advantages to parent companies by specializing in the gathering and management of information concerning the businesses they lend to. Typically, these lending relationships between banks and firms endure over extended periods. The symbiotic relationship between banks and firms enables banks to utilize informal information, giving them a competitive edge (Boot, 2000). This implies that banks possess

* Corresponding author
E-mail address: hatm@hvnh.edu.vn
https://doi.org/10.57110/vnujeb.v2i6.257

comprehensive insights into their clients, their operational dynamics, and opportunities for overseas investments. Leveraging this knowledge, banks facilitate firms seeking expansion abroad by offering financial and legal support through an interconnected network of banks spanning different countries.

Additionally, bank connections reduce investment expenses by broadening and enhancing the pool of potential firms available (Poelhekke, 2015). Given the risk of failure, parent companies must identify reliable partners. The associated search costs necessitate financial intermediaries (Beck, 2002). Host-country banks, with their domestic presence, can discern reputable firms by exclusively engaging with financially robust entities. This proprietary knowledge can be exchanged within a network of affiliated banks. Augmenting the number of bank connections enlarges the roster of dependable firms, thus diminishing search costs.

Lastly, bank nexuses improve the internal financial organization of multinational enterprises. As international banks have knowledge about the parent firms' businesses and host-country imperfections in external capital markets, they can provide an efficient plan to organize financing for both the parent and FDI firms and help to fundraise in various financial markets. Moreover, banks can arrange direct financing for multinational enterprises in the new markets. De la Torre et al. (2010) indicate that international banks can offer a loan package with a highly competitive fee for multinational enterprises' operations related to FDI. Klein et al. (2002) document that firms are reluctant to implement FDI projects when their home banks suffer financial turmoil.

To investigate the relationship between bank linkages and FDI, we use bilateral country-year data, including 1,624 country pairs for the period 2001–2012. We define global bank linkages as the number of bank pairs that connect via international syndicated lending from source to host country. Syndicated loan data is utilized as these loans can usually be extended to other banks and thereby create a dense linkage of banks (Hale, 2012). In addition, the 3-year median of these loans' maturity implies that banks can accumulate rich information (Poelhekke, 2016). We use the bilateral outward FDI stock as it is less volatile than bilateral FDI flow (De Sousa and Lochard, 2011). We add the year, country, and pair-fixed effects to mitigate the unobserved variables' biases. Since we argue that the global bank linkages may reduce adverse effects of uncertainty, crisis, and shocks and adverse effects of distance on financial market development, culture and geography, the interaction terms between the global bank linkage and variables capturing this information are added into the original model. This paper's main finding is that bank linkages have a positive association with outward FDI because they help to dampen the adverse effects caused by uncertainty, crisis, and shocks in the host country. Our finding implies that to facilitate outward FDI, governments should support the formation of bank linkages across countries.

Our paper belongs to several strands of literature. Firstly, this article is closely related to papers that investigate an association between cross-border banking flows and outward FDI. Although the importance of banking networks in overcoming home bias in investment is argued by Hale (2012), the study of Poelhekke (2015) is the first to provide evidence of this relationship. By using restricted access data in The Netherlands covering 19 years (1984–2002) and 190 host countries, Poelhekke (2015) demonstrates that FDI by non-financial firms is boosted by banking foreign investments. Recently, Donaubauer et al. (2020) highlighted the essential role of FMD in increasing FDI. Although there are several studies such as Klein et al. (2002), and Bilir et al. (2019) raising the same issue, these papers address FMD on just one side of the source-host pair. Donaubauer et al. (2020) and Cerutti et al. (2023) indicate that an increase in inward and outward FDI is contingent upon the development of the home and host countries' financial markets. Apart from these studies, there are no others that focus on explaining the relationship between global bank linkages and FDI flows.

The second strand of the literature relevant to this study is related to research on factors that make FDI costly, and the role of global bank linkages in mitigating these costs. This role arises because banks specialize in acquiring and processing information about their borrowers (e.g., potential affiliate firms), and they may therefore provide information advantages to parent firms. Similar discussions explaining the

firm-bank relationship and the information advantage over other banks obtained from this relationship can be found in relevant studies (Boot, 2000). Poelhekke (2015) also argues that knowledge about banks' customers and investment opportunities abroad allows banks to offer financial and legal advice, thus helping firms to overcome any difficulties and barriers between home and host countries.

In the literature, the first factor includes uncertainty and information asymmetry (Antràs et al., 2009), or shocks (Goldberg, 2009). Prior scholars argue that the risk arising from this factor may lead to a reduction in international transactions. For example, Beck (2002) demonstrates that information asymmetry has great impacts on investment decisions. Regarding the effects of shocks, Choi and Furceri (2019) consider financial shocks and show how they negatively affect international trade through increased corporate risk. The adverse effects of other types of shocks such as natural disasters, terrorist attacks, and unexpected political shocks are discussed in Baker and Bloom's (2013) study. Under these circumstances, cross-border banking flows promote FDI flows through the information advantage about host-country firms or by attenuating the adverse effects of risk arising from uncertainty and shocks. In particular, the effects of risk can be reduced in countries with a greater share of trade finance; thus, there is an improvement in international transactions (Niepmann and Schmidt-Eisenlohr, 2017). Poelhekke (2015) indicates that the impacts of banking FDI are stronger in countries with great information asymmetry and hazardous investment. Goldberg (2009) also concentrates on the transmission of shocks through multinational banks and their positive effects on growth, then implies the nexus between bank globalization and multinational firms. Multinational banks are essential for firms expanding their businesses abroad through FDI, as they help them to overcome information asymmetry and foreign market frictions.

The second factor that makes FDI costly is distance. Petersen and Rajan (2002) contended that a greater distance causes the effective collection of information to be harder, which suggests that banks' local presence via FDI through their subsidiaries and branches plays a more important role than that of cross-border lending. There are information asymmetry and higher search costs at greater distances (Guiso et al., 2009), and they are two of the main reasons for financial intermediation (Beck, 2002). However, these issues can be reduced by cross-border banking investments through the information advantage about host-country firms or by attenuating the adverse effects of distance between the home and host countries, as argued by Poelhekke (2015).

Although the literature has investigated the association between global banking investments and the flows of FDI, and the role of banking networks in reducing risk and information asymmetry, there are still gaps in this field. First, there is a paucity of studies on this relationship. The sole paper on this subject is Poelhekke (2015). However, this study only investigates the effects of banking FDI and non-financial FDI between one nation (The Netherlands) and 190 host countries. Moreover, home banking FDI is defined simply as the stock of outward FDI to the host country by Dutch resident banks. Our study fills this gap by using country-pair data around the world to examine the effects of cross-border bank linkages and bilateral FDI stocks. Regarding bank linkage, we follow Caballero et al. (2018) to use cross-border syndicated lending as a measure for the number of bank pairs in these two countries. Unlike the cross-border stocks and flows of outstanding bank claims based on the BIS database and bank ownership linkages (Claessens and Horen, 2014), our measure captures banks' information acquisition as it is based on long-term interbank relationships. Second, to the best of our knowledge, there has been no paper investigating the effects of global bank linkages on reducing the risk and information asymmetry arising from uncertainty, shocks, and distance, as this study does. Our paper, therefore, provides a more in-depth explanation of the mechanisms through which cross-border bank linkages promote the flows of FDI.

The rest of this paper is organized as follows: Section 2 describes the methodology; Section 3 provides the empirical results; Section 4 gives concluding remarks.

2. Data and methodology

We specify the following model to estimate the effect of bank linkages on FDI[1].

$$FDI_{ijt} = \beta_0 + \beta_1 LINK_{ij,t-1} + \beta_2 CONTROL_{ij,t-1} + v_t + \lambda_i + \gamma_j + \alpha_{ij} + \varepsilon_{ijt,} \quad (1)$$

where superscripts *i* and *j* denote the source and host country, and *t* denotes year. v_t, λ_i, γ_j, and α_{ij} capture year, source-country-fixed, host-country-fixed, and pair-fixed effects, respectively. *LINK* measures the aggregate number of bank linkages of country *i* in country *j* and this is simply the sum of bank pairs in which banks in country *i* lend to those in country *j*. We rescale LINK by dividing by 100. FDI_{ijt} is the bilateral FDI stock of country *i* in country *j* in year *t*. The FDI is reported in terms of millions of USD, and we take a natural logarithm. In this vein, we apply log-linearization to solve with the zero-trade problem. Another approach used to solve zero observation and the presence of heteroscedasticity is the pseudo-Poisson maximum-likelihood (PPML) estimation technique proposed by Silva and Tenreyo (2006). Yet, Head et al. (2014) and Martin and Pham (2020) argue against the biased estimations that derive from using PPML when there is large zero observation[2]. *CONTROL* is a set of control variables, including GDP, population, area, and other common gravity variables that capture weighted distance (*D*), colonial relationship (*colony*), common colonizer post-1945 (*comcol*), common language (*comlang*), contiguity (*contig*), and the same country currently or in the past (*smctry*). While GDP represents the economic scale, physical distance captures the transportation cost. Other variables reflect the information costs. We also incorporate multilateral real exchange rate (REER), financial openness (KAOPEN), and difference in corporate tax (*Corporatetax*).

FDI data is collected from UNCTAD, while bank linkages are computed based on syndicated bank loans from Dealogic's Loan Analysis[3]. The value of outward FDI is set to zero with negative FDI stock reports. GDP, population, and area are taken from the World Bank database. The gravity variables are obtained from CEPII. Data of REER is collected from Bruegel Datasets. The Chinn-Ito Index is used to capture financial openness. Corporate tax is obtained from Tax Foundation.

Table 1: Statistical summary

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI	12,813	6.37	2.79	0.00	13.38
LINK	12,813	0.18	0.49	0.00	6.74
GDP_i	12,813	9.37	0.90	6.49	10.69
GDP_j	12,813	8.90	1.14	5.61	10.69
contig	12,813	0.06	0.24	0.00	1.00
comlang	12,813	0.10	0.31	0.00	1.00
colony	12,813	0.05	0.21	0.00	1.00
comcol	12,813	0.01	0.07	0.00	1.00
smctry	12,813	0.01	0.10	0.00	1.00
D	12,813	6.24	4.52	0.16	19.56
$REER_i$	12,813	99.72	14.01	40.68	319.74
REERj	12,813	100.77	15.93	40.68	319.74
$KAOPEN_i$	12,813	0.81	0.30	0.00	1.00
KAOPENj	12,813	0.77	0.33	0.00	1.00
CorporatetaxD	12,813	1.88	10.38	-45.00	40.87
WUI_Word	12,423	0.78	0.11	0.42	1.26
WUI_Page	12,423	0.77	0.08	0.46	1.13
Stockvol	12,119	-3.10	0.38	-4.23	-1.59
Bankcrisis	12,500	0.04	0.20	0.00	1.00
Debtcrisis	12,500	0.01	0.08	0.00	1.00

[1] 15% in our sample.
[2] We thank Caballero et al. (2018) for sharing the data.

Currcrisis	12,500	0.00	0.06	0.00	1.00
natshock	6,535	0.43	0.71	0.00	4.00
revshock	6,535	0.01	0.08	0.00	1.00
tershock	6,535	0.03	0.22	0.00	4.00
Foreignown	3,193	1.97	1.50	1.00	11.00
FDIflow	8,803	4.34	2.75	0.00	11.60

Source: Author's calculation.

3. Empirical results

3.1. Benchmark results

Columns 1-2 in Table 2 outline the main benchmark results of equation (1), where we examine the association between the number of bank linkages in year *t-1* and the FDI stock in year *t*. In all models, we cluster standard errors in country pairs. In Column (1), we include all common gravity regressors, considering both country and year fixed effects. Our results show that *LINK* is statistically significant at a 1% level, and it has a positive sign as expected. In other words, bank linkages positively affect the following year's FDI. This finding is aligned with Poelhekke (2015), who investigates the relationship between global finance proxied by so-called "banking FDI" and non-financial FDI.

The positive and significant impacts of GDP_i and GDP_j imply that the greater the size of the source and host countries' GDP, the simpler it will be to either make the decision or find an appropriate destination for investment abroad. Donaubauer et al. (2020) also investigate the effect of GDP in the source and host country on bilateral FDI, but they only find a positive sign for the effect of income per capita of the origin country on FDI in developing host countries. They argue that this fact may stem from the opposing effects of the horizontal and vertical FDI. Other common gravity regressors such as the contiguity (*contig*), the colonial relationship (*colony*), the common language (*comlang*), the same country currently or in the past (*smctry*), and the bilateral distance (*D*) also play a vital decisive role in bilateral FDI. The positive signs of *contig*, *comlang*, and *smctry*, as well as the negative sign of *D*, suggest that the proximity and share of commons can reduce the risk of investment failure, thus enhancing the motivation to make investments abroad. Petersen and Rajan (2002) also contend that the physical proximity of lenders and borrowers plays a vital role in effectively monitoring and collecting soft information. The coefficients of financial openness are statistically positive, implying that a more liberal capital account boosts the bilateral FDI. We use the difference in corporate tax rates between source and host countries as a proxy for excess profit in which the returns on the FDI host country are larger than that on the FDI source country. However, the coefficient of *CorporatetaxD* is insignificant. Finally, real exchange rates play no role in determining FDI linkage.

In the second regression, there is the concern that the correlation between global bank linkages and bilateral FDI might result from the globalization trend or historically established country ties, so we include the pair country *i* and *j* fixed effects and report the results in Column 2 in Table 2. The results reveal that the variable *LINK* is still statistically significant at a 1% level, but its magnitude slightly decreases. This discussion is consistent with that of Caballero et al. (2018).

We additionally assess the impact of control variables on FDI with and without considering the influence of bank linkages. Overall, while the size of coefficients may vary slightly, their significance levels remain consistent.

Table 2: Baseline results

	(1)	**(2)**
Variables	FDI	FDI
LINK	0.250***	0.193***
	(0.0689)	(0.0738)
GDP_i	1.233***	1.242***
	(0.157)	(0.158)
GDP_j	0.558***	0.582***

	(0.126)	(0.128)
contig	0.743***	
	(0.173)	
comlang	0.962***	
	(0.134)	
colony	1.071***	
	(0.154)	
comcol	0.595	
	(0.627)	
smctry	1.513***	
	(0.344)	
D	-0.225***	
	(0.0114)	
$REER_i$	-0.000657	-0.000788
	(0.00160)	(0.00163)
$REER_j$	-0.00103	-0.00108
	(0.00217)	(0.00221)
$KAOPEN_i$	0.894***	0.894***
	(0.344)	(0.344)
$KAOPEN_j$	0.331**	0.320**
	(0.140)	(0.141)
CorporatetaxD	0.00134	0.00107
	(0.00439)	(0.00440)
Constant	-10.57***	-10.85***
	(1.428)	(1.641)
Observations	12,813	12,813
R-squared	0.742	0.350
Number of pair	1,624	1,624
Pair FE	NO	YES
Country FE	YES	YES
Year FE	YES	YES
Robust standard errors in parentheses		
***p < 0.01, **p < 0.05, *p < 0.1		

Source: Author's calculation.

3.2. The role of global bank linkages in reducing the effects of uncertainty, global financial crisis and other global shocks

This paper follows Antràs et al. (2009) to consider the first type of factors that make FDI costly, including uncertainty and information asymmetry. We argue that cross-border banking flows promote FDI flows through the information advantage about the host-country firms or by attenuating the adverse effects of uncertainty, shocks, and crisis in the recipient countries. Niepmann and Schmidt-Eisenlohr (2017) provide a similar argument – that the higher share of trade finance in a given country can lower the effects of risk, then lead to a rise in international transactions. Directly related to FDI, Poelhekke (2015) also shows that the effects of the so-called "banking FDI" become more sizable in countries featuring large information asymmetry and hazardous investment. Hence, the effects of global bank linkages should be greater in countries featuring a high level of uncertainty or hit by negative shocks and various types of crises. The significant and positive interactions may thus help to identify the effects of global banking capital flows on FDI by reducing the impacts of the reverse channels.

To provide greater insight into the mechanism behind the baseline results, we interact bank linkages with variables capturing uncertainty, crisis, and shocks to illustrate the level of information asymmetry. Regarding uncertainty, we employ the World Uncertainty Index (*WUI*), which uses frequency counts of the word "uncertainty" (*WUI_Word*) or the number of pages containing the word "uncertainty"

(*WUI_Page*) in the Economist Intelligence Unit (EIU). For a robust check, we follow Choi and Furceri (2019) to use the stock market volatility as another measure of uncertainty that focuses more on the financial market (*Stockvol*). Crises include systemic bank, sovereign debt, and currency crises. We obtain crisis data from Caballero et al. (2018). Following Baker and Bloom (2013), we incorporate the diverse types of shock, including natural disasters, revolution shocks, and terrorist attack shocks. In particular, natural disaster information is available from the Center for Research on the Epidemiology of Disasters (CRED). The dataset includes various categorized events such as drought, earthquakes, epidemics, floods, extreme temperatures, insect infestations, avalanches, landslides, storms, volcanoes, fires, and hurricanes. The information about terrorist events is obtained from the Center for Systemic Peace (CSP), including all terrorist bombings leading to more than 15 deaths. The political shocks in our study consist of all successful assassinations, coups, revolutions, and wars, and the data are available from CSP.

The various categories of each type of channel may be relevant for the following reasons. Each measure of risk may cause foreign firms to encounter the distinct probability of making bad investments or forming a corporation with the wrong partners. As revealed by Baker and Bloom (2013), these exogenous shocks might lead to volatility in the stock market or cause the consequences of a crisis to be more severe. Furthermore, there are spikes of uncertainty proxied by WUI around the 9/11 attack, SARS outbreak, Gulf War II, Euro debt crisis, El Niño, and the European border crisis (Ahir et al., 2018). In addition, stock market volatilities can be a good proxy for multiple economic impacts such as property destruction after a natural disaster or the closure of the banking system after a revolution, thus changing the strategic behavior of firms and banks. Therefore, it is necessary to separate each source of information asymmetry to make it possible to quantify how each type of risk attenuates the effects of making banking investments abroad on the bilateral FDI flow. To test our expectations, we extend our baseline model by examining the interactions between each measure of risk and global bank linkages. Both are lagged by one period. The regressions always control for country and year fixed effects. We also further control for the pair country *i* and *j* fixed effects to overcome concerns regarding the correlation between global bank linkage and bilateral FDI that might stem from the globalization trend or historically established country ties. In general, the result differences are not significant in any models.

Table 3 outlines the estimation results when we examine the interaction between each measure of uncertainty and global bank linkages. Interactions in all models are statistically significant and have the expected positive signs. However, there are differences in the marginal effects of WUI and stock market volatility. The influences of the global banking network become greater in recipient countries with a high WUI, implying greater uncertainty related to economic and political development in both the short and long term (Ahir et al., 2018). The positive signs illustrate that the margin effects of cross-border banking flows increase with the level of uncertainty. Focusing explicitly on the economic dimension by using the volatility in the stock market, we report the results in Columns 5-6 in Table 3. The marginal effects are roughly 0.07 if these countries encounter risks in the stock market.

Table 3: Interaction between bank linkages and uncertainty in the host country

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**
LINK	0.0204	-0.0547	-0.256	-0.322*	0.481***	0.420***
	(0.151)	(0.151)	(0.193)	(0.191)	(0.119)	(0.125)
WUI_Word_j	0.0460	0.0265				
	(0.158)	(0.159)				
$LINK*WUI\_Word_j$	0.280*	0.325**				
	(0.157)	(0.160)				
WUI_Page_j			-0.253	-0.290		

			(0.228)	(0.228)		
LINK*WUI_Page$_j$			0.659***	0.706***		
			(0.232)	(0.229)		
Stockvol$_j$					-0.0236	-0.0220
					(0.0576)	(0.0576)
LINK*Stockvol$_j$					0.0771***	0.0737***
					(0.0272)	(0.0272)
Constant	-10.82***	-11.00***	-10.41***	-10.53***	-11.74***	-11.88***
	(1.460)	(1.681)	(1.481)	(1.702)	(1.462)	(1.690)
Observations	12,423	12,423	12,423	12,423	12,055	12,055
R-squared	0.746	0.360	0.746	0.360	0.746	0.364
Number of pair	1,563	1,563	1,563	1,563	1,525	1,525
Pair FE	NO	YES	NO	YES	NO	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Robust standard errors in parentheses						
***p < 0.01, **p < 0.05, *p < 0.1. CONTROL variables are included.						

Source: Author's calculation.

We then examine the interaction between the various genres of crisis and the amount of bilateral cross-border capital flows. Table 4 displays the estimation results. A global crisis may cause foreign banks to stop lending to the domestic banks in the interconnected financial system. A global crisis and the subsequent financial turmoil can affect international transactions by increasing both bank risks and corporate risks (Del Prete and Federico, 2020). In this study, we emphasize the role of global bank linkage in reducing these risks. Niepmann and Schmidt-Eisenlohr (2017) provide a similar argument – that the higher share of trade finance can lower the effects of risk, then lead to a rise in international transactions. Our study contends that global bank linkages can promote information advantages, and thus, their effects should be greater if the host countries face crisis shocks. We expect positive signs for these interactions. Table 4 demonstrates the substantial heterogeneity in each type of shock. While the interaction terms of systemic bank crisis and currency crisis are statistically insignificant in our database, debt crisis is proven to be a useful channel through which global bank linkages can promote FDI flows. Our results provide more empirical evidence to support the view that cross-border bank linkages can dampen the adverse effects of financial crisis shocks on international transactions, especially in the debt market, by analyzing the flows of FDI. Our findings on the role of interbank intermediation in reducing the adverse effects of shocks on financial market international transactions are aligned with those of Del Prete and Federico (2020).

In addition to the frictions in the financial markets, we also consider other shocks, including natural disasters, revolution shocks, and terrorist attacks shocks, as these might augment the risks and impact bilateral FDI. The results are summarized in Table 5. Among the three genres of shock, we find that only the shocks capturing natural disasters support our belief. These shocks are statistically significant and have positive signs, which suggests that the marginal effects of global bank linkages on FDI increase with the risk of natural disaster shocks.

In short, our results illustrate that cross-border banking flows play a decisive role in predicting the flow of bilateral FDI, conditional on fixed year, country, and pair-country effects. There is a positive association between global bank linkages and FDIs. The effects of cross-border banking flows become more sizable in countries that face uncertainty, debt crisis or natural disaster shock.

Table 4: Interaction between bank linkages and crisis in the host country

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**
LINK	0.225***	0.221***	0.220***	0.170**	0.166**	0.165**
	(0.0660)	(0.0651)	(0.0653)	(0.0721)	(0.0705)	(0.0708)
$Bankcrisis_j$	0.0290			0.0295		
	(0.0370)			(0.0369)		
$LINK*Bankcrisis_j$	-0.0106			2.49e-06		
	(0.0262)			(0.0263)		
$Debtcrisis_j$		0.247			0.262	
		(0.170)			(0.171)	
$LINK*Debtcrisis_j$		0.615*			0.613*	
		(0.342)			(0.338)	
$Currcrisis_j$			0.191**			0.200**
			(0.0947)			(0.0946)
$LINK*Currcrisis_j$			-0.0835			-0.0924
			(0.0572)			(0.0569)
Constant	-11.73***	-11.80***	-11.87***	-12.18***	-12.27***	-12.31***
	(1.400)	(1.399)	(1.407)	(1.614)	(1.613)	(1.621)
Observations	12,500	12,500	12,500	12,500	12,500	12,500
R-squared	0.749	0.749	0.749	0.361	0.362	0.362
Number of pair	1,578	1,578	1,578	1,578	1,578	1,578
Pair FE	NO	NO	NO	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Robust standard errors in parentheses.						
***p < 0.01, **p < 0.05, *p < 0.1. CONTROL variables are included.						

Source: Author's calculation.

Table 5: Interaction between bank linkages and shocks in the host country

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**
LINK	0.193***	0.198***	0.210***	0.186**	0.191**	0.205**
	(0.0685)	(0.0682)	(0.0720)	(0.0831)	(0.0831)	(0.0905)
$natshock_j$	-0.0300**			-0.0297*		
	(0.0153)			(0.0152)		
$LINK*natshock_j$	0.0161*			0.0189**		
	(0.00927)			(0.00919)		
$revshock_j$		-0.0183			-0.0285	
		(0.103)			(0.104)	
$LINK*revshock_j$		0.0502			0.0489	
		(0.0372)			(0.0356)	
$tershock_j$			0.0760			0.0726
			(0.0523)			(0.0530)
$LINK*tershock_j$			0.0144			0.0103
			(0.0742)			(0.0806)

Constant	-14.63***	-14.59***	-14.58***	-14.49***	-14.48***	-14.48***
	(1.861)	(1.858)	(1.860)	(2.150)	(2.148)	(2.149)
Observations	6,535	6,535	6,535	6,535	6,535	6,535
R-squared	0.767	0.767	0.767	0.373	0.372	0.373
Number of pair	814	814	814	814	814	814
Pair FE	NO	NO	NO	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Robust standard errors in parentheses.						
***p < 0.01, **p < 0.05, *p < 0.1. CONTROL variables are included.						

Source: Author's calculation.

3.3. Robustness check

We first drop those countries with peaks in the bank linkages in the source, host, or both countries and report the re-regression results in Columns 1–3 of Table 6. The signs and the level of statistical significance are robust. More importantly, the magnitude of *LINK* increases when we drop the observations from countries that have substantial bank linkages.

Up to now, we have measured bank linkages as the aggregate number of bank pairs in which banks in the home country lend to those in host countries. We may want to examine whether a change in bank networks matters. We define *DLINK* as the first difference of *LINK*, and we re-regress equation (1) by replacing LINK with *DLINK*. All the independent variables are lagged one year. The estimation results reported in Column 4 of Table 6 show that a positive change in the number of bank linkages enhances bilateral FDI.

We next use the ownership relationships between the main shareholders of foreign banks as an alternative measure for long-term bank linkages. We obtain the data from Claessens and van Horen (2014) for the period 1995–2013. We construct a variable *Foreignown*, which is the sum of foreign subsidiaries from source country *i* in host country *j*, to measure the bank network's intensity between two countries and therefore captures another dimension of long-term bank connection. The regression result of LINK on *Foreignown*, reported in Column 5 of Table 6, indicates a positive and statistically significant effect.

For the FDI measure, we assign a zero value to negative FDI stock entries. In this part, we drop the negative and zero FDI observations and report the re-estimated results of the baseline model in Column 6 of Table 6. Therefore, our baseline results are robust.

Table 6: Robustness check

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Variables	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**	**FDI**
LINK	0.537**	0.405***	1.014***			0.250***
	(0.259)	(0.147)	(0.389)			(0.0689)
DLINK				1.004***		
				(0.226)		
Foreignown					0.0986***	
					(0.0209)	
Constant	-9.366***	-11.06***	-10.21***	-10.22***	-6.427**	-10.57***
	(1.682)	(1.532)	(1.801)	(1.432)	(2.679)	(1.428)
Observations	10,061	11,212	8,786	11,374	3,182	12,813
Number of pair	1,348	1,436	1,192	1,597	395	1,624
Pair FE	NO	NO	NO	NO	NO	NO

Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
R2	0.690	0.733	0.680	0.744	0.846	0.742

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1

Column 1 drops the source countries with peaks, including Germany, UK, Japan, US, Australia, France;
Column 2 drops the host countries with peaks, including Turkey, Russia, Korea, Italy, USA, and Hongkong.
Column 3 drops both source and host countries with peaks.
CONTROL variables are included.

Source: Author's calculation.

4. Conclusion

This paper examines the impact of cross-border banking investments on FDI flows using data from 2001 to 2012 across 1,624 country pairs. The results indicate a positive relationship between global bank connections and bilateral FDI stocks, suggesting reduced overseas business costs for multinational corporations in a connected financial system. Augmenting the model with interactions between banking capital flows and uncertainty variables reveals that the effects of cross-border banking increase with risk levels, indicating a potential for global banking networks to mitigate risk and uncertainty in international transactions. This has significant implications for economists and policymakers aiming to foster economic growth through international transactions, particularly in promoting bilateral FDI flows. Encouraging the formation of cross-border bank connections is essential, requiring policies to enhance cooperation among banks across different countries to create interconnected financial systems, particularly crucial during periods of economic volatility and uncertainty.

Reference

Ahir, H., Bloom, N., & Furceri, D. (2018). The World Uncertainty Index. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3275033

Ahn, J., Amiti, M., & Weinstein, D. E. (2011). Trade Finance and the Great Trade Collapse. *American Economic Review*, *101*(3), 298–302 . https://doi.org/10.1257/aer.101.3.298

Antràs, P., Desai, M. A., & Foley, C. F. (2009). Multinational Firms, FDI Flows, and Imperfect Capital Markets. *The Quarterly Journal of Economics*, *124*(3), 1171–1219. https://doi.org/10.1162/qjec.2009.124.3.1171

Baker, S. R., & Bloom, N. (2013). *Does Uncertainty Reduce Growth? Using Disasters as Natural Experiments* (Working Paper No. 19475; Working Paper Series). National Bureau of Economic Research. https://doi.org/10.3386/w19475

Beck, T. (2002). Financial development and international trade: Is there a link?. *Journal of International Economics*, *57*(1), 107-131.

Becker, J., Fuest, C., & Riedel, N. (2012). Corporate tax effects on the quality and quantity of FDI. *European Economic Review*, *56*(8), 1495–1511. https://doi.org/10.1016/j.euroecorev.2012.07.001

Bilir, L. K., Chor, D., & Manova, K. (2019). Host-country financial development and multinational activity. *European Economic Review, 115*, 192–220. https://doi.org/10.1016/j.euroecorev.2019.02.008

Boot, A. W. A. (2000). Relationship Banking: What Do We Know? *Journal of Financial Intermediation*, *9*(1), 7–25. https://doi.org/10.1006/jfin.2000.0282

Caballero, J., Candelaria, C., & Hale, G. (2018). Bank linkages and international trade. *Journal of International Economics*, *115*, 30–47. https://doi.org/10.1016/j.jinteco.2018.08.006

Choi, S., & Furceri, D. (2019). Uncertainty and cross-border banking flows. *Journal of International Money and Finance*, *93*, 260–274. https://doi.org/10.1016/j.jimonfin.2019.01.012

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics*, *87*(1), 117–133. https://doi.org/10.1016/j.jinteco.2011.04.001

Claessens, S., & Horen, N. V. (2014). Foreign Banks: Trends and Impact. *Journal of Money, Credit and Banking*, *46*(s1), 295–326. https://doi.org/10.1111/jmcb.12092

De la Torre, A., Soledad Martinez Peria, M., & Schmukler, S. L. (2008). *Bank involvement with*

SMEs: Beyond relationship lending. The World Bank.

Del Prete, S., & Federico, S. (2020). Do links between banks matter for bilateral trade? Evidence

from financial crises. *Review of World Economics*. https://doi.org/10.1007/s10290-020-00383-1

De Sousa, J., & Lochard, J. (2011). Does the single currency affect foreign direct

investment?. *The Scandinavian Journal of Economics*, *113*(3), 553-578.

Dincer, N. N., & Eichengreen, B. (2014). Central Bank Transparency and Independence:

Updates and New Measures. *International Journal of Central Banking*, *10*(1), 189-259.

Donaubauer, J., Neumayer, E., & Nunnenkamp, P. (2020). Financial market development in host and source countries and their effects on bilateral foreign direct investment. *The World Economy*, *43*(3), 534–556. https://doi.org/10.1111/twec.12884

Edgington, D. W., & Hayter, R. (2001). Japanese direct foreign investment and the Asian financial crisis. *Geoforum*, *32*(1), 103–120. https://doi.org/10.1016/S0016-7185(00)00040-3

Egger, P., & Merlo, V. (2007). The impact of bilateral investment treaties on FDI

dynamics. *World Economy*, *30*(10), 1536-1549.

Eichler, S., Littke, H. C., & Tonzer, L. (2017). Central bank transparency and cross-border

banking. *Journal of International Money and Finance*, *74*, 1-30.

Garriga, A. C. (2016). Central bank independence in the world: A new data set. *International*

Interactions, *42*(5), 849-868.

Goldberg, L. S. (2009). Understanding Banking Sector Globalization. *IMF Staff Papers*, *56*(1), 171–197. https://doi.org/10.1057/imfsp.2008.31

Guiso, L., Sapienza, P., & Zingales, L. (2009). Cultural Biases in Economic Exchange? *The Quarterly Journal of Economics*, *124*(3), 1095–1131. JSTOR.

Hale, G. (2012). Bank relationships, business cycles, and financial crises. *Journal of International Economics*, *88*(2), 312–325. https://doi.org/10.1016/j.jinteco.2012.01.011

Hale, G., Kapan, T., & Minoiu, C. (2016). *Crisis Transmission in the Global Banking Network* (SSRN Scholarly Paper ID 2882655). Social Science Research Network. https://papers.ssrn.com/abstract=2882655

Han, W., Wang, J., & Wang, X. (2022). FDI and firm productivity in host countries: The role of financial constraints. *Journal of International Money and Finance*, *124*, 102623.

Head, K., & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook.

In *Handbook of international economics* (Vol. 4, pp. 131-195). Elsevier.

Kapás, J., & Czeglédi, P. (2020). The impact of culture on FDI disentangled: Separating the "level" and the "distance" effects. *Economia Politica*, *37*(1), 223–250. https://doi.org/10.1007/s40888-020-00175-8

Klein, M. W., Peek, J., & Rosengren, E. S. (2002). Troubled Banks, Impaired Foreign Direct Investment: The Role of Relative Access to Credit. *American Economic Review*, *92*(3), 664–682. https://doi.org/10.1257/00028280260136309

Martin, W., & Pham, C. S. (2020). Estimating the gravity model when zero trade flows are

frequent and economically determined. *Applied Economics*, *52*(26), 2766-2779.

Milesi-Ferretti, G.-M., Tille, C., Ottaviano, G. I. P., & Ravn, M. O. (2011). The great retrenchment: International capital flows during the global financial crisis. *Economic Policy*, *26*(66), 285–342. JSTOR.

Niepmann, F., & Schmidt-Eisenlohr, T. (2017). International trade, risk and the role of banks. *Journal of International Economics*, *107*, 111–126. https://doi.org/10.1016/j.jinteco.2017.03.007

Petersen, M. A., & Rajan, R. G. (2002). Does Distance Still Matter? The Information Revolution in Small Business Lending. *The Journal of Finance*, *57*(6), 2533–2570. https://doi.org/10.1111/1540-6261.00505

Poelhekke, S. (2015). Do global banks facilitate foreign direct investment? *European Economic Review*, *76*, 25–46. https://doi.org/10.1016/j.euroecorev.2015.01.014

Poelhekke, S. (2016). *Financial Globalization and Foreign Direct Investment* (SSRN Scholarly Paper ID 2864410). Social Science Research Network. https://doi.org/10.2139/ssrn.2864410

Silva, J. S., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, *88*(4), 641-658.

Ucal, M., Özcan, K. M., Bilgin, M. H., & Mungo, J. (2010). Relationship between financial crisis and foreign direct investment in developing countries using semiparametric regression approach. *Journal of Business Economics and Management*, *11*(1), 20–33. https://doi.org/10.3846/jbem.2010.02