Why Do Banks Go Abroad? Evidence Using a Three-Way Error Component Model

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ABSTRACT. This paper examines whether a host country's bank-capital-to-asset ratio and internet capability affect inward banking FDI. To do so we develop a two-asset portfolio selection model to analyze the risk-return factors in banking FDI. We then employ a three-way error component estimation model to account for time fixed effects as well as unobserved source- and host-country heterogeneity. The investment activities of 1156 banks from 20 source countries into 108 host countries over the period of 2000 - 2008 indicate that low bank-capital-to-asset ratio, better telecommunications infrastructure, strong bilateral trade, and the host's economic and financial sector development increase inward banking FDI. Finally, increased source-host geographic distance and the source country's government effectiveness affect banks' international investment activity. (C13, F21, F23, G11)

I. Introduction

This paper investigates the factors that determine a bank's decision to invest internationally. We extend the previous literature by testing if banks are attracted to countries where there is financial capital scarcity. This hypothesis is based on the assumption that banks tend to exploit profit opportunities present in the host country due to local bank capital scarcity and the associated high rate of return on domestic capital. We also test the hypothesis that banks tend to invest in countries with better telecommunication infrastructure. This hypothesis is based on the fact that since banks communicate with customers to handle transactions, countries with better communication infrastructure should have a comparative advantage in attracting financial FDI.

The past two decades have seen significant financial globalization through banking foreign direct investment (FDI). While much of this has

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been in the developed world, significant banking FDI now occurs into developing countries. According to Mathieson and Roldos (2001) the share of foreign banks' asset to total banking assets reached 70% in Central and Eastern Europe, and 40% in Latin America, at the end of 1990s. Recently, Claessens et. al. (2008) documented that foreign banks' assets have reached $1,247 billion in 2006 in developing countries alone, compared to $157 billion in 1995. They also find the number of foreign banks operating in developing countries has increased by 58%, while the number of domestic banks in those countries has declined by 24% over the same period. Despite this significant trend in banking FDI, there are no clear theoretical or empirical findings that explain the observed banking FDI trend.

We contribute to the existing literature in several ways. First, we test our two hypotheses by developing a two-asset portfolio selection model which captures the risk-return factors of banking FDI. Next, we empirically estimate this model employing a three-way error component model (ECM). Egger and Pfaffermayr (2003), Cornelissen and Hubler (2007), Andrews et. al. (2006), and Davis (2002) all suggest the proper way to estimate models with more than two fixed effects is to use a multi-way ECM, where these models all use dummy variables to control for unobserved heterogeneity. As our model contains home-country, host-country, and time-specific fixed effects, we differ from previous banking FDI studies that typically control only home-host pair and time fixed effects.

Our data sample includes 1156 banks from 20 source countries investing in 108 host countries during 2000 - 2008. Our empirical results reveal that banks invest in countries that have lower bank capital-to-asset ratio, better telecommunications infrastructure, host's economic growth, financial sector development and strong bilateral trade and cultural ties. Finally, the distance between the source and the host country as well as government effectiveness of the source country affect the international investment activity of the bank. The result is consistent when the sample is divided into subsamples to examine intra-OECD, OECD to non-OECD, and banking flows from Europe.

II. Related Literature

A. THEORETICAL LITERATURE

It is well established that banks wishing to diversify their income base

can reduce their risk by operating in a foreign country (e.g., Errunza and Senbet (1981), and Berger and DeYoung (2001)), although banking FDI activity itself carries its own set of risks. Although no consensus exists as to where banks like to expand, Repullo (2000) argues that banks prefer to open branches in relatively riskier countries with generous deposit guarantee schemes. Using a similar argument Sabi (1988), Buch (2000), and Wezel (2004) developed portfolio selection models for the application of banking sector FDI analysis.

B. EMPIRICAL-BANKING-FDI DETERMINANTS

We classify banking FDI determinant factors into three categories: push factors (i.e., home-country specific characteristics); pull factors (i.e., host-country characteristics), and home-host pair-wise bilateral variables. Push factors measure the home country's economy and include home country growth, GDP, per capita GDP, productivity and business cycle. For example, Barrell and Pain (1996) find that U.S. economic growth is positively related to U.S. outbound FDI while, on a larger scale, Albuquerque et. al. (2005) find world per capita GDP growth increases FDI outflows to developing countries. Improvements in the home country's financial conditions, often measures via a firm's stock market capitalization (Klein and Rosengren (1994)) and increased access to credit (Klein et. al. (2002), Brealey and Kaplains (1996)) all positively affect banking FDI.

Pull factors are the characteristics which attract banks by providing profit opportunities in the host country. Buch (2000) and Wezel (2004) find host country overall economic and financial sector growth is found to attract financial FDI by Buch (2000) and Wezel (2004). Brealey and Kaplanis (1996) and Magri et. al. (2004) find banks tend to invest in countries with relatively developed and competitive financial systems. Nigh et. al (1986) find tax incentives and host country openness to positively affect financial FDI, while increased host country risk, as measured by the nation's position in the annual Euromoney risk rankings, hampers inward financial FDI (Magri et. al. (2004), Wezel (2004)). In addition, host country institutional factors such as banks operational scope limitations (Buch and DeLong (2001)) and host country banking FDI openness (Papaioannou (2005)) are often shown as significant FDI determinants.[1]

Common gravity-model factors such as colonial ties, common legal origin, and distance are often determined as significant home-host pairwise FDI influences (e.g. see Aviat and Coeurdacier (2004), Buch (2003), and Galindo et. al. (2003)). Colonial ties, common legal origin, border and language have positive sign while distance is typically found to negatively impact banking flows. Home-host interest rate differentials also found to be significant determining banking FDI positively (see Magri et. al. (2004)). Finally, the "Follow-the-Client" hypothesis suggests that bilateral economic integration, with non-banking FDI and bilateral trade levels often used as proxies for customer activity in the foreign market, positively affects banking FDI.[2]

III. Model Specification and Data Description

A. PORTFOLIO SELECTION MODEL FOR BFDI

A portfolio selection model framework allows us to consider multiple factors that affect banking FDI risks and returns. Sabi (1988), Buch (2000), and Wezel (2004) have used n-asset portfolio models without considering a fixed investment cost. In contrast, we considered a two-asset portfolio model that includes fixed investment costs.

Suppose that a representative bank, with headquarters in the domestic country (d) considers diversifying its investments geographically through either opening a branch in a new location in country (d) or engaging in banking FDI in a foreign country (f). For the bank's investment manager, the goal is to maximize expected profit subject to some acceptable level of risk and other balance sheet constraints. Alternatively, the manager can formulate the bank's investment allocation problem as the minimization of the total risk of the investments, subject to a given level of expected return acceptable to the bank shareholders and other balance sheet constraints. In either view, the manager must find the optimal level of foreign investment that improves the bank's position in terms of profit maximization and risk diversification. Assuming a general functional form for both the total risk and expected return, this investment allocation problem can be described as:

$$\text{Minimize } \sigma(\pi)^2 = \sigma\left(\sigma^2_{rf}(X), \sigma^2_{rd}(Z), \sigma_{df}(X,Z), A_f, A_f, W\right) \quad (1)$$

Subject to

$$R = R\left(r^e_f(X), r^e_d(Z), C(v,F), W, A_f, A_d\right) \quad (2)$$

$$A_d + A_f = 1 \quad (3)$$
$$A_d \geq 0 \text{ and } A_f \geq 0 \quad (4)$$

where R is the investment's overall expected rate of return, A_d (A_f) are the fractions of total assets held in the domestic (foreign) market. r_i^e (i=d, f) is the expected rate of return from holding asset type i. $\sigma^2(\pi)$ is the total risk (variance) of the investment while $\sigma_{\pi i}^2$ is the specific risk related to asset type i and σ_{df} is the covariance of the two asset types. The arguments in equation (1) and (2) are factors that determine r_i^e and the cost of the investment C(v,F), where v and F are variable and fixed costs, respectively. Similarly, X and Z are factors that affect the expected rate of return in the home and host countries, respectively. Finally, W is a vector of home-host bilateral variables.

The first constraint (equation (2)) implies that the investment's expected return is a function of the two expected rates of return, the amount of assets invested in the domestic and foreign countries, as well as overall investment costs. The second constraint (equation (3)) indicates that the bank's assets will be exhaustively allocated between the two assets, while the third constraint (equation (4)) rules out short sales.

After solving the minimization problem, the bank's FDI decision is determined by variables that affect the expected rate of return on the investment, R, and the associated risk, $\sigma^2(\pi)$. That is,

$$A_f^* = f\left(r_f^e(X), r_d^e(Z), \sigma_{rd}^2(Z), \sigma_{rf}^2(X), \sigma_{df}(X,Z), W, C\right) \quad (5)$$

Equation (5) implies that the level of bank assets invested in foreign countries depends on: host-country specific characteristics (X) that affect expected rate of return (r_f^e) and risk (σ_{rf}^2), home-country factors (Z) that affect expected rate of return (r_d^e) and risk (σ_{rd}^2), host-home bilateral variables (W), and bank-specific variables (C).

For estimation purposes, we employ two proxy variables for A_f (i.e., Bank assets and earnings before tax) and write an estimating equation that includes all variables (i.e., X, Z, W, and C) in a single vector (V). Since there are also three heterogeneities present in our dataset, we added three fixed effect variables (i.e., home- (a_i), host- (δ_j), and time-specific

(γ_t)). Following previous literature, these determinant variables can also be grouped as push- , pull- , and bilateral- factors.[3]

B. EMPIRICAL MODEL

Equation (5) serves as the basis for the empirical model. As such, we need to account for the impact that each variable has on banking FDI. The expected rate of return on foreign assets will be positively affected by the demand for foreign credit in the host country by firms (including those doing non-banking FDI) from the home country, the host's level of banking competition, the level of infrastructure relevant for foreign bank operation, measures of economic growth as well as the level of bilateral trade.[4] Thus, we can estimate equation (5) by:

$$BFDI_{ijt} = V'_{ijt}\beta + a_i + \delta_j + \gamma_t + \in_{ijt} \tag{6}$$

where $BFDI_{ijt}$ represents banking FDI, from home country i to host country j over time t. We follow previous banking FDI studies by measuring $BFDI_{ijt}$ through either total bank assets or earnings before tax (EBT) in the foreign country.[5] V is a vector of the home-, host-, and bilateral explanatory variables.

This model (equation (6)) is a three-way error-component panel data model, as home- (a_i), host- (δ_j), and time-specific (γ_t) heterogeneities potentially exist in the data. Estimating this type of three-way error component model is not common in empirical FDI research as this estimation technique requires significant memory space to specify a model with such a large number of dummy variables for all fixed effects in the data.[6] As a result, this paper presents three alternative estimation techniques, each addressing issues arising by omitting one of these fixed effects.

The first technique (Case I) estimates $BFDI_{(ij)t} = V'_{ijt}\beta + a_{ij} + \gamma_t + \in_{(ij)t}$ where the home-host country pair is considered as a single cross-section. The second (Case II) estimates $BFDI_{ijt} = V'_{ijt}\beta + Da_i + \delta_j + \gamma_t + \in_{ijt}$, where the home country effect is assumed to be fixed; to do so, a NXN home country dummy variable matrix (i.e., D) is used. The last case (Case III) assumes the host country effects are fixed (through the use of a MXM host country dummy variable matrix, F) and estimate $BFDI_{ijt} = V'_{ijt}\beta + a_i + F\delta_j + \gamma_t + \in_{ijt}$.

Note that each case above controls for different aspects of the multiple heterogeneities that exist in our data. Clearly, limiting our study to only a single two-way ECM is suboptimal, as such a choice fails to account for the recognized presence of unobserved heterogeneities. We must consider all three of the two-way ECMs in order to capture the effects of all three potential heterogeneity sources. For instance, Case I cannot accurately handle host- and home-specific heterogeneities, but rather captures only pair wise effects. Cases II and III can capture all of the home-, host-, and time-specific effects, although at a cost of imposing a fixed effect on the model. If the data indicates that the true model is a fixed effect model, then Cases II and III will yield nearly identical results. However, if the data suggests the possibility of random effects in the model, then these two estimates could differ. This would result in inefficient (although unbiased) coefficient estimates because of the fixed effect that was imposed on the model. To ensure proper model specification (fixed- or random-effect), we conduct a Hausman test on each alternative case. As detailed below, these results indicate only the presence of fixed-effects in our data.

C. DATA

Our sample consists of 1,156 banks from 20 source countries operating in 108 host countries during the period 2000-2008.[7] The banking data is reported annually by Orbis, and as we do not have data for our dependent variable for all countries during the entire sample period, our sample data is an unbalanced panel. Orbis defines bank nationality on its ownership structure, with banks considered foreign if more than 25.01 percent of its shares of equity are foreign owned. As stated above, banking FDI is measured by the bank's total assets or its earnings before tax (EBT) in a particular host.

Home country push variables include its growth rate (HOMEGRGDP), inflation rate (HOMEINF), government effectiveness (HOMEGOVEFF), and government regulatory quality (HOMEREGQUAL). We expect a negative sign on these variables, as poorer home institutional quality suggests bank would search for more stable environments in which to do business. Seven variables are included as host-specific pull factors. This list includes the host's: bank capital-to-asset ratio (BKAR), ratio of domestic private sector credit to GDP (CREDIT/GDP), international internet bandwidth in megabits per

person (INTERNET), GDP growth rate (GDPGR), inflation (INFLATION), government effectiveness (GOVEFF), and regulatory quality (REGQUAL).[8]

TABLE 1–List of home and host countries

HOME	HOST				
Australia	Albania	Chile	Honduras	Mongolia	Sri Lanka
Austria	Algeria	China	Hungary	Morocco	Slovakia
Belgium	Angola	Colombia	India	Mozambique	Slovenia
Canada	Argentina	Cote d'Ivoire	Indonesia	Netherlands	South Africa
France	Armenia	Croatia	Iraq	Neth. Antilles	Spain
Germany	Australia	Cyprus	Ireland	New Zealand	Sweden
Greece	Austria	Czech	Italy	Nicaragua	Switzerland
Ireland	Azerbaijan	Denmark	Jamaica	Nigeria	Seychelles
Italy	Bahamas	Djibouti	Japan	Norway	Tanzania
S. Korea	Bahrain	Ecuador	Kazakhstan	Pakistan	Thailand
Japan	Barbados	Egypt	Kenya	Panama	Trinidad & Tobago
Luxembourg	Belarus	El Salvador	S. Korea	Paraguay	Tunisia
Netherlands	Belgium	Estonia	Lebanon	Peru	Turkey
Portugal	Bermuda	Finland	Luxembourg	Philippines	Uganda
Russia	Bolivia	France	Macedonia	Poland	United Kingdom
Spain	Bosnia-Herzegovina	Gabon	Madagascar	Portugal	Uruguay
Sweden	Botswana	Gambia	Malawi	Romania	United States
Switzerland	Brazil	Georgia	Malaysia	Russia	Venezuela
United Kingdom	Bulgaria	Germany	Malta	Rwanda	Zambia
United States	Brukina Faso	Ghana	Mauritius	Saudi Arabia	Zimbabwe
	Cameroon	Greece	Mexico	Senegal	
	Canada	Guatemala	Moldova	Singapore	

TABLE 2–Descriptive Statistics of Bank Level Data

Variable	N	Mean	Std. Dev.	Min	Max
ASSET (in $)	8309	2626651	8649339	0	9.67E+07
EBT (in $)	8203	44641.44	371839.9	1.56E+07	8845797
BKAR (%)	9537	7.01	3.61	0	28.3
CREDITGDP%	10317	73.85	62.83	0	254.65
INTERNET (in megabits)	10355	33.25	25.77	0	86.56
GDPGR (%)	10269	3.87	2.79	-41.3	46.5
GOVEFF (index)	10395	1.03	1.07	-1.91	2.99
LEGAL (dummy)	10394	0.27	0.45	0	1
COLONY (dummy)	10394	0.17	0.38	0	1
DISTANCE (in km)	10394	3994.95	4143.03	59.62	17693.2
INFLATION (%)	10254	14.31	482.05	-1.7	24411.3
HOMEGOVEFF (index)	10421	1.71	0.55	-0.58	2.99
HOMEINF (%)	10417	2.35	2.63	-1.8	37.7
HOMEREGQUAL (index)	10421	1.42	0.41	-0.78	2.5
HOMEGRGDP (%)	10279	2.68	1.5	-0.81	9.24
TRADE (in millions $)	8698	8.73	2.35	-2.3	13.16

The bank capital-to-asset ratio (BKAR) measures if banks are exploiting demand opportunities in the host country. A low bank capital-to-asset ratio implies that host country banks have low capital and thus cannot meet credit demands due to capital scarcity. This situation may lead to an increase in the interest rate, which provides an incentive for a home-based bank to do FDI in the foreign country. CREDIT/GDP proxies the host country's financial sector development, while a more stable host-country market, as measured by government effectiveness (GOVEFF) and regulatory quality (REGQUAL), should increase inward FDI. Finally, to test bank investment senstitivity to a nation's telecommunication infrastructure, the variable (INTERNET) measures for this infrastructure by indicating the strength and quality of its international internet bandwidth.

Home-host bilateral ties are measured through the level of bilateral trade (TRADE), which investigates the role that Follow-the-Customer plays in banking FDI.

TABLE 3–Variable Description

	Name	Description	Proxy For/Affects/Expected Sign
BANK	LASSET	Log of bank's total asset in the host	Dependent variable: Banking FDI.
	LEBT	Log of bank's earnings before tax in the host	Dependent variable: Banking FDI
HOST	BKAR	Host's local bank capital to asset ratio	Host-country business opportunities (-)
	INFLATION	Host's inflation	Affect bank's rate of return (-) & risk (+)
	CREDIT/GDP	Domestic credit to private sector to GDP ratio	Host's financial sector development (+)
	INTERNET	Host's level of internet service measured in megabits per second per person	Bank's cost effectiveness, affects return (+)
	GDPGR	Host's economy GDP growth rate	Return/risk variables (+/-) depending upon recessionary/inflationary period
	GOVEFF	Government effectiveness of the host	Costs associated with host goverment's rules/regulations; affects rate of return (+)
	REGQUAL	Regulatory quality in the host	Costs associated with host government's rules/regulations; affects rate of return (+)
BILATERAL	TRADE	Log of bilateral trade between the home and the host	Rate of return (+)
	LEGAL	Common legal origin	Rate of return (+)
	COLONY	Colonial ties between the home and the host	Rate of return (+)
	DISTANCE	The distance between the home and the host	Rate of return (-) & risk (+)
HOME	HOMEGRGDP	Home's economy GDP growth rate	Rate of return (+)
	HOMEGOVEFF	Government effectiveness of the home	Rate of return (+)
	HOMEREQUAL	Regulatory quality in the home	Rate of return (+)
	HOMEINFLATION	Rate of inflation in the home	Rate of return (-) & risk (+)

A common legal origin (LEGAL) increases the ease at which contracts can be written/enforced, leading to increased investment cost efficiency. Colonial ties (COLONY) often serves to increase access to the host country, while geographic distance (DISTANCE) often increases monitoring and other costs that decrease FDI likelihood.[9]

IV. Empirical Results

A. THREE-WAY ERROR COMPONENT MODEL

We estimate our three-way error component model (ECM) using the approach discussed in section III. For each estimation case, a Hausman specification tests indicates the appropriateness of a fixed effect framework. Likelihood ratio (LR) tests indicate that, except in two cases, no heteroskedasticity problem exists in the data.[10] To correct for the heteroskedasticity, we employ robust standard error estimation techniques (to be consistent, we do this in all regressions). Combined, these tests support our use of a robust standard error fixed-effect estimation method.[11]

Estimation results are summarized in Tables 4 - 7 according to the chosen measure of banking FDI (Total Assets, EBT) and estimation methods. In Table 4a-c, the first column is the base model, estimated using the full sample and without regional dummy variables, while the second column adds regional dummies. Recognizing that a large percentage of our FDI flows are within the OECD countries while most host countries are non-OECD, column (3) provides estimation results for the intra-OECD data subset while column (4) investigates OECD/ non-OECD flows, respectively. As many of our OECD countries are in European, the last three columns provide results using a European subsample. Column (5) examines intra EU-North flows, column (6) focuses on EU-North to EU-South, and column (7) estimates EU-North to all non-OECD countries, respectively. [12]

BFDI measured by total assets

In each table, the two variables upon which our hypothesis rests (BKAR, INTERNET) have the expected signs and are significant at least at the 10% significant level. This indicates that banks tend to invest in those countries where there are low local bank capital-to-asset ratios and better

internet services. The first occurs because banks want to exploit profit opportunities associated with bank capital scarcity in the host countries and the resulting higher rate of return. The latter is also consistent with our expectation because if the host country has better internet service, then the bank's operating costs will be lower. This cost saving could be made as better infrastructure can facilitate the bank's monitoring activities, payment, and loan collection transactions. Note, however, that when we split the sample into EU-North and EU-South, we find no significant impact on banking FDI decisions. This is so because there is little difference in the level of internet services in the EU-North subsample.

The other explanatory variables such as home country government effectiveness (HOMEGOVEFF) and inflation (INFLATION), significant in the case one regression, become insignificant as we move from the first case to the other two cases. However, variables such as common legal origin, colonial ties and distance that are insignificant in the first case become significant determinants of banking FDI. Similarly, the bilateral trade variable has become one of the highly significant variables that were insignificant in the first case.[13]

TABLE 4a–Estimation Results, FDI=Total Assets, Case I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Host Variables							
BKAR	-0.062***	-0.062***	-0.103**	-0.039*	0.051	-0.0056**	-0.049***
	(0.016)	(0.016)	(0.033)	(0.016)	(0.062)	(0.020)	(0.013)
CREDIT/GDP	0.002**	0.002**	0.002*	0.004*	0.002*	0.002	0.003*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)
INTERNET	0.005*	0.005*	0.003	0.012**	0.002	0.007	0.010**
	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.005)	(0.003)
GDPGR	0.040*	0.040*	0.107**	0.014	0.035	0.054	0.002
	(0.019)	(0.019)	(0.040)	(0.022)	(0.050)	(0.029)	(0.017)
GOVEFF	-0.161	-0.162	-0.152	-0.278	-0.162	-0.189	-0.153
	(0.128)	(0.128)	(0.171)	(0.224)	(0.193)	(0.234)	(0.168)
REGQUAL	0.036	0.037	0.04	0.062	0.169	0.071	0.202
	(0.165)	(0.165)	(0.263)	(0.210)	(0.257)	(0.269)	(0.158)
INFLATION	-0.022*	-0.022*	-0.045	-0.018	-0.129	-0.012	-0.012
	(0.009)	(0.009)	(0.027)	(0.010)	(0.092)	(0.011)	(0.007)
Home/Bilateral Variables							
HOMEGOVEFF	-0.391**	-0.392**	-0.318	-0.413	-0.317	-0.693**	-0.545**
	(0.144)	(0.144)	(0.181)	(0.224)	(0.218)	(0.215)	(0.189)
TRADE	0.169	0.164	0.209	0.071	0.300	-0.09	0.004
	(0.097)	(0.101)	(0.190)	(0.111)	(0.261)	(0.117)	(0.101)
HOMEGRGDP	0.012	0.012	-0.063	0.074	-0.05	0.047	0.036
	(0.031)	(0.031)	(0.046)	(0.049)	(0.047)	(0.047)	(0.039)
HOMEREGQUAL	0.263	0.261	0.388	-0.076	0.266	-0.32	0.117
	(0.272)	(0.272)	(0.351)	(0.418)	(0.358)	(0.438)	(0.333)
HOMEINF	-0.003	-0.003	-0.015	0.008	0.014	-0.008	0.001
	(0.023)	(0.023)	(0.036)	(0.027)	(0.045)	(0.020)	(0.014)
N	6170	6170	3912	2258	2558	1930	2258
R-Square	0.013	0.013	0.013	0.021	0.009	0.024	0.024
DF	354	355	156	209	101	114	209
LR Chi square	LR chi^2(319) = 1387.42 (P> chi^2 = 0.000						

Notes: * p<0.05, **p<0.01, *** p<0.001. Standard errors in parenthesis. Dependant variable: Total Assets. Column (1): Base model. Column (2): Base model with regional dummies (only significant dummies shown); Column (3): intra-OECD banking FDI only; Column (4): OECD to non-OECD banking FDI only. Column (5): intra-EU North. Column (6): EU North-EU South only. Column (7): EU North to non-OECD. LEGAL, COLONY, and DISTANCE drop out of the regression analysis as they are bilateral fixed effects.

TABLE 4b–Estimation Results, FDI=Total Assets, Case II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Host Variables							
BKAR	-0.067***	-0.067***	-0.214***	0.007	0.078	-0.014	-0.009
	(0.015)	(0.015)	(0.030)	(0.016)	(0.054)	(0.020)	(0.013)
CREDIT/GDP	0.000	0.000	0.000	0.003	0.000	-0.003	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
INTERNET	0.007***	0.007**	0.003	0.016***	0.001	0.015***	0.011***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.004)	(0.003)
GDPGR	0.077***	0.076***	0.115**	0.045*	0.02	0.072**	0.021
	(0.018)	(0.018)	(0.037)	(0.022)	(0.047)	(0.027)	(0.017)
GOVEFF	-0.205	-0.203	-0.276	-0.007	-0.204	0.261	0.375*
	(0.124)	(0.124)	(0.157)	(0.237)	(0.186)	(0.235)	(0.175)
REGQUAL	0.076	0.071	-0.065	0.162	0.134	-0.009	0.153
	(0.157)	(0.157)	(0.233)	(0.212)	(0.235)	(0.268)	(0.159)
INFLATION	-0.012	-0.011	-0.011	-0.011	0.033	-0.006	-0.009
	(0.009)	(0.009)	(0.026)	(0.010)	(0.080)	(0.010)	(0.006)
Home/Bilateral Variables							
HOMEGOVEFF	-0.578***	-0.574***	-0.424**	-0.564*	-0.645**	-0.591**	-0.580**
	(0.131)	(0.131)	(0.160)	(0.230)	(0.201)	(0.207)	(0.197)
TRADE	0.248**	0.265**	0.277	0.095	0.379	0.142	0.088
	(0.091)	(0.094)	(0.171)	(0.103)	(0.252)	(0.103)	(0.093)
HOMEGRGDP	0.035	0.034	-0.051	0.113*	0.01	0.048	0.053
	(0.030)	(0.030)	(0.042)	(0.050)	(0.046)	(0.048)	(0.041)
HOMEREGQUAL	0.347	0.353	0.329	-0.083	0.066	0.28	-0.247
	(0.240)	(0.240)	(0.298)	(0.419)	(0.274)	(0.398)	(0.306)
HOMEINF	0.038	0.038	0.034	0.023	-0.009	0.024	-0.019
	(0.024)	(0.024)	(0.027)	(0.042)	(0.044)	(0.020)	(0.018)
N	5368	5368	3349	2019	2144	1778	2019
R-Square	0.028	0.028	0.041	0.038	0.015	0.035	0.036
DF	356	357	156	211	102	116	211
LR Chi square	LR chi^2(93) = 2136.88 (P> chi^2 = 0.000)						

Notes: * p<0.05, **p<0.01, *** p<0.001. Standard errors in parenthesis. Dependant variable: Total Assets. Column (1): Base model. Column (2): Base model with regional dummies (only significant dummies shown); Column (3): intra-OECD banking FDI only; Column (4): OECD to non-OECD banking FDI only. Column (5): intra-EU North. Column (6): EU North-EU South only. Column (7): EU North to non-OECD. LEGAL, COLONY, and DISTANCE drop out of the regression analysis as they are bilateral fixed effects.

BFDI measured by EBT

We provide the results of our estimation using EBT as the measure of banking FDI in Table 5. The EBT results generally mimic the Total Assets regressions in that the bank capital-to-asset ratio and the level of internet service are highly significant with expected signs in all the three estimation cases.

Economic growth of the host country, government effectiveness of the home and host country affect bank's earnings.

In the non-banking FDI literature, distance is expected to affect FDI negatively. However, in banking FDI case, we find the opposite result. When the distance between the home and host countries increases, banks prefer to do banking FDI by opening up a subsidiary in the host country rather than serving that market through other means. This could be the result of risk diversification, as it may be less risky to open up the foreign subsidiary as compared to serving the customer in the host country located from its domestic headquarters. Servicing the host market located at a distance requires better technology to communicate with the borrower and monitor the project compared to doing it physically by being near to the financed project. As distance host increases, the bank tends to locate in the host country as long as it is justifiable by profit opportunities in the host country.[14]

B. ROBUSTNESS: DYNAMIC PANEL MODEL

An alternative to the above estimation technique is to use a dynamic panel analysis framework.[15] An advantage of using the dynamic panel approach is to control for endogeneity by using an instrumental variable created by the existing independent variables in the data (rather than an external instrument which often proves difficult to find). Additionally, this method fits well for small t - large n (small timeframe but large cross-sectional component) datasets, which accurately characterizes our dataset.

There are two primary frameworks from which we can choose: the Arellano-Bond (1991) and the Arellano-Bover (1995)/Blundell-Bond (1998) dynamic panel estimators. The Arellano-Bond ("Difference GMM") technique differences all regressors so they can be used as proper instrumental variables in a Generalized Method of Moments (GMM) framework. The Arellano-Bover/Blundell-Bond ("System GMM") estimator makes an additional assumption over Arellano-Bond in that the first differences of instrument variables are uncorrelated with the fixed effects, which allows for the introduction of more instruments. It effectively creates a system of two equations (i.e., the original equation as well as the differenced one).[16]

TABLE 5–Estimation Results, BFDI=EBT

	CASE I			CASE II			CASE III		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Host Variables									
BKAR	-0.069***	-0.223***	0.011	-0.051**	-0.082*	-0.037*	-0.070***	-0.223***	0.009
	(0.016)	(0.030)	(0.017)	(0.016)	(0.033)	(0.017)	(0.016)	(0.030)	(0.017)
CREDIT/GDP	0.000	0.000	0.003	0.002**	0.002*	0.004*	0.000	0.000	0.003
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
INTERNET	0.007***	0.003	0.016***	0.004*	0.003	0.011*	0.007***	0.003	0.016***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.004)
GDPGR	0.068***	0.108**	0.033	0.035	0.114**	0.007	0.068***	0.108**	0.033
	(0.020)	(0.038)	(0.023)	(0.020)	(0.041)	(0.022)	(0.020)	(0.038)	(0.023)
GOVEFF	-0.091	-0.168	-0.019	-0.172	-0.206	-0.201	-0.087	-0.168	-0.012
	(0.126)	(0.160)	(0.220)	(0.132)	(0.180)	(0.209)	(0.126)	(0.160)	(0.220)
INFLATION	-0.008	-0.012	-0.007	-0.032	-0.106	0.042	0.046	-0.166	0.155
	(0.009)	(0.025)	(0.010)	(0.178)	(0.277)	(0.219)	(0.162)	(0.241)	(0.211)
REGQUAL	0.063	-0.166	0.188	-0.015	-0.052	-0.013	-0.008	-0.012	-0.007
	(0.162)	(0.241)	(0.212)	(0.009)	(0.027)	(0.010)	(0.009)	(0.025)	(0.010)
Home/Bilateral Variables									
HOMEGOVEFF	-0.556***	-0.438**	-0.36	-0.364*	-0.412*	-0.184	-0.555***	-0.438**	-0.363
	(0.136)	(0.165)	(0.237)	(0.151)	(0.187)	(0.235)	(0.136)	(0.165)	(0.237)
TRADE	0.171***	0.236*	0.143*	0.252***	0.176	0.329***	0.180***	0.236*	0.162*
	(0.052)	(0.103)	(0.069)	(0.057)	(0.115)	(0.068)	(0.052)	(0.103)	(0.068)
HOMEGRGDP	0.045	-0.047	0.135**	0.028	-0.051	0.084	0.045	-0.047	0.135*
	(0.032)	(0.044)	(0.052)	(0.033)	(0.048)	(0.050)	(0.032)	(0.044)	(0.052)

	CASE I			CASE II			CASE III		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HOMEREGQUAL	0.275 (0.254)	0.257 (0.305)	-0.222 (0.453)	0.248 (0.287)	0.277 (0.363)	-0.178 (0.435)	0.281 (0.254)	0.257 (0.305)	-0.206 (0.453)
HOMEINF	0.041 (0.025)	0.036 (0.029)	0.025 (0.042)	0.004 (0.025)	-0.007 (0.040)	0.009 (0.028)	0.041 (0.025)	0.036 (0.029)	0.025 (0.042)
COLONY	0.111 (0.127)	0.217 (0.165)	0.219 (0.245)	0.219 (0.139)	0.466* (0.192)	-0.211 (0.233)	0.114 (0.127)	0.217 (0.165)	0.23 (0.244)
DISTANCE	0.208** (0.075)	0.134 (0.120)	0.380** (0.135)	0.311*** (0.084)	0.073 (0.133)	0.717*** (0.132)	0.218** (0.075)	0.134 (0.120)	0.396** (0.135)
LEGAL	-0.086 (0.088)	-0.205 (0.119)	0.287* (0.142)	-0.659*** (0.093)	-1.106*** (0.134)	0.514*** (0.135)	-0.09 (0.088)	-0.205 (0.119)	0.287* (0.142)
N R-square DF	5368 0.06 129	3349 0.08 54	2019 0.098 105	6170 0.136 129	3912 0.109 53	2258 0.24 105	5868 0.134 129	3349 0.079 54	2019 0.253 105
LR Chi square	LR chi^2(317) = 1250.88 (P> chi^2 = 0.000)			LR chi^2(93) = -549.71 (P>chi^2 = 1.000)			LR chi^2(19) = -117.69 (P> chi^2 = 1.000)		

Notes: * p<0.05, **p<0.01, ***p<0.001. Standard errors in parenthesis. Dependent variable: Earnings Before Tax. Columns (1), (4), and (7): Base Model. Columns (2), (5), and (8); intra-OECD banking FDI only. Columns (3), (6), and (9): OECD to non-OECD banking FDI only.

TABLE 6–Difference GMM Estimators, FDI=Total Assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host Variables								
ASSET (-1)	0.102 (0.125)	-0.049 (0.095)	-0.272 (0.116)	0.333* (0.183)	0.061 (0.039)	0.061 (0.039)	0.044 (0.054)	-0.012 (0.093)
TREND					0.121*** (0.030)	0.121*** (0.030)	0.044 (0.043)	0.249 (0.072)
BKAR	-0.036 (0.029)	-0.047* (0.023)	-0.165*** (0.040)	0.006 (0.048)	-0.038 (0.024)	-0.038 (0.024)	-0.149** (0.046)	-0.007 (0.040)
CREDIT/GDP	0.002 (0.001)	0.002* (0.001)	0.002 (0.001)	0.002 (0.004)	0.003** (0.001)	0.003** (0.001)	0.002* (0.001)	0.001 (0.003)
INTERNET	0.002 (0.002)	0.004 (0.002)	0.001 (0.002)	0.004 (0.007)	0.000 (0.002)	0.000 (0.002)	0.000 (0.002)	-0.002 (0.006)
GRGDP	0.088* (0.039)	0.093** (0.032)	0.122* (0.062)	0.07 (0.059)	0.056 (0.035)	0.056 (0.035)	0.093 (0.073)	0.046 (0.050)
GOVEFF	-0.461* (0.222)	-0.506** (0.180)	-0.396 (0.237)	-0.478 (0.457)	-0.380* (0.190)	-0.380* (0.190)	-0.162 (0.268)	-0.59 (0.381)
REGQUAL	0.125 (0.283)	0.071 (0.228)	0.218 (0.335)	0.049 (0.450)	0.081 (0.239)	0.081 (0.239)	0.23 (0.379)	-0.022 (0.378)
INFLATION	-0.006 (0.026)	-0.004 (0.020)	-0.025 (0.040)	-0.054 (0.045)	-0.006 (0.021)	-0.006 (0.021)	-0.034 (0.045)	-0.045 (0.038)
Home/BilateralVariables								
HOMEGOVEFF	-0.228 (0.265)	-0.174 (0.209)	-0.163 (0.227)	-0.693 (0.642)	0.218 (0.226)	0.218 (0.227)	-0.01 (0.267)	-0.086 (0.570)
TRADE	-0.154 (0.177)	-0.155 (0.143)	-0.468* (0.239)	0.187 (0.258)	-0.125 (0.149)	-0.125 (0.149)	-0.523 (0.269)	0.117 (0.202)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HOMEGRGDP	0.001 (0.070)	0.07 (0.055)	-0.001 (0.070)	0.024 (0.197)	-0.053 (0.061)	-0.053 (0.061)	-0.052 (0.083)	0.003 (0.164)
HOMEREGQUAL	0.195 (0.497)	0.073 (0.365)	-0.02 (0.420)	-0.172 (0.988)	0.131 (0.380)	0.131 (0.381)	0.103 (0.472)	-0.674 (0.842)
HOMEINF	-0.008 (0.042)	-0.005 (0.035)	-0.003 (0.046)	-0.01 (0.077)	-0.026 (0.037)	-0.026 (0.037)	-0.014 (0.052)	-0.022 (0.065)
N	2771	3434	2227	752	3434	3434	2227	752
Chi-squared	29.055		26.42	24.268	33.509		27.295	24.353
Sargan TEST (P-value)	0.1433		0.3855	0.1464	0.1188		0.3413	0.1438
Wald (P-Value)	0.005	0.000	0.000	0462	0.000	0.000	0.000	0.007

Notes: * p<0.05, **p<0.01, ***p<0.001. Standard errors in parenthesis. Dependent variable: Total Assets. Columns (1) and (5): Base Model. Columns (2) and (6): Base model with regional dummies. Columns (3) and (7): North-North banking FDI only. Columns (4) and (8): North-South Banking FDI. ASSET (-1) is the dynamic term. LEGAL, COLONY, and DISTANCE drop out of the regression analysis as they are bilateral fixed effects.

TABLE 7–System GMM Estimators, FDI=Total Assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host Variables								
ASSET (-1)	0.299* (0.155)	0.320* (0.170)	0.238 (0.1777)	0.089 (0.141)	0.061 (0.191)	0.076 (0.204)	0.221 (0.217)	-0.197 (0.139)
TREND					0.103 (0.058)	0.102 (0.059)	0.009 (0.067)	0.302** (0.073)
BKAR	-0.133* (0.060)	-0.131* (0.062)	-0.188** (0.058)	0.012 (0.079)	-0.136* (0.053)	-0.135* (0.054)	-0.187** (0.058)	-0.078 (0.071)
CREDIT/GDP	0.000 (0.002)	0.000 (0.002)	0.001 (0.002)	0.000 (0.003)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.002 (0.003)
INTERNET	0.002 (0.004)	0.001 (0.004)	-0.002 (0.003)	0.000 (0.008)	-0.001 (0.004)	-0.001 (0.004)	-0.002 (0.004)	-0.003 (0.007)
GRGDP	0.02 (0.038)	0.021 (0.039)	0.096 (0.074)	-0.028 (0.040)	-0.001 (0.036)	0.000 (0.036)	0.093 (0.077)	-0.027 (0.034)
GOVEFF	-0.148 (0.684)	-0.159 (0.697)	0.64 (0.548)	1.254 (0.636)	-0.131 (0.601)	-0.138 (0.609)	0.652 (0.550)	0.38 (0.583)
REGQUAL	1.903* (0.960)	1.915 (0.979)	1.101 (0.885)	0.249 (0.769)	1.591 (0.862)	1.602 (0.874)	1.096 (0.877)	-0.186 (0.666)
INFLATION	0.029 (0.079)	0.033 (0.081)	-0.123 (0.069)	-0.169 (0.066)	-0.003 (0.072)	0.000 (0.074)	-0.122 (0.069)	-0.105 (0.059)
Home/Bilateral Variables								
HOMEGOVEFF	-0.96 (0.681)	-0.935 (0.698)	-1.365 (0.796)	-1.467 (0.938)	-0.241 (0.722)	-0.234 (0.731)	-1.315 (0.871)	1.065 (1.007)
TRADE	-0.262 (0.390)	-0.247 (0.400)	-0.996* (0.508)	-0.219 (0.446)	-0.366 (0.348)	-0.356 (0.355)	-0.987 (0.507)	0.038 (0.387)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HOMEGRGDP	0.012 (0.092)	0.009 (0.094)	0.025 (0.115)	0.009 (0.134)	0.02 (0.081)	0.018 (0.083)	0.024 (0.114)	-0.038 (0.115)
HOMEREGQUAL	-0.768 (1.435)	-0.696 (1.477)	-1.822 (1.623)	1.073 (2.422)	-0.978 (1.267)	-0.932 (1.297)	-1.818 (1.608)	-0.253 (2.096)
HOMEINF	-0.004 (0.042)	-0.005 (0.042)	0.02 (0.055)	-0.055 (0.055)	0.003 (0.037)	0.003 (0.037)	0.02 (0.054)	-0.023 (0.048)
N	4183	4183	2718	1465	4183	4183	2718	1465
Chi-squared	24.944	23.923	19.856	41.425	29.077	28.348	20.22	39.215
Sargan TEST (P-value)	0.204	0.199	0.467	0.211	0.065	0.057	0.381	0.247
AR(1)	0.000	0.000	0.000	0.000	0.006	0.008	0.002	0.015
AR(2)	0.147	0.140	0.269	0.423	0.881	0.833	0.387	0.093
F	4.898	4.39	3.942	2.486	6.111	5.573	3.73	4.39

Notes: * p<0.05, **p<0.01, ***p<0.001. Standard errors in parenthesis. Dependent variable: Total Assets. Columns (1) and (5): Base Model. Columns (2) and (6): Base model with regional dummies. Columns (3) and (7): North-North banking FDI only. Columns (4) and (8): North-South Banking FDI. ASSET (-1) is the dynamic term. LEGAL, COLONY, and DISTANCE drop out of the regression analysis as they are bilateral fixed effects.

We employ both estimations in our analysis to investigate regressions with and without a time trend. The dynamic panel approach, however, is limited in that it cannot simultaneously control for home-country, host-country and time-fixed effects as it was the case in applying three-way EMC.[17] Thus, our use of this estimation technique focuses only on bank- and time-specific fixed effects.

Our difference GMM (Table 6) and system GMM (Table 7) estimation results from columns (1-4) do not contain a time trend, while columns (5)-(8) do include a time trend.[18] The results show that bank FDI decisions remain negatively affected by the host country BKAR levels, but not by the strength of its internet service. These results are consistent across the use of a time trend, which itself proves significant in only a few of the regressions. Note the Sargan test results indicate a failure to reject the null hypothesis that the instruments are exogenous (with the exception of the regressions including regional dummies). Similarly, the AR(1) and AR(2) tests, we show no autocorrelation between residuals. Finally, most of the remaining independent variables maintain their signs/significances as compared to our ECM analysis.

In sum, when comparison is made between the two approaches (i.e., the three-way ECM and dynamic panel model), the former enables us to control for three unobserved, but possibly present heterogeneities in the data, where as the later model can only enable us to control for single potential heterogeneity, namely bank-specific fixed effects. Thus, we see some differences in the estimation results for some of our variables under the difference approaches. However, statistical significance remains mostly consistent across the two approaches for both our primary variables of interest (BKAR, INTERNET). It is not surprising that the addition of the time trend reduces its INTERNET's impact on banking, as we see rapid growth in host nations' internet growth over time. Note, however, that the trend does not affect BKAR.

V. Conclusion

This paper investigates whether banks tend to invest in countries where both low local banks'-capital- to-asset ratios and better telecommunication infrastructures exist. The bank capital-to-asset ratio is intended to capture profit opportunities in the host country while the hosts' international internet bandwidth is our proxy for telecommunication infrastructure. To test such hypotheses, we employed

a three-way error component panel data model to better address the three types (home, host, bilateral) of potential unobserved heterogeneity in the data as well as the dynamic panel data model as a robustness check.

For both measures of banking FDI, our results suggest that banking FDI is negatively affected by banks' capital-to-asset ratio. This implies that banks tend to exploit profit opportunities that are available in host countries due to capital scarcity and the higher rate of return associated with this scarcity. Our results also support the hypothesis that banks are attracted to those areas with a better internet services. This is particularly true given the daily activities of these banks, as they need to have a better communication infrastructure in their operation areas to attract new customers, monitor projects, and transfer payments efficiently. Clearly, increased internet capability is one area that policymakers can address as they seek to attract inward banking FDI.

In a three-way error component model approach, we note that bilateral trade between the home and the host positively affects banking FDI, suggesting that banks also tend to follow their customers abroad, even when controlling for geographic distance. This suggests that banking and non-banking FDI are tied together, and that policies to attract both types of inward FDI have positive externalities on each other. In addition to this, host's economic growth and financial sector development affects banking sector FDI. Finally, the home country's government effectiveness is also found to be one of the push factors in banks' FDI decisions.

Since both push and pull factors affect FDI flows, one question that arises is why are there so few banking FDI home (source) countries. While every home country in our data also serves as a banking FDI recipient, the reverse is clearly not true; the overwhelming majority of FDI host countries do not serve as banking FDI sources. We believe that a threshold effect may exist with regard to the banking FDI push factors, and that the FDI host-only countries fall below this threshold. While determining the presence and/or size of this effect falls outside the scope of this research, we believe that it does warrant future study.

Appendix: Dynamic Panel Models

Here we provide a brief primer on the different dynamic panel models used in the paper.
Consider a dynamic panel model with one error component in it.

$$y_{it} = a_i + \gamma y_{it-1} + X_{it}'\beta + \varepsilon_{it} \quad (1)$$

OLS cannot provide a consistent estimator of γ, since the error term is correlated with the explanatory variables, including y_{it-1} . For instance, take the first difference of the above equation.

$$(y_{it} - y_{it-1}) = \delta(y_{it-1} - y_{it-2}) + (X_{it} - X_{it-1})\beta + (\varepsilon_{it} - \varepsilon_{it-1}), \text{ or} \quad (2)$$
$$(\Delta y_{it}^{*}) = \delta(\Delta y_{it-1}^{*}) + (\Delta X_{it}^{*})\beta + (\Delta \varepsilon_{it}^{*}) \quad (2a)$$

From these equations, we can see that

$$Cov\left((\Delta y_{it-1}^{*})(\Delta \varepsilon_{it}^{*})\right) \neq 0 \quad (3)$$

Thus, to estimate equation (1), a valid instrumental variable is required. Arellano and Bond (1991) suggest a "difference GMM" approach that solves this problem, as one can use ($y_{it-2} - y_{it-3}$) or (y_{it-2}) and (y_{it-3}) as instruments for ($y_{it-1} - y_{it-2}$) so that we will get:

$$Cov\left((y_{it-1}^{**})(\Delta \varepsilon_{it}^{*})\right) = 0 \quad (3a)$$

where Δy_{it-1}^{**} is one of the above instruments.

Alternatively, one can employ the Arellano and Bover (1995)/ Blundell and Bond (1995) "system GMM" approach. Here, multiple differencing of equation (1) creating a system of instrumental variables. For example, consider a simple dynamic panel model as in Equation (1) but without the explanatory variable X_{it}':

$$y_{it} = \gamma y_{it-1} + u_{it}, \text{ where } u_{it} = a_i + \varepsilon_{it} \quad (4)$$

The system GMM estimator combines moment conditions for the differenced equation with moment conditions for the model in levels. These moment conditions are:

$$Cov\left((y_{it-j})(\Delta u_{it})\right) = 0 \text{ for } (j = 2,\ldots,t-1; t = 3,\ldots,T) \quad (5a)$$

$$Cov\left((\Delta y_{it-1})(u_{it})\right) = 0 \text{ for} (t = 3,\ldots,T) \quad (5b)$$

More compactly, these moment conditions can be expressed as:

$$E\left[Z_{si}^{'} q_i\right] = 0 \quad (5c)$$

where $q_i = \begin{bmatrix} \Delta u_{it} \\ u_{it} \end{bmatrix}$ and $\begin{bmatrix} Z_{di} & 0 \\ 0 & Z_{li} \end{bmatrix}$. Here Z_{di} and Z_{li} refer to the instruments in the first differenced equation and the levels equation, respectively. Thus, we estimate the following dynamic panel model via GMM estimation:

$$BFDI_{bt} = \varphi BFDI_{bt-1} V'_{ijt}\beta + a_b + \varepsilon_{bt} \quad (6)$$

where a_b is a bank specific fixed effect and φ is:

$$\varphi = \left[BFDI_{-1}^{'} Z_s W_N Z_{-1}^{'} BFDI_{-1}\right]^{-1}\left[BFDI_{-1}^{'} Z_s W_N Z_s^{'} BFDI\right] \quad (7)$$

where W_N some positive weight matrix as suggested for example by Blundell and Bond (1998). In Difference GMM, W_N is a single equation, while in System GMM, W_N is based on the above two moment conditions.

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Endnotes

1. Buch and DeLong (2001) use dummy variable for host countries considered international financial centres. An international financial centre is an indication of liberal financial regulation and fewer restrictions.
2. Magri et. al. (2004), using non-banking FDI as the proxy, failed to find support for the FTC hypothesis. Buch (2000), Wezel (2004), and von der Ruhr and Ryan (2005), using non-banking FDI, and Wezel (2004)) using bilateral trade, confirm the presence of FTC activity.
3. See Table 1 for a full description of these variables.
4. The home market's expected rate of return and risk will also be affected by similar set of factors.
5. Use of total assets as a measure of banking FDI is standard in the literature. Sales volume in the foreign country is also often used. (For a survey outlining the use of banking FDI measures, see Wezel (2004)).
6. See Andrews et. al. (2006) and Corneilssen (2008) both provide computer-memory saving estimation approaches to deal with this problem.
7. In our data, only countries with at least one locally owned bank doing FDI are considered "home countries." Likewise, only countries with at least one foreign bank operating in their local financial markets can be considered a "host country." Data on the dependent variable does not exist for banks in other countries, and since we cannot assume that these are zero values, we cannot include these countries in our dataset.
8. The World Bank's Worldwide Governance Indicator (WGI) is the source for the government effectiveness and regulatory quality data. All other data is found in the World Bank's World Development Indicator (WDI)
9. Distance, measured in kilometers, is calculated as the great circle distance between national capitals. The data sources for the bilateral trade and common legal origin are Correlates of War (http://correlatesofwar.org/) and La Porta et. al. (1999), respectively. The remaining variables are obtained from the CEPII.
10. The likelihood ratio test statistics are provided in Tables 4 and 5.
11. Results from skewness-kurtosis tests on all the model variables, including each dependent variable and regression residuals, reveal that we do not have highly leptokurtic distributions, which would have required the use of an alternative estimation technique such as FGLS.
12. EU-North includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. All other European countries are considered EU-South.
13. Note that the low R2 values in Tables 4 and 5 are not unlike most other studies employing panel data techniques. The transformation of the dependent variable in panel models (e.g, taking logs, first differencing), as well as the combination of cross-section and time-series components in the dat often leads to such low R2 values.
14. Additional EBT-based regressions that control for regional dummies (not reported here) provide qualitatively similar results as found in Table 5, column 1.
15. We thank the anonymous referee for this suggestion.

16. Note that this is a brief discussion of the dynamic panel approach. For more detail, please see the referenced papers. We provide a brief primer on the topic in the appendix.
17. For example, having multiple US banks investing in a particular year, regardless of destination, leads to the inability to determine home-specific effects. The same would be true if a single host receives investments from multiple banks in the same year. Both situations lead to a repeated time period per panel (home or host) problem for which dynamic panel estimation cannot handle.
18. Dynamic panel estimation results for EBT are qualitatively quite similar to the Total Asset results. These results are available on request.