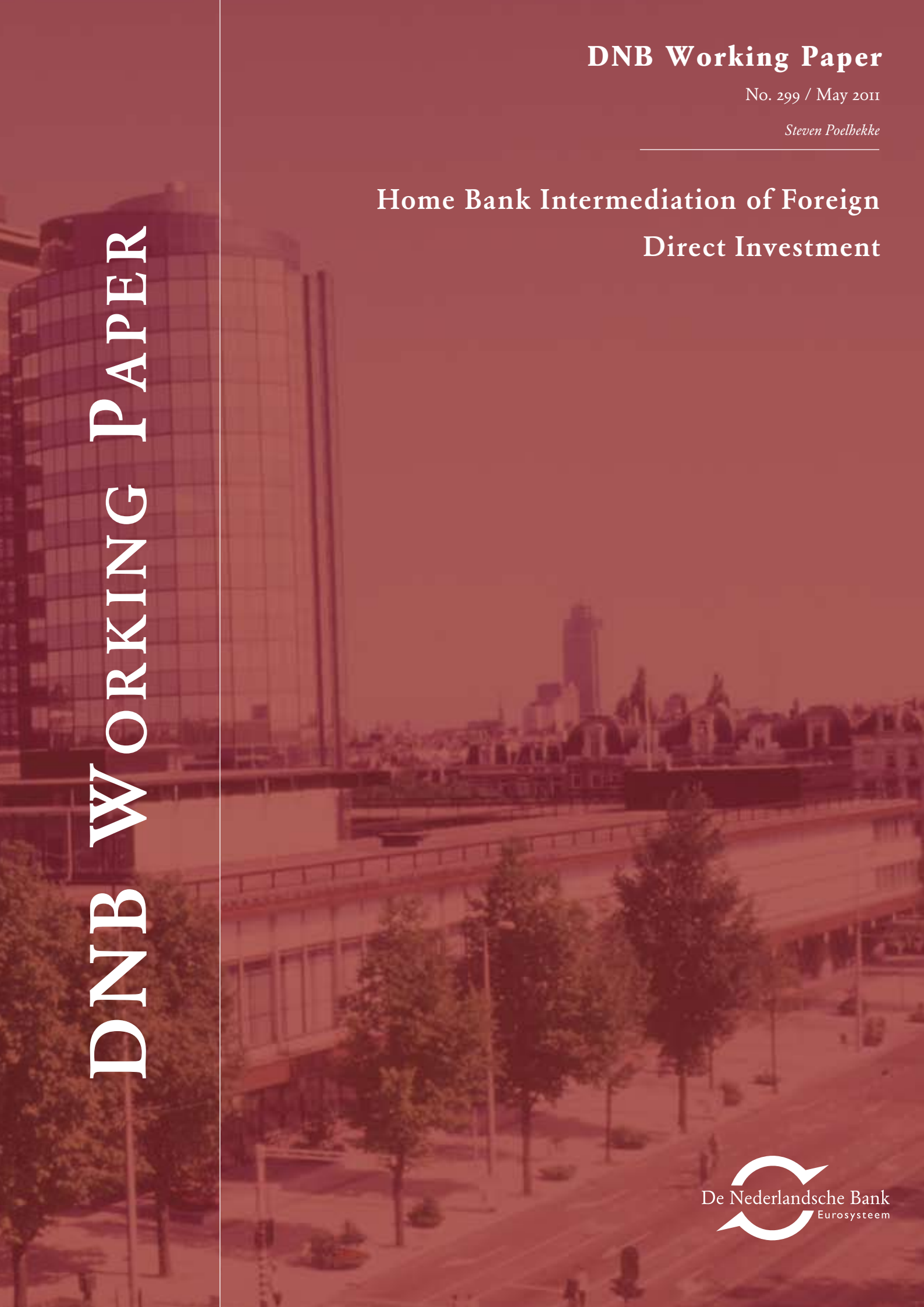

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De Nederlandsche Bank
Eurosysteem

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* Views expressed are those of the author and do not necessarily reflect official positions of De Nederlandsche Bank.

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Home Bank Intermediation of Foreign Direct Investment*

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Abstract

This paper investigates the benefits of banks' direct investment in foreign subsidiaries and branches for non-financial multinationals. The paper builds on the literature on international banks which has primarily focused on the implications for host countries, rather than for its international clients, and on the literature on foreign direct investment (FDI), which emphasizes significant costs of investment. Using a new detailed data set of non-stationary sector-level outward FDI, this paper finds that the volume of FDI by home market banks boosts FDI by non-financial firms from the *same* home market. Domestic and third-country foreign banking provide imperfect substitutes, especially in countries that are corrupt or have weak rule of law. The result rests on banks' FDI in local branches and subsidiaries rather than cross-border lending. These findings are consistent with a role for home market multinational banks in intermediating information asymmetry in opaque foreign markets. The sale of a major international bank to third-country counter parties during the recent crisis may thus result in persistently lower volumes of outward FDI from the bank's home market.

Keywords: outward sector-level FDI, banks, asymmetric information, panel non-stationarity
JEL code: F21, G21, O16, C33

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1. Introduction

The recent crisis provides a new episode to the intense debate on the benefits and risks of financial globalization. It has turned public opinion against too-big-to-fail multinational banks, because saving them has turned out costly for taxpayers. However, this paper argues that one under-appreciated benefit of large international banks is their role in facilitating investment in foreign markets. In particular, firms wishing to expand abroad through foreign direct investment may find the services offered by multinational banks essential to overcome the market frictions and information asymmetries associated with foreign investment. While conventional wisdom has it that banks follow customers abroad, this paper provides, to the best of my knowledge, the first evidence that the presence of foreign banks subsequently boosts foreign investment by non-financial firms, especially if they originate from the same home market. It therefore makes sense for a well known British bank to advertise as 'the world's local bank', but more so for its British clients.

The complex nature of foreign direct investment (FDI) suggests that only the most productive firms can successfully invest abroad on their own, while many other firms may benefit from the knowledge acquired by earlier investors, in particular by banks. The spread of FDI across countries with various institutions implies that multinationals have to deal with varying degrees of investor protection and market frictions. Financial intermediaries and financial markets could play an important role in overcoming these frictions because of their specialized ability to lower transaction costs and overcome information asymmetries. The range of investment decisions a multinational has to make include deciding on which country to invest in, whether to make a greenfield investment or to buy an existing foreign firm, finding a suitable potential subsidiary and deciding on the share of ownership. The investment itself will entail transaction costs and call for optimal financing through host, home or internal credit markets while information asymmetries arise from institutional differences between the countries, differences about corporate culture, valuation of the target firm, sourcing of inputs, and sharing of technology. Besides financing projects directly, providing diversification of risk and offering cross-border payment services, banks specialize in acquiring and processing information about the firms they lend to and in addition they are well equipped to monitor investment projects. The fixed costs of engaging in relatively complex FDI and firms' heterogeneous productivity sort firms into domestic producers, exporters and those engaging in FDI in Helpman et al. (2004). Banks may be able to lower

the costs of FDI and thereby widen the range of firms which is productive enough to invest abroad, and in addition increase the pool and quality of investment opportunities.

Using a detailed panel of sector level outward FDI, this paper finds that the presence of home banks in foreign host countries boost the volume of FDI undertaken by firms from the same home country. The evidence suggests that banks are an important catalyser of FDI by non-financial multinationals especially in countries that suffer from investor risk due to weak rule of law or corruption. On average, a one standard deviation year-on-year increase in the stock of home origin banking FDI (of about 60%) leads, if permanent, to 24% more non-financial foreign direct investment from the same country, in the long run. This effect is even larger for the most corrupt and lawless countries. These findings are robust to allowing explicitly for banking FDI endogeneity, non-stationarity of FDI, and sample selection bias. Also, banks' direct investment in branches and subsidiaries is more beneficial than the volume of cross-border and local lending, and third-country and host banks provide only an imperfect substitute. The sectors that benefit more from home banking also tend to rely more on banks for external financing and invest in firms belonging to sectors with more distinct sub-sectors. Lastly, these results are independent of the possibility that firms use banks with the best match in country coverage with respect to the firm's operations.

These findings suggest several channels through which banks create more and better investment opportunities for foreign firms. There is stronger support for those related to firm level information asymmetries and bridging institutional distance, than for those related to direct lending or organising internal capital markets, although they cannot be ruled out. Intermediation by banks lowers the cost and increases the success rate of investment.

While this paper investigates the effects of international banking on FDI, the literature on multinational banking has mostly focused on the implications for host countries (Goldberg, 2009). The main areas of research have been the transmission of shocks, financial sector technology spillovers which improves the efficiency of host banks, improved local asset allocation and its positive effect on growth (for example because foreign banks suffer less from political influence), and weak evidence for improved institutional development which may arise as foreign banks introduce better corporate governance. Kose et al. (2009) emphasize that financial globalization has probably more 'collateral' effects such as those mentioned above than direct effects through capital accumulation and portfolio diversification, although "work needs to be done on how countries can best exploit the ‘‘potential collateral benefits’’ of globalization" (p.50). If banks facilitate other direct

investment, than this is an additional collateral benefit of financial globalization. Although the evidence on direct growth effects of foreign direct investment is mixed[1], it has positive effects on investment.[2] This paper aims to add to this literature by shifting the focus to the benefits of multinational banking to other international firms, motivated by the premise that countries benefit from FDI.

The paper is organized as follows: Section 2 links the related literature to possible channels through which banking FDI may affect non-financial FDI. Section 3 describes the estimation strategy and Section 4 the data. Section 5 addresses non-stationarity of FDI and separates the long and short-run determinants of FDI. In Section 6 banking FDI is instrumented with regulatory reform to identify the main effect. Sections 7 and 8 establish that home banking is more important than third-country foreign banking or cross-border lending, especially in risky markets. Section 9 presents results at the sector level, while Section 10 uses the results to estimate the effect of the recent sale of a major international bank on future FDI. The last section concludes and revisits the main mechanisms through which banking intermediation facilitates foreign direct investment.

2. How do banks intermediate foreign direct investment?

Related literature and the evidence in this paper appeal to four arguments through which investment in foreign markets is made easier by the presence of banks. Taken together, these predict that foreign banking should increase investment by non-financial foreign firms. These are that bank relationships may: (i) increase the size and quality of the pool of potential affiliates; (ii) bridge the institutional distance between home and host firms; (iii) help to efficiently organize internal capital markets; (iv) provide direct financing. The first three information-based services could also be supplied by specialized service firms other than banks. However, if they are (strategic) complements to lending, banks' main source of income, then banks are the more likely suppliers (see e.g. Spence (1976) for a general treatment). The results reveal that the first two channels which relate to information asymmetries are somewhat more likely than those related to direct lending or organising

[1] A related literature stresses the benefits of general financial development. Empirical work at the cross-country level has shown that financial development raises growth rates in sectors that are more dependent on external funding (Rajan and Zingales 1998). Alfaro et al. (2004) show that FDI has only a positive effect on growth in combination with a higher level of financial development.
[2] Javorcik (2004) for example finds compelling evidence of positive productivity spillovers of FDI on local firms.

internal capital markets. Because acquiring information takes time, such effects will be more beneficial beyond the short run.

A firm wishing to expand abroad faces several investment decisions which, independent of whether expansion is horizontal, vertical or mixed[3], have to deal with information asymmetries between the parent and the investment opportunity. Although the multinational initiates the search based on technological requirements it cannot easily assess other dimensions of the target firm necessary for successful investment. Such are for example financial soundness, corporate governance and valuation.

It appears natural to assume that there are search costs for finding suitable offshoring subsidiaries.[4] Risk of failure makes it worthwhile to find a trustworthy affiliate and because banks lend to firms they can assess the likelihood of their misbehaviour. For example, some types of asymmetry, such as the degree of contract enforcement and how relationship-specific investments are, determine whether the firm engages in an ownership relationship with the affiliate (offshoring) as opposed to an arm's length relationship (outsourcing) in Grossman and Helpman (2002). Grossman and Helpman (2005) allow for explicit technology related search costs incurred by the multinational for finding outsourcing partners across countries. At the same time, a target firm may be hesitant to convey too much proprietary information in the process, information which its own bank already possesses as part of a lending relationship. This predicts a positive effect of the size of home bank involvement through local offices in host markets on FDI, which allows information collection on a larger pool of potential subsidiaries and generate better opportunities. This effect should be stronger for more opaque markets and firms. Both effects are confirmed the results in this paper. The banking literature emphasises the importance of physical proximity between firms and lenders for effective monitoring and collection of soft information (Petersen and Rajan, 1994

[3] To explain the pattern of foreign direct investment across countries, models of FDI have mostly focussed on the spatial organization between parent firms and affiliates in which local production cost advantages are traded off with transportation costs. High transportation costs predict horizontal FDI to serve the local market by means of local production instead of costly trade (Markusen, 1984) while significant production cost advantages predict vertical FDI where the final good is shipped back to home market consumers (Helpman, 1984). Mixed models such as export-platform FDI occur if multinationals use horizontal FDI to sell in the host market and in neighboring countries in addition to the home market (Ekholm et al., 2007), while export-fragmentation FDI allows fragmentation of the production process by producing through intermediaries in different countries, and shipping the final good back to the parent or another country (Yeaple, 2003).

[4] Neary (2009) notes that mergers and acquisitions constitute by far the largest part of the value of foreign direct investment, which are encouraged by falling trade costs, unlike pure greenfield horizontal FDI.

and 2002). The alternative of arm's length lending relies mostly on hard information, which is the type of information that is relatively easier to acquire and more accessible for MNEs as well. Possibly the best way to gain local soft knowledge on firms is by acquisition of or joint ventures with existing local banks. If this channel is operating cross-border lending should be less important than FDI by banks. This is indeed supported by the data. The idea that distance related agency and informational costs are very substantial for non-financial multinationals is suggested by the fact the even banks face these costs (Mian, 2006). Also Berger et al. (2001) find that South American foreign banks are more likely to lend to small Argentine businesses than other foreign banks. Arguably, these effects should be stronger for non-financial MNEs which do not specialize in overcoming agency and information transaction costs.

Monitoring after investment could be an additional advantage offered by banks. In Antràs et al. (2009) credit constraints, relationship specific investments and weak investor protection create the need to monitor investments, leading to vertical integration if monitoring is done by parent firms. They find for a sample of US multinationals that while the share of ownership is indeed decreasing in the level of investor protection, the scale of operations is nonetheless increasing in investor protection.[5] In their model firms are assumed to be better monitors than banks, leading to similar conclusions when banks also monitor investment. However, the model is inconclusive for low levels of protection and unless the activities are very specialized banks may well be better at monitoring. Also information disclosure affects foreign investment. Kroszner et al. (2006) find that the disproportional negative effect that banking crises have on firms that depend on external finance (through the credit channel) is attenuated for less opaque firms with better information disclosure. In Beck (2002) financial intermediation arises due to information asymmetries and financial intermediaries incur search costs when channelling savings to entrepreneurs. Financial development is modelled as lowering the search costs and thus increasing the supply of external finance in the economy. As a provider of capital a multinational enterprise (MNE) faces similar constraints. However, because there is usually no pooling of capital by multiple MNEs and no risk sharing the costs will be higher, making intermediation relatively more important.

[5] Claessens and Laeven (2003) show that the security of property rights has as large an effect on asset allocation and firm growth as financial development does. Lack of property rights induce firms to over-invest in tangible capital which is easier to protect from competitors. Weak contract enforcement also results in under-investment and specialization in products that require less relationship-specific investments (Nunn, 2007).

Secondly, banks may help to decrease institutional distance between subsidiaries and MNEs at the country level, where distance can be geographical, cultural, hierarchical and institutional or relate to differences in tax treatment between the destination country and the firm's home country. This channel predicts, consistent with this paper's findings, that banks from the same origin country are more important for foreign investment than similar services offered by either domestic host country banks or other foreign banks, and more so in relatively difficult host countries as measured by corruption and rule of law. The more involved a home bank is in the local market, the easier it will be to bridge these measures of distance. In addition, soft information through banks' direct investment should be more beneficial than hard information collected for cross-border lending.

The third channel relates to the internal financial organization of the multinational, which involves optimal capital allocation across affiliates and efficient payment services. Desai et al. (2004) find evidence that the financial organization of multinationals' activities is affected by depth of local credit markets, especially if creditor rights are weak. Local bankruptcy laws prevail such that local creditor rights matter more in the case of disputes, resulting in higher local interest rates. Foreign affiliates then depend heavily on the MNE's internal capital market for their financing. Banks which are familiar with the firm's operations and local imperfections in the external capital market may be able to help arrange financing within multinationals in the most efficient way, especially if institutions are weak. Also, Manova et al. (2011) find that firms operating in an environment of relatively underdeveloped local credit markets who can rely on foreign parents for funding export larger volumes of a broader range of products to more countries. FDI is therefore a more productive organizational structure over arm's length relationships in sectors which depend on external capital or which have fewer collateralizable assets. Similarly, Argentinian firms are more likely to be foreign owned when they depend on external finance (Bustos, 2011). This suggests that there is a role for financial intermediation by banks. A larger positive effect of banking FDI in more opaque markets by home rather than third-country or host banks also supports this channel. However, there is also some evidence that sectors which rely on external finance benefit more from home banking, although this could also capture that some sectors have more banking relationships.

The fourth channel works through direct financing of multinationals' foreign operations by banks. For example, Klein et al. (2002) show that firms initiate fewer FDI projects if their home bank is in distress. Banking crises limit credit supply which multinationals need to

finance investments. If funding is predominantly provided by its home bank than home country banking FDI to should have a stronger effect than third-country banking FDI, although firms may draw from both sources. However, in that case a positive effect of the volume of local lending is also expected. The latter is however not supported by the data.

3. Estimating the effect of home banking on non-financial direct investment

The main goal is to identify and estimate the effect of home origin banking in foreign countries on non-financial direct investment from the same source country. The following components of bank assets will be allowed to separately affect investment by non-financial firms: the balance sheet value of banks' FDI in branches and subsidiaries, local currency lending, and foreign currency lending. The data for FDI is more detailed (see Section 4) than for the volume of lending, so the focus is initially on the former.

The following baseline model captures the effect of home banking on non-financial FDI:

$$\ln FDI_{it}^{NF} = \mathbf{X}_{it}\beta + \ln FDI_{i,t-1}^{B}\gamma + c_i + \tau_t + v_{it} \quad (1)$$

where $\ln FDI_{it}^{NF}$ is the log of the stock of outward non-financial FDI in year t to host country i, $\ln FDI_{i,t-1}^{B}$ is the log of the stock of outward banking FDI in year t-1 and country i, and γ is the main parameter of interest. The matrix $\mathbf{X}$ contains a constant and exogenous regressors such as market potential and market potential in surrounding countries. The c_i are country fixed effects which may be correlated with the $\mathbf{X}$ and which will absorb any unobserved and observed time-invariant regressors, such as distance and average institutional quality. The τ_t are year fixed effects. There are several potential issues with estimating this equation. These are: (i) endogeneity of banking FDI; (ii) non-stationarity of FDI; (iii) cross-sectional dependence in the form of spatial auto-correlation.

Although banking FDI is allowed to affect non-financial FDI only with a delay of one year, banks may be forward looking and following their domestic customers abroad. Banks may also invest abroad to grow beyond the limits posed by saturated domestic markets. Partly unobserved factors that determine non-financial FDI such as the quality of institutions may also determine banking FDI. This source of endogeneity, and the possibility of reverse causality, requires an instrument that predicts the amount of banking FDI but is unrelated to the amount of non-financial FDI.

Secondly, Figures 1 and 2 in the next Section clearly show that outward FDI is trending upwards. Simple OLS on the levels of FDI will lead to inconsistent estimates if the variables are non-stationary. Testing for non-stationarity and for cointegration is therefore necessary. If the variables follow a common trend the equation of interest can be estimated in error-correction form, adding lags, and first differences for the short run effects.

Thirdly, models of FDI predict that distance, host market potential and the investment and market potential in neighbouring countries determine FDI (i.e. Blonigen et al., 2007). Just as is the case with time lags, third-country effects in the form of spatial lags can bias the estimates if not properly accounted for, which calls for testing for spatial dependence in both the dependent and independent variables.

To deal with the first problem the following two stage model is estimated:

$$\ln FDI_{it}^{NF} = \mathbf{X}_{it}\beta_1 + \ln FDI_{i,t-1}^{B}\gamma + c_{i1} + \tau_t + v_{it1} \tag{2}$$

where:

$$\ln FDI_{it}^{B} = \mathbf{X}_{it}\beta_2 + Z_{it}\delta_2 + c_{i2} + \tau_t + v_{it2}\,. \tag{3}$$

The variable Z is an (excluded) instrument that determines the amount of banking FDI, which is provided by a new database of financial reforms (Abiad et al., 2010) as described in more detail in Section 6.

Furthermore, since Section 5 further down establishes that the variables are cointegrated, equation (2) can be estimated in error-correction form to separate the long run from the short run effects:

$$\begin{aligned}\Delta \ln FDI_{it}^{NF} &= \xi[\ln FDI_{i,t-1}^{NF} - \mathbf{X}_{i,t-1}\beta - \ln FDI_{i,t-2}^{B}\gamma] \\ &+\Delta \ln FDI_{i,t-1}^{NF}\kappa_1 + \Delta\mathbf{X}_{i,t-1}\kappa_2 + \Delta \ln FDI_{i,t-2}^{B}\omega + C_{i1} + v_{it1},\ \ \xi < 0\end{aligned} \tag{4}$$

To test for cross-sectional dependence equations (2) and (4) are augmented with a spatial lag of the dependent variable, $\ln FDI_{it}^{NF}\mathbf{W}\rho_1$, where the matrix $\mathbf{W}$ is a row-standardized matrix containing the inverse of distance between all pairs of countries. Because of the spatial term ρ_1 the estimates are based on ML instead of OLS as explained in more detail in Appendix B.

Robustness Appendix D deals with several additional potential sources of bias. These do not affect the main message, but show that long run effects are more robust than short run effects. These are: (iv) left censoring of the dependent variable and possible sample selection bias; (v)

left censoring of the main explanatory variable which could be non-random with respect to the equation of interest; (vi) the possibility that the panel is unbalanced due to endogenous entry and exit.

4. Data on sector level outward FDI

To test the main hypotheses data is required on outward FDI for investments done by multinationals in the non-financial and in the banking sector for as many countries as possible. Since available FDI data sets either have large gaps in them for reasons of confidentiality or do not contain much sector level FDI, this paper uses a unique dataset on outward FDI from the Netherlands collected by the central bank. This dataset benefits from all firms being legally required to report their current-account transactions, including foreign investment flows and positions collected via banks, stating the balance sheet current value of FDI stocks and flows. Aggregate FDI and disaggregated FDI data for several broad sectors and large countries are available through the central bank's website.[6] At the more detailed level of specific countries and sectors, the data is confidential and accessible by permission. Home banking FDI is defined as all FDI by Dutch resident banks supervised by the central bank and non-financial FDI as total FDI net of banking FDI, excluding also insurance companies and pension funds, other financial institutions including financial holding companies, bourses and brokers. Non-financial FDI covers 190 host countries for the years 1984 to 2002 for the whole population of affiliates of multinationals; and 71 countries receive positive banking FDI between 1984 and 2002.[7] Five of these firms were among the 100 largest non-financial multinationals in the world in 2002 by foreign assets.[8] In 2007 Dutch FDI represented 5.5% of world FDI while US FDI represented 18% (UNCTAD, 2008). Following the conventional definition of FDI, outward stocks are classified according to the activity of the non-resident enterprise and consist of investments in which the parent has at least a 10% ownership share.

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[6] http://www.statistics.dnb.nl/popup.cgi?/usr/statistics/excel/t12.6.2ey.xls

[7] Unfortunately, since the method of reporting changed in 2003 the 2003-2009 data is not used. Before this date, all data was reported through the banking system, since they collect balance sheet data for loan purposes and perform the actual transactions. After April 2003, a new system was introduced based on direct reporting by resident parent companies for a slightly smaller sample covering at least 95% of investments.

[8] These are (rank; industry): Shell (6; petroleum), Unilever (36; food product), Philips (37; electrical & electronic equipment), Ahold (51; retail), Reed Elsevier (90; publishing and printing). (UNCTAD, http://www.unctad.org/Templates/Page.asp?intItemID=2443&lang=1)

The top five of largest destination countries for banking FDI in 2002 are Belgium, the US, Ireland, the UK, and Brazil. In 1984 these were Switzerland, the US, West Germany, Netherlands Antilles and the UK. Top non-financial FDI destination countries in 2002 include the US, France, Belgium, Switzerland, and Luxembourg. China ranks a mere 27th among all countries in terms of non-financial FDI. Figures 1 and 2 shows the size and international scope of non-financial and banking FDI. FDI has grown rapidly in terms of overall value and number of destination countries.

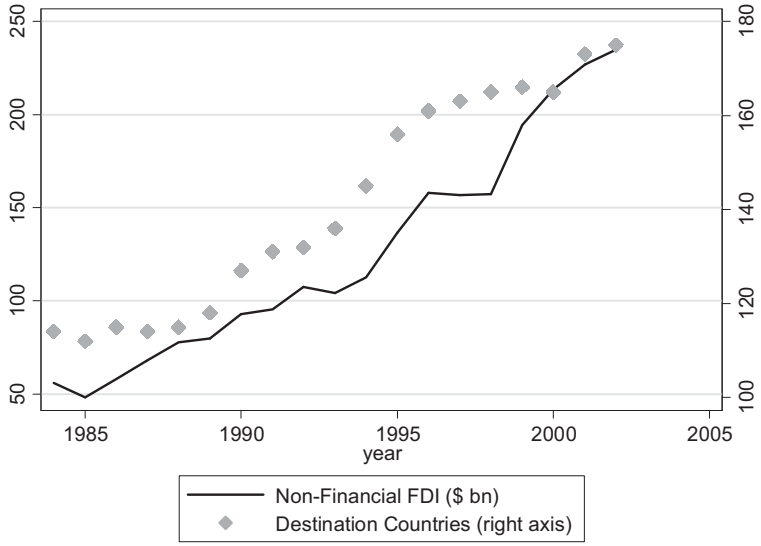

Figure 1: Non-financial outward FDI (in constant 2000 USD bn)

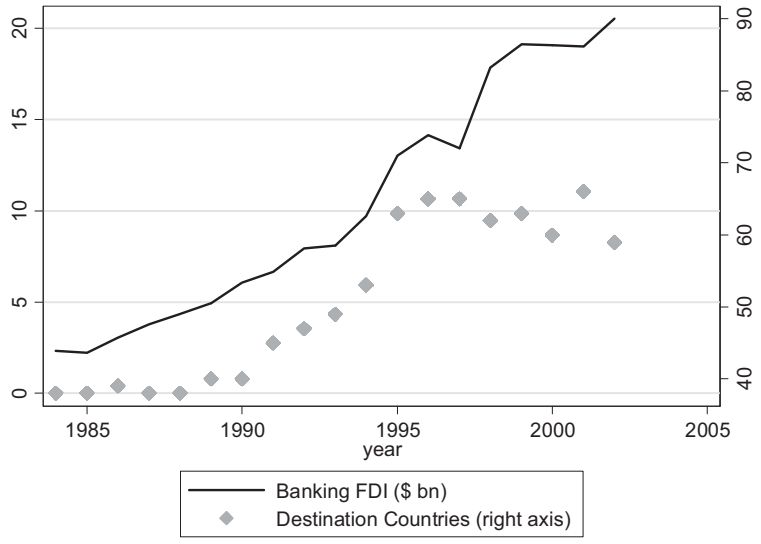

Figure 2: Banking outward FDI (in constant 2000 USD bn)

Table 1 offers some stylized facts on outward FDI. Banking FDI has increased almost nine-fold in the course of 19 years, while non-financial FDI quadrupled (and real GDP less than doubled). The fastest (above average) growing regions for banking are Eastern Europe, South Asia, East Asia and North America. For non-financial FDI these are also Eastern Europe and South Asia, followed by Sub-Saharan Africa, East Asia and Western Europe. Western Europe and North America remain however by far the most important destination regions by overall volume.

Table 1: Regional spread of non-financial and banking FDI (mln 2000 USD)

Region	Total banking FDI		Total non-financial FDI	
	1984	2002	1984	2002
East Asia & Pacific (incl. China)	202	2,341	2,450	18,773
Eastern Europe & Central Asia	8	869	159	9,807
Latin America & Caribbean	270	2,384	5,124	13,924
Middle East & North Africa	166	301	1,251	3,355
North America	439	4,111	27,308	53,084
South Asia (incl. India)	6	231	79	846
Sub-Saharan Africa	3	42	551	4,405
Western Europe	1,230	10,151	18,664	130,213
Total	2,325	20,430	55,586	234,407

To measure the extent of home banking in host countries there exist more variables than direct investment alone. The supervisory authority also collects actual local lending.[9] This allows distinguishing between (i) direct investment, (ii) total assets (loans) owned by branches, and (iii) local foreign currency lending by consolidated home country resident banks (which includes cross-border lending).[10] For local lending in local currency (iv) the data is collected for reporting to the BIS. Unfortunately, because reporting was not required for local currency lending in the 40 BIS-reporting countries, the data only includes local currency lending in mostly developing countries. Foreign currency lending is the sum of lending to banks, the public sector and the private sector, but such a breakdown is not available for local currency lending.

Furthermore, the empirical model requires a measure of the extent of third country foreign banking. Micco et al. (2007) collected annual data between 1995 and 2005 on the volume of

[9] In the Netherlands this is the central bank, which collects locational banking statistics following the guidelines of the Bank for International Settlements (2008).

[10] Branches plus subsidiaries and joint ventures, where inter-office positions are netted out. The BIS distinguishes between branches, which are defined as unincorporated entities wholly owned by a parent bank, while subsidiaries are separate *in*corporated entities at least 50% owned by a parent bank. Joint ventures are incorporated entities in which the parent bank holds a major stake.

banking assets and the share which is held by foreign banks (including Dutch banks) for a large number of developed and developing countries. Their main data source is Bankscope augmented with individual annual reports to track ownership over time. The data covers at least 75% of total banking assets in each destination country.

To construct the share of third country foreign banking in destination countries the sum of Dutch consolidated parent lending and FDI, which is the sum of (i), (iii), and (iv), is subtracted from the total of foreign assets from Micco et al. (2007).[11] Because there is missing data for local currency lending the estimation strategy will experiment with excluding it altogether and selecting on a restricted group of countries for which all data is available.

The other important control variables come from a variety of (standard) sources as specified in detail in Appendix A. The next Section explores the time series properties of FDI and each of these control variables, which determines the appropriate specification.

5. Short-run, long-run and spatial determinants of FDI

The strong upwards trend of aggregate outward FDI reported in Figures 1 and 2 suggests that FDI is non-stationary, and it may be not enough to allow for a common deterministic trend or year effects. Recent studies that do not explicitly take account of these issues assume that investment in a specific host country is independent from investments done earlier in the same host country, but this seems overly restrictive. For example, Baltagi et al. (2007) estimate the (spatial) determinants of US outward FDI stocks and affiliate sales between 1989 and 1999 using as much industry level data as is publicly available. Although they carefully allow for third-country effects and industry-time dummies to capture industry-time specific effects common to host countries, they do not test for stationarity of FDI or other regressors. If direct investment to specific host countries is trending, the estimated coefficients and standard errors on the pooled data are unreliable. Similarly, Blonigen et al. (2007) use the same data source on affiliate sales data over 16 years: except for a common deterministic trend, they do not investigate the time-series properties of the data. The instability created by potentially trending variables could affect the estimates as well. Carr et al. (2001) and

[11] Unfortunately, they cannot share the individual bank data which could reveal the share of Dutch banks in total assets in their data. Foreign banks are defined on the basis of at least 50% foreign ownership.

Markusen and Maskus (2002) do not allow for cross-sectional dependence and treat each host country as an independent destination, and are thus susceptible to a similar critique.

With this in mind, Table 2, column (a), presents the preliminary regression result of equation 1. The result is that banking FDI has a significant effect on the subsequent level of non-financial FDI. Moreover, general financial development does not benefit FDI. Trade liberalization, market potential, free trade agreements and small government (which proxies for low taxes) all attract FDI. The market potential of neighbouring countries discounted by distance has no effect, nor does the distance-discounted level of FDI in the region. However, these estimates may be biased because of non-stationarity, which will be addressed first.

Apart from outward FDI, the variables human capital, GDP and the size of the population may also be non-stationary. This need not be a problem if v_{it} is stationary, because equation (2) then forms a co-integrated relationship from which the long-run effects on FDI can be deduced. A unit root test can verify whether this is the case, but it must explicitly allow for the possibility that the data exhibits cross-sectional dependence from spatial effects as predicted by theory. Such cross-sectional dependence renders standard IPS tests for a unit root (Im, Pesaran and Shin, 2003) invalid, but *CIPS* unit root tests take into account general cross- sectional dependence by augmenting ADF regressions for each country with cross-section averages (Pesaran, 2007). Moreover, the standardized version of the cross-sectionally augmented Dickey-Fuller (CADF) allows for unbalanced panels.[12] [13] Table 3 presents the results of the CADF(p) test for orders $p=0$ and $p=1$ and for two types of deterministic components. In almost all cases the unit root hypothesis cannot be rejected. For population and financial development the null can also not be rejected if the sample is restricted to a balanced panel. Table 3 also reports IPS and LLC (Levin, Lin and Chu, 2002) tests which do not allow for cross-sectional dependence. The LLC test has more power, but also requires balanced data and assumes a homogenous auto-regressive parameter (Banerjee and Wagner, 2009). Again, the null is almost never rejected. Table 4 performs the same tests on the first difference of every variable to test for a possible mixture of I(1) and I(2) variables. The null

[12] Baltagi, Bresson and Pirotte (2007) show that, if spatial dependence is present in the data, the Pesaran (2007) test performs much better than first generation panel unit root test which do not take cross-sectional dependence into account.

[13] Since this test cannot accommodate gaps in the data and requires at least six time periods, the Ukraine (for which less than six observations exist) is dropped and gaps are removed. There are 15 gaps in the data, so observation of Brazil before 1988 are deleted, also Greece before 1997, India before 1992, Indonesia after 1998, Morocco before 1996, New Zealand before 1997 and after 2000, Panama before 1996 and after 2000, Paraguay before 1990, Portugal after 2000, Russia after 1998, Sri Lanka before 1988, and Thailand after 1998 is deleted, affecting 31 observations in total.

is nearly always comfortably rejected, also if the CADF(1) test is restricted to a balanced panel of observations. Overall, all variables can thus be regarded as I(1).

Table 2: Long-run determinants of FDI

Dependent variable: ln non-financial FDI	(a)	(b)	(c)	(d)
ln home banking FDI (t-1)	**0.068*** **	**0.083** **	**0.085** **	**0.260*** **
	(0.025)	**(0.035)**	**(0.036)**	**(0.042)**
Fin. development (private credit/GDP)	-0.003	-0.004**	-0.003*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
ln population	-0.482	-0.263	-0.799	0.755***
	(0.878)	(1.246)	(1.067)	(0.056)
Trade liberalization	0.288**	0.555***	0.548***	1.062***
	(0.127)	(0.202)	(0.207)	(0.318)
ln human capital	-0.204	-0.660		0.522
	(0.415)	(0.476)		(0.376)
ln distance (km)				-0.524**
				(0.251)
ln GDP per capita (t-1)	1.046***	2.143***	2.085***	1.330***
	(0.226)	(0.412)	(0.411)	(0.136)
ln GDP surrounding market potential	0.375	0.755	0.900	0.192
	(1.058)	(1.331)	(1.266)	(0.508)
FTA	0.296**	0.155	0.072	0.507*
	(0.126)	(0.209)	(0.204)	(0.289)
Real exchange rate	-0.095	-1.961***	-1.858***	-2.388***
	(0.466)	(0.712)	(0.720)	(0.499)
Implicit tax rate (Government % GDP*100)	-0.057***	0.004		-0.012
	(0.018)	(0.027)		(0.018)
Institutions 5-yearly	0.008	0.001		0.029
	(0.013)	(0.011)		(0.020)
spatial lag: ln non-financial FDI (i-1)	-0.319	-0.403	-0.391	-0.227
	(0.197)	(0.262)	(0.244)	(0.304)
Country fixed effects	yes	yes	yes	no
DOLS, 1 lead 1 lag	no	yes	yes	yes
Robust LM test for spatial lag	1.536	5.673**	5.180**	1.108
Robust LM test for spatial error	0.630	0.619	0.408	0.231
Observations	632	494	494	494
Log-likelihood	-324.8	-176.6	-178.4	-463.1
Variance ratio	0.962	0.972	0.972	0.911
Number of countries	46	46	46	46

Standard errors clustered by country in parentheses. Robust LM statistics test for the presence of a spatial lag in the dependent variable or in the error. H0: spatial lag/error=0. Constant, and year fixed effects included. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Panel unit root tests on level variables

	$CADF_i$		IPS		LLC		$CADF_i$		IPS	
cross-sectional dependence:	yes		no		no		yes		no	
lag order:	0	1	0	1	0	1	0	1	0	1
	Intercept						Intercept + trend			
ln non-financial FDI	-3.3[a]	2.9	0.3	1.7	10.5	7.1	2.0	9.3	-0.7	-4.4[a]
ln home banking FDI (*t*-1)	-1.1	2.9	-1.8[b]	-1.7[b]	6.6	5.1	2.4	7.1	0.6	-6.7[a]
financial development	-3.2[a]	2.1	3.0	1.9	4.8	2.2	-0.7	4.5	-2.7[a]	-1.1
ln population	-8.2[a]	1.5	-59.6[a]	-9.0[a]	14.9	0.7	8.7	8.1	17.8	1.8
ln human capital	-1.2	4.2	4.0	-0.7	4.1	4.5	-1.5	8.9	-3.6[a]	-3.1[a]
ln GDP per capita (*t*-1)	2.0	5.8	4.1	2.9	15.6	5.3	2.6	5.7	1.5	-12.0[a]
ln GDP surrounding market potential	1.3	2.7	3.5	3.2	17.1	6.2	-1.0	6.1	-0.2	-0.4
Real exchange rate based on GDP price level	0.3	2.6	-3.6[a]	-0.9	-2.5[a]	-1.1	1.5	4.6	-2.6[a]	-5.5[a]
Implicit tax rate (Government share of GDP*100)	3.0	5.4	0.5	-1.5	0.4	0.4	1.6	5.7	0.0	-1.0
Institutions	1.0	1.2	2.1	0.5	0.0	-0.1	0.0	5.5	2.6	1.5
ln home banking FDI (*i*-1)	-3.1[b]	6.3	5.0	6.8	13.4	8.6	3.3	8.4	-1.6[c]	-10.5[a]

Note: $CIPS_i$ H0: All series are non-stationary. N=46; T≈13.74. The statistics are the standardized version of the CIPS(p) statistic for an unbalanced panel. The CIPS(p) statistic is the cross-section average of the cross-sectionally augmented Dickey-Fuller test statistic ($CADF_i(p)$)). Following Pesaran (2007), extreme t-values are truncated to avoid any undue influence of extreme outcomes, because t is small (10-20). IPS H0: All panels contain unit roots. The IPS(p) test allows for heterogeneous auto-regressive parameters of order p but not for cross-sectional dependence. For the IPS test with a trend at least 7 periods are needed so Greece is deleted. LLC H0: Panels contain unit roots. The LLC(p) test requires a balanced panel (N=20; T=18) and assumes a common auto-regressive parameters of order p and no panel specific means or time trends (for the latter N should be small relative to T). Statistic is adjusted for a lagged dependent variable. a: p<0.01, b: p<0.05, c: p<0.1.

Table 5 tests the null of no co-integration between non-financial FDI, banking FDI and control variables, using the residuals from regression (1) of Table 2. Because there is no evidence for cross-sectional dependence in de dependent variable, nor in the residuals, according to the robust LM tests[14], the test for co-integration is based on the standard IPS and LLC test procedures which allows for heterogeneous and homogenous autoregressive parameters respectively. The Fisher ADF or Fisher Phillips–Perron tests combine the test statistics of country-by-country unit root tests and provide an additional check. The null of no co-integration is rejected in all cases. Hence, regression (1) of Table 2 can be treated as co-

[14] The tests are based on a whether the general regression $y = Xb + \varepsilon$ can be significantly improved by including either of the terms ρWy or $\lambda W\varepsilon$, robustified against the alternative of the other form. See also Appendix A.

Table 4: Panel unit root tests on first differences

	$CADF_i(0)$	$CADF_i(1)$	IPS(0)	IPS(1)	LLC(0)	LLC(1)
Δln non-financial FDI	-8.2[a]	9.6	-8.9[a]	-5.7[a]	-12.6[a]	-9.3[a]
Δln home banking FDI (*t*-1)	-7.7[a]	2.8	-8.2[a]	-5.9[a]	-12.1[a]	-8.8[a]
Δfinancial development	-8.3[a]	5.2	-12.9[a]	-8.7[a]	-13.0[a]	-8.5[a]
Δln population	2.8	5.2	4.0	-5.5[a]	-9.4[a]	-3.3[a]
Δln human capital	0.4	6.3	-10.1[a]	-5.8[a]	-17.1[a]	-11.7[a]
Δln GDP per capita (*t*-1)	-6.6[a]	2.8	-8.2[a]	-6.1[a]	-8.8[a]	-8.4[a]
Δln GDP surrounding market potential	-7.7[a]	1.7	-5.9[a]	-5.0[a]	-10.7[a]	-9.9[a]
ΔReal exchange rate based on GDP price level	-3.9[a]	6.2	-6.3[a]	-13.5[a]	-18.1[a]	-16.1[a]
ΔImplicit tax rate (Government share of GDP*100)	-6.8[a]	4.1	-9.4[a]	-4.9[a]	-11.7[a]	-10.6[a]
ΔInstitutions	-0.9	6.1	-8.6[a]	-2.5[a]	-17.1[a]	-11.7[a]
Δln home banking FDI (i-1)	-7.2[a]	11.8	-8.2[a]	-82.6[a]	-12.8[a]	-11.0[a]

Note: $CIPS_i$ H0: All series are non-stationary. N=46; T≈12.74. The statistics are the standardized version of the CIPS(*p*) statistic for an unbalanced panel. The CIPS(*p*) statistic is the cross-section average of the cross-sectionally augmented Dickey-Fuller test statistic ($CADF_i(p)$)). Following Pesaran (2007), extreme t-values are truncated to avoid any undue influence of extreme outcomes, because t is small (10-20). IPS H0: All panels contain unit roots. The IPS(*p*) test allows for heterogeneous auto-regressive parameters of order *p* but not for cross-sectional dependence. For the IPS test with a trend at least 7 periods are needed so Greece is deleted. LLC H0: Panels contain unit roots. The LLC(p) test requires a balanced panel (N=20; T=17) and assumes a common auto-regressive parameters of order *p* and no panel specific means or time trends. Statistic is adjusted for a lagged dependent variable. : p<0.01, b: p<0.05, c: p<0.1.

integrated, representing a relationship that is stable over time and thus allowing the coefficients to be interpreted as the long-run determinants of FDI.

The estimates may nonetheless be biased because the error term v_{it} in equation (2) may be correlated with each of the disturbances of the I(1) processes belonging to each independent variable. One can correct for this correlation by including leads and lags of the first difference of the I(1) independent variables in the regression – dynamic OLS or D-OLS (Kao and Chiang, 2000). Simulations in Wagner and Hlouskova (2010) suggest that D-OLS outperforms fully modified OLS (Phillips and Moon, 1999) and is least sensitive to I(2) components, cross-sectional correlation and small T (i.e. $T \leq 25$).

Column (b) in Table 2 adds first-differenced leads and lags of the independent variables to equation (2). This results in a slightly larger effect of banking FDI and the estimated effect of some control variables changes precision. In column (c) several insignificant variables are

Table 5: Co-integration test on residuals of equation (1)

IPS	ADF(0) N=46; T≈13.74	ADF(1) N=46; T≈13.74
	-2.90***	-1.81**
LLC	ADF(0) N=20; T=18	ADF(1) N=20; T=18
	-8.30***	-8.62***
Fisher	ADF(0) & PP(0) N=46; T≈13.74	ADF(1) N=46; T≈13.74
		-2.05**
Fisher	-3.26***	PP(1) N=46; T≈13.74
		-3.19***

Note: IPS: H0: All panels contain unit roots. Allows for panel specific auto-regressive parameter and includes panel means. LLC: H0: Panels contain unit roots. Assumes homogenous auto-regressive parameter. Fisher: H0: All panels contain unit roots. Allows for panel specific auto-regressive parameter and includes panel means. *** p<0.01, ** p<0.05, * p<0.1

dropped which increases the sample somewhat, resulting in a slightly larger effect. In none of these regressions the null of no spatial auto-correlation can be rejected. Even when the unobserved country effects are dropped to exploit the cross-sectional variation in the data there is no evidence for a significant spatial lag, but a much larger effect of banking FDI. Furthermore, the usual determinants of non-financial FDI are confirmed. Local market potential, trade liberalization, and free trade agreements attract FDI whilst distance deters it. Together with the insignificant spatial lag this suggests that non-financial FDI, which is itself an aggregate of many different sectors, is on average horizontal in nature in favour of the Markusen (1984) model, where firms seek out the best market and make little use of regional markets or suppliers in neighbouring countries. Furthermore, the analysis finds statistically significant support for the hypothesis that, given informational imperfections in globally integrated capital markets, destination countries where the currency is weak in real terms attract more FDI due to more spending power of home firms and/or lower costs of non-tradables costs in the destination country (cf., Froot and Stein, 1991). The effects of taxation as proxied by the size of government as a share of GDP and good institutions have no significant effect on FDI.[15]

Since equation (2) is a co-integrating relationship, Table 6 finally presents the estimates of both the short- and long-run dynamics of the panel error-correction model (equation 4).

The error-correction coefficient ξ is significant at the 1% level which confirms convergence towards the steady state after transitory shocks (down to 10% of steady state in 4 years). Column (a) indicates that of the short-run dynamic effects only banking FDI and income per

[15] Recent research as also found that the quality of institutions has more bearing on portfolio investment than on direct investment (Daude and Fratzscher, 2008).

capita are statistically significant. For example, trade liberalization has no immediate effect on FDI although it raised the long run equilibrium volume of FDI. A one percent positive shock to income on the other hand boosts FDI by 0.5% the next year and, if permanent, raises the equilibrium volume of FDI by 1.6%. General financial development has no effect on non-financial FDI, nor does the stock of FDI from the rest of the world as proxied by the cumulative inflow of FDI since 1980 and tested in (b).[16] Columns (c) and (d) furthermore control for the volume of lending in host markets, but unlike banks' direct investment, these are not robust to allowing for non-nested arbitrary correlation of the errors within both countries and years (Cameron et al., 2010) as shown by regession (e). This implies that it is less likely that firms need banks for local direct financing, and that it is soft knowledge rather than hard knowledge that benefits firms. None of the additional tests yield results for the short run dynamics. The preferred estimate in column (f) finds that a permanent one standard deviation increase in banking FDI (about 60%) increases the equilibrium level of non-financial FDI by 10%.[17] [18]

[16] Here total Dutch FDI inflow is subtracted from total foreign inflow of FDI by country and year (World Bank, 2009) and cumulated annually, setting 1979 to zero. For Dutch data only, this method yields a correlation between actual stocks and the cumulative flow of 0.95.
[17] The results are robust to excluding Barbados, Hong-Kong, Panama and Singapore, which are defined as offshore centres by the Bank for International Settlements.
[18] The list of countries included is provided in Appendix Table B2.

Table 6: Panel error-correction estimates

Dependent variable: Δ(1) ln non-financial FDI					2-way clustering	
Error correction:	(a)	(b)	(c)	(d)	(e)	(f)
ln non-financial FDI (*t*-1)	-0.423***	-0.455***	-0.552***	-0.426***	-0.426***	-0.418***
	(0.069)	(0.070)	(0.100)	(0.066)	(0.087)	(0.067)
ln home banking FDI (*t*-2)	**0.070*** **	**0.073*** **	**0.084** **	**0.060*** **	**0.060*** **	**0.069*** **
	(0.017)	**(0.018)**	**(0.034)**	**(0.018)**	**(0.021)**	**(0.017)**
ln population (*t*-1)	-0.578	-0.429	-1.475	-0.622	-0.622	-0.583
	(0.508)	(0.576)	(1.101)	(0.566)	(0.675)	(0.533)
Trade liberalization (*t*-1)	0.303***	0.380***	0.158	0.318***	0.318**	0.321***
	(0.112)	(0.129)	(0.193)	(0.114)	(0.131)	(0.106)
ln GDP per capita (*t*-2)	0.664***	0.631***	0.543*	0.596***	0.596***	0.651***
	(0.184)	(0.191)	(0.295)	(0.181)	(0.223)	(0.179)
Real exchange rate (*t*-1)	-0.907**	-0.882*	0.186	-0.837*	-0.837*	-0.944**
	(0.433)	(0.499)	(0.846)	(0.421)	(0.468)	(0.418)
Fin. development (private credit/GDP) (*t*-1)	-0.001					
	(0.002)					
ln cumulative FDI inflow ROW (*t*-1)		0.080				
		(0.057)				
ln home lending, *foreign* currency (t-1)			0.174**	0.077**	0.077	
			(0.068)	(0.038)	(0.054)	
ln home lending, *local* currency (t-1)			0.010			
			(0.032)			
Short-run dynamics:						
Δ(1) ln non-financial FDI (*t*-1)	-0.082	-0.072	-0.107*	-0.083	-0.083	-0.085
	(0.053)	(0.052)	(0.056)	(0.051)	(0.083)	(0.052)
Δ(1) ln home banking FDI (*t*-1)	**0.062** **	**0.067** **	**0.102** **	**0.059** **	**0.059* **	**0.062** **
	(0.027)	**(0.028)**	**(0.049)**	**(0.027)**	**(0.031)**	**(0.027)**
Δ(1) ln population	-1.372	1.185	-9.034	-1.088	-1.088	-0.305
	(4.868)	(5.667)	(6.339)	(4.846)	(5.246)	(4.792)
Δ(1) Trade liberalization	0.188	0.227	0.089	0.201	0.201	0.193
	(0.198)	(0.204)	(0.250)	(0.198)	(0.283)	(0.197)
Δ(1) ln GDP per capita (*t*-1)	0.504***	0.497**	0.235	0.462***	0.462	0.505***
	(0.179)	(0.187)	(0.299)	(0.172)	(0.321)	(0.174)
Δ(1) Real exchange rate	0.599	0.555	1.297**	0.585	0.585	0.536
	(0.424)	(0.463)	(0.506)	(0.409)	(0.452)	(0.413)
Δ(1) Fin. development (private credit/GDP)	0.001					
	(0.001)					
Δ(1) ln cumulative FDI inflow ROW		-0.270				
		(0.206)				
Δ(1) ln home lending, *foreign* currency (t-1)			0.052	0.045	0.045	
			(0.061)	(0.048)	(0.060)	
Δ(1) ln home lending, *local* currency (t-1)			0.024			
			(0.027)			
Observations	639	626	341	649	649	649
R-squared	0.261	0.282	0.371	0.264	0.315	0.259
Number of countries	55	54	38	55	55	55

Standard errors clustered by country in parentheses in (a)-(d) and (f) and clustered by year and country in (e). *** p<0.01, ** p<0.05, * p<0.1. ROW: rest of the world. Constant, year and country fixed effects included.

6. Correcting for banking FDI endogeneity

The fact that banks specialize in screening and monitoring their clients suggests that they have insider information on multinationals' plans for international expansion. The positive correlation between banking FDI and non-financial FDI could also reflect banks following their clients. A time lag of one year may not be enough to circumvent that possibility, nor does it adequately deal with the second possibility, that both banks and multinationals expand into foreign markets to sell products locally and simply react to unobserved improvements in the investment climate or market potential. Banking FDI therefore has to be instrumented. This section shows that the main effect is robust across several instruments and samples.

Banks investing in the US during the 80s were partly following their clients and partly responding to fewer entry restrictions (Goldberg and Grosse, 1994), while more recently banking FDI has responded strongly to liberalization of the banking sector such as in Latin America during the 90s, and after local crises required recapitalization of the banking sector which was partly done through allowing entry of foreign banks (Goldberg, 2009). This is also reflected in the data by the jump in destination countries after 1990 and 1995 (see Figure 2). Sometimes, foreign banks were already present before regulation became tighter and they could only expand again after later liberalization.[19] This suggests that changes in banking sector regulation should successfully predict entry and expansion of foreign banks.

Variable Z in equation (3), the instrument that predicts banking FDI, but does not predict the outcome, is provided by a new database of financial reforms (Abiad et al., 2010). The banking sector was up until the 80s and 90s one of the most widely regulated sectors in industrial and developing countries, with common state ownership, entry restriction, and capital flow and interest rate regulations in place. The database tracks and grades actual policy changes in 91 countries between 1973 and 2005 in integer steps between zero and four on several dimensions, four being fully liberalized. These are: credit controls and reserve requirements, credit ceilings, interest rates, banking sector entry, capital account transactions, privatization of banks, security markets and banking sector supervision.

Four measures of financial reform stand out for the purpose of predicting banking FDI and the services that banks offer to multinationals. *Banking sector entry* is an obvious candidate (with the weight of sub-components in brackets) which reaches a maximum with majority foreign ownership of domestic banks (2/5), free entry of new domestic banks (1/5), no

[19] See for an example from Pakistan: Mian (2006).

branching restrictions (1/5), allowing universal banks (1/5). Free *capital account transactions regarding financial credits* allow banks to offer their clients cross-border services essential to FDI. These are considered liberalized if the exchange rate system is unified (1/3), foreign borrowing by banks is unrestricted (1/3), banking capital outflow is free (1/3). *Banking sector supervision* levels the playing field between foreign and domestic banks and is composed of: the application of the Basel capital adequacy ratio (1/6), supervision independent from the ministry of finance and a legal framework in place (2/6), effective on- and off-site bank examinations (2/6), supervision covering all banks (1/6). The liberalization of *security markets* allows banks to offer a wider range of financial products. It can reach three-fifth of its maximum value if a country has a liberalized market for treasury bills, corporate bond, equity, and derivatives markets, including deregulated institutional investors. A further two-fifths of the score can be achieved by allowing majority foreign ownership. Although the latter component of the security markets variable has a smaller weight it will also affect the outcome variable and is therefore not suitable as an instrument. Unfortunately, they do not publish the sub-components separately. However, Abiad et al. (2010) note that in mainly low income countries information of foreign ownership restrictions was not available and values were imputed based on the level of the first components' development. The analysis will experiment allowing the security markets variable to affect the outcome as well.

Although the banking sector remains heavily regulated, such reforms may have resulted from World Bank or IMF led wider economy reforms which may simultaneously make a country more attractive to other FDI as well. The reforms in this database are specific to the banking sector, but to control for the extend that other reforms took place at the same time the regressions will always control for an institutional measure of trade liberalization from Wacziarg and Welch (2008) and improvements in the rule of law, corruption, government stability, quality of the bureaucracy and the investment profile from the International Country Risk Guide. In addition, the data show no correlation between reforms of banking sector entry or supervision and (lagged) changes in trade liberalization. Reform of capital account transactions and security markets correlate positively with trade liberalization, but also with lags. Moreover, Appendix C explores an alternative instrument from Golub (2009) on liberalization of service sectors for FDI, for a sample of OECD countries.

The result is reported in Table 7a. Column (a) reports the result of estimating equation (2) where Z = (Banking sector entry, Capital account transactions regarding financial credits, Banking Supervision, Security Markets). Except for banking sector entry all the instruments

Table 7a: Instrumenting banking FDI with banking sector regulatory reform

Dependent variable:	(a) 1st stage ln home banking FDI (t-1)	(b) 2nd stage ln non-financial FDI	(c) 2nd stage Δ(1) ln **non-financial** FDI	(d) 2nd stage Δ(1) ln **manu-facturing** FDI
ln non-financial FDI (t-1)			-0.420***	-0.468***
			(0.073)	(0.076)
ln home banking FDI (t-1) (instrumented)		**0.304****	**0.155*****	**0.159****
		(0.122)	**(0.054)**	**(0.062)**
ln total population (t-1)	3.101	-1.648	-0.743	-0.670
	(1.981)	(1.128)	(0.505)	(0.674)
Trade liberalization (t-1)	-0.767	0.422*	0.353**	0.358**
	(0.463)	(0.213)	(0.134)	(0.176)
ln GDP per capita (t-2)	-0.067	0.753***	0.593***	0.773***
	(0.554)	(0.269)	(0.198)	(0.273)
Real exchange rate (t-1)	-0.052	-0.286	-0.916**	-0.831
	(0.796)	(0.538)	(0.444)	(0.547)
Institutions, 5 year initial (t-1)	-0.002	0.010	0.001	0.001
	(0.024)	(0.014)	(0.008)	(0.011)
Banking sector entry (t-1)	*-0.183**			
	(0.104)			
Capital account transactions regarding financial credits (t-1)	*0.194**			
	(0.109)			
Banking Supervision (t-1)	*0.236***			
	(0.112)			
Security Markets (t-1)	*0.600****			
	(0.186)			
Short-run dynamics:				
Δ(1) ln non-financial FDI (t-1)			-0.081*	-0.054
			(0.044)	(0.037)
Δ(1) ln home banking FDI (t-1) (instr.)			**0.081**	**0.057**
			(0.069)	**(0.066)**
Δ(1) ln total population			-1.207	3.120
			(4.961)	(5.890)
Δ(1) Trade liberalization			0.141	0.270
			(0.209)	(0.319)
Δ(1) ln GDP per capita (t-1)			0.460**	0.399
			(0.176)	(0.274)
Δ(1) Real exchange rate			0.497	0.849
			(0.417)	(0.572)
Δ(1) Institutions, 5 year initial			-0.006	-0.011
			(0.010)	(0.014)
Observations (countries)	732 (52)	678 (52)	610 (50)	600 (50)
R-squared	0.570	0.704	0.267	0.323
Cragg-Donald F-stat	19.44			
Robust test of overidentifying restrictions (p-value)		0.775	0.782	0.801

Standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Robust LM test for spatial lag/error in 1st stage regression (3): 1.344/1.396. Year and country effects and constant term included in all models. Excluded instruments in italics.

Table 7b: Co-integration test on residuals of equation (2), column (b), Table 8a

IPS	ADF(0) N=46; T≈14.78	ADF(1) N=46; T≈15.35
	-0.908	1.360
LLC	ADF(0) N=24; T=19	ADF(1) N=24; T=19
	-7.077***	-6.114***
Fisher	ADF(0) & PP(0) N=46; T≈14.08	ADF(1) N=46; T≈14.08
		108.6
Fisher		PP(1) N=46; T≈14.08
	124.5**	125.4**

Note: IPS H0: All panels contain unit roots. Allows for panel specific auto-regressive parameter and includes panel means. LLC H0: Panels contain unit roots. Assumes homogenous auto-regressive parameter. Fisher H0: All panels contain unit roots. Allows for panel specific auto-regressive parameter and includes panel means. *** p<0.01, ** p<0.05, * p<0.1

have the expected sign and a level playing field in the form of high quality supervision and developed security markets are most significant. While free entry of banks allows also foreign banks to invest, it also increases competition in the banking sector, which may cause banks to invest less on average. The Cragg-Donald F-statistic (which is much higher than the rule of thumb 10) suggests that the instruments are strong: the IV estimate has less than 5% bias relative to the un-instrumented case. The second stage reports both the cointegrating relationship in column (b) and the error-correction representation of equation (3) in column (c). In both cases the statistically significant effect of banking FDI on non-financial FDI in the long run is confirmed and the robust overidentifying restrictions test cannot reject that there is no correlation between the instruments and the second stage error. The estimate is higher and corresponds to at least a 20% increase in the volume of FDI after a permanent one standard deviation increase in banking FDI.[20] The results also confirm that regulation is a better predictor of banking globalization than foreign market potential. Lastly, to address concern that the quality of institutions and trade liberalization insufficiently capture further liberalization of the economy that may be correlated with banking sector reform, for example if trade liberalization only captures manufacturing trade liberalization but not services liberalization, column (d) presents a regression where the dependent variable is manufacturing sector FDI only. The result is very similar, lending further support to the identification strategy. Table 7b tests the residuals of equation (2), column (b) for non-

[20] That the effect is larger than the OLS estimate, even though one would expect a positive correlation between banking FDI and unobserved components affecting non-financial FDI, could be due to underlying heterogeneity to the benefits of banking FDI. The 'return' to banking FDI may be higher in those countries where the banking sector is more liberalized. This is a common observation in the returns to schooling literature, see Card (2001).

stationarity and rejects in most cases that the errors are non-stationary, meaning that the trending variables follow a common trend, allowing estimation of the error-correction representation.

Given worries that security market liberalization or capital account transactions reform affects the outcome variable (unreported) alternative regressions allow these to affect non-financial FDI directly. In that case the F-statistic (for the remaining instruments) drops to 7.99, but it affects the result qualitatively nor quantitatively, nor does it enter significantly in the second stage. Also, Appendix C shows that the effect is robust to instrumenting banking FDI with an alternative measure of banking sector liberalization to foreign investors and controlling for services liberalization directly, but for a smaller sample of OECD countries.

7. Do multinationals use home banks or any foreign banks?

So far the analysis shows a strong positive effect of banking FDI and non-financial FDI of the same origin country. Multinationals need not rely on home banks for their investments abroad. Other foreign banks, which are foreign both from the perspective of the host country and the home country of the multinational can also provide cross-border financial services and provide local host market knowledge. For example, a firm may use banks which provide the best match in country coverage with respect to the firm's operations, which is not necessarily the home bank. However, the always included year fixed effects also control for the latter possibility. To test whether other banks can offer the same level of familiarity to home institutions, proprietary information, and the way of doing business by the multinational as a home bank would, the presence of third country foreign bank in host countries has to be to controlled for. Detailed bilateral information on the level of FDI by banks by host and origin country is unfortunately publicly unavailable, but Micco et al. (2007) offer a proxy in the form of the volume of banking assets and the share which is held by foreign banks annually between 1995 and 2005, covering the more recent period.

Column (a) of Table 8 includes the log of the volume of total foreign assets.[21] The result is a strong significant positive effect of foreign banking in general on the long run level of non-financial FDI. Column (b) splits total foreign assets (A) into third country banking assets (=A-B-C-D) and home banking assets (=B+C+D), where the latter is split into direct

[21] The focus is on the long run relationship only, because the time dimension is short when foreign banking assets are included in the regression (T=7).

investment (B), foreign currency lending (C) and local currency lending (D). As explained before, there is missing data for local currency lending and the smaller sample captures mostly developing countries. The result is that only home market foreign banking is statistically significant. Disregarding local currency lending and estimating a larger sample in column (c) reveals that third country banking does affect non-financial FDI positively, although home market banking is more significant.

Given that the volume of lending yields less precise results than direct investment, columns (d) to (f) focus on the latter and instrument *both* banking FDI and third-country foreign banking assets. The latter is instrumented with only *capital account transactions regarding financial credits*, which is always highly significant and yields high F-test scores.[22] The regression in column (d) implicitly assumes that the volume of assets held is proportional to the balance sheet value of FDI owned by banks. Under that assumption, the variable

Table 8: Robustness to other foreign banking

Dependent variable: ln non-financial FDI				**instrumenting both ln home banking FDI and third-country banking assets**		
	(a)	(b)	(c)	(d)	(e)	(f)
A: ln foreign owned banking assets (incl. home) (t-1)	0.161**			-0.082		
	(0.068)			(0.179)		
ln 3rd-country foreign banking (=A - B - C - D) (t-1)		0.104			-0.062	
		(0.109)			(0.279)	
ln 3rd-country foreign banking (=A - B - C) (t-1)			0.131*			0.020
			(0.076)			(0.250)
B: ln home banking FDI (t-1)		**0.154*** **	**0.106*** **	**0.473** **	**0.446***	**0.398***
		(0.047)	**(0.032)**	**(0.219)**	**(0.263)**	**(0.237)**
C: ln home lending, *foreign* currency (t-1)		0.205	0.083			
		(0.161)	(0.100)			
D: ln home lending, *local* currency (t-1)		-0.015				
		(0.063)				
ln host banking assets (t-1)	-0.103	0.128	-0.019	0.052	0.124	0.129
	(0.090)	(0.106)	(0.158)	(0.073)	(0.093)	(0.097)
C-D F-test home banking FDI				19.44	19.44	19.44
C-D F-test 3rd-country assets				24.69	16.94	13.97
Observations	607	186	308	321	280	287
R-squared	0.293	0.275	0.286	0.257	0.215	0.249
Number of countries	101	38	53	52	50	50

Year and country effects always included. Standard errors clustered by country in parentheses. Constant included but not shown. Other included controls: ln population, trade liberalization, ln GDP per capita (*t*-1), real exchange rate, institutions. *** p<0.01, ** p<0.05, * p<0.1. First stage for ln home banking FDI as in Table 7(a). First stages for ln third-country banking assets use only *capital account transactions regarding financial credits* as IV, which is always highly significant.

[22] That only this instrument is significant for third-country banking assets reflects the fact that these assets include not only FDI but also the volume of lending.

measuring foreign owned banking assets captures only the variation in third-country foreign owned assets. After instrumentation, none of the third-country banking assets predict higher long-run levels FDI: only *home* country banking FDI still boosts non-financial direct investment. The fact that home banking FDI is more important than hard information-based cross-border lending also points to the direction of the benefit of local soft information. The conclusion is that home bank branches and subsidiaries provide better services than other banks.

8. Information advantage of banks in countries with investor risk

If the channel through which banks level the path for multinationals is by employing their information advantage on the pool of host country firms or by bridging institutional distance, then the effect of banking FDI should be greater in countries where doing business is more opaque. To test this, the regressions include (interactions with) measures of the degree of risk faced by investors as measured by the International Country Risk Guide for the following categories: corruption; bureaucracy quality; law and order; risk of contract viability/expropriation, profit repatriation, payment delays; and government unity, legislative strength, and popular support. Although it is unlikely that banks can speed up bureaucracy itself or prevent official expropriation, they may offer an information advantage. In countries where corruption, and weak law enforcement is a big problem, foreign firms face a higher probability of choosing the wrong business partners and making bad investment decisions. In such countries, the effective degree of control a foreign firm has over the average subsidiary may be low, increasing the case for extensive search for the best partners before a deal is made. More monitoring may also be required after the acquisition is made.

Equation (2) is extended with an interaction between each measure of risk and (instrumented) banking FDI, both lagged by one period, while controlling for the sum of the score on all other institutions, the volume of third country banking assets, and the volume of host domestic banking assets. The result is summarized in Table 9. The interactions are negative for almost all measures of risk, but only the interactions of home country banking FDI with less risk of corruption and better rule of law are significant at 95% confidence or more. The slopes are negative, indicating that the marginal effect of banking FDI on non-financial FDI increases in the risk of corruption and weakness of law enforcement. The marginal effect is significant for countries with corruption scores worse than 6, which is for all of the

Table 9: Interactions of measures of risk with banking FDI and third-country banking

Interaction of risk measure (maximum score) with:	ln home banking FDI (instr.)	ln 3rd-country foreign banking assets	Marg. effect is significant: from/until an institution score of:		for % of obs.	Coefficient range:	
	slope	slope	from	until		min	max
Institutions, sum of below (40)	0.003	-0.001					
less corruption (6)	-0.069**	-0.001	1	6	100%	0.36	0.71
more law and order (6)	-0.097***	0.003	1.58	6	100%	0.28	0.71
higher bureaucracy quality (4)	-0.054	-0.004					
less risk of contract viability/expropriation, profit repatriation, payment delays (12)	0.018*	-0.002					
more government unity, legislative strength, popular support (12)	0.006	-0.000					

*** p<0.01, ** p<0.05, * p<0.1. Sample years: 1996-2002. ln third-country foreign banking assets are total foreign banking assets minus home banking direct investment and minus home foreign currency lending. Also subtracting home local currency lending does not change the results, except for the fifth interaction which is then no longer weakly significant. Control variables: population, trade liberalization, GDP per capita, real exchange rate, direct effects of interacted variables. The direct effect of each banking variable is always significant and positive. Interacted variables are lagged one period.

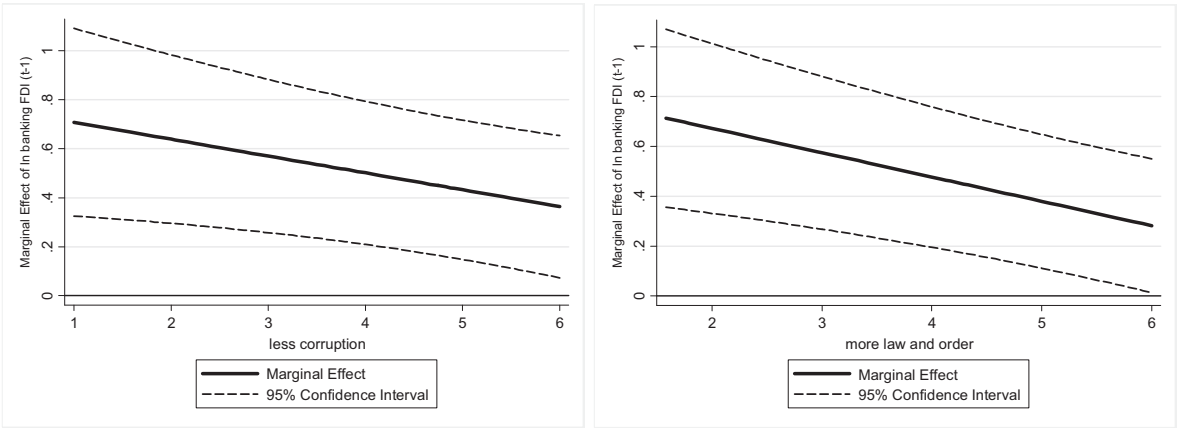

Figure 3: Marginal effect of ln banking FDI for levels of corruption (left) and rule of law (right)

observations in the sample. The effect is also always significant for varying degrees of law and order. These ranges are illustrated by Figure 3. The marginal effect is up to 0.71 for both the most corrupt countries (left graph), and for countries with the worst law enforcement (right graph). Note that none of the interactions with the volume of third-country foreign

owned banking assets are significant.[23] This means that institutions do not interact significantly with the variation in banking assets from third countries. Only home country banks provide an advantage in countries that are either corrupt or have weak rule of law.

9. Which sectors benefit more from home banking?

The results so far suggest that the harder it is to invest in a particular country, the more firms will make use of their home bank's international network to facilitate investment. It may also be that international investment is harder for some *sectors*, because of sector specific characteristics. This Section explores which sectors benefit more from international banking and finds that these tend to be sectors which rely more on external financing. The regressions in Appendix E rank sectors according to how much investment increases as a function of banking FDI, showing that *real estate* and *transportation and communication* lead the sector ranking, and *agriculture and fisheries* benefits the least. However, the ranking is slightly altered when examining the extensive margin: the *machines, electronics, automotive* and *chemicals, rubber, plastics* are more likely to invest in a new country if a home bank is present. Table 10 below takes the coefficients as given and correlates these with four different sector characteristics: dependence on external financing from Rajan and Zingales (1998)[24]; investment inefficiency from Durnev et al. (2004) capturing how hard it is to make optimal capital investment decisions[25]; rating agency disagreement of corporate bonds from Morgan (2002) capturing opacity of the sector[26]; and the number of subsectors for which data is available on the investment inefficiency measure, a proxy for how different firms are within each FDI sector. The table shows three regressions for each margin. Where financial dependence is included these include resource and manufacturing sectors, while each third regression can also include the services and construction sectors. The most robust result is

[23] Here the measure is total foreign banking assets minus home direct investment and minus home foreign currency lending. The results are qualitatively unchanged if also local currency lending is subtracted. In addition, the results are unchanged if also third-country banking assets is instrumented with regulatory reform.

[24] The fraction of capital expenditures not financed with cash flow from operations during the 1980s, for 35 sectors.

[25] =|mq-1|, where mq is Tobin's marginal *q* ratio. It estimates the deviation from the optimal level of the change in firm value due to unexpected changes in investment scaled by expected changes, for 196 industries between 1993 and 1997. A small number implies greater (capital budgeting) investment efficiency.

[26] Measures the degree to which Moody's and S&P disagree on the rating of corporate bonds issued by firms between 1983 and 1993 in 9 sectors relative to banks. The coefficient estimates are taken from Table 3, regression (6). A higher number implies more disagreement.

Table 10: Which sector characteristics predict benefits from home banking FDI?

Dependent variable:	sector dummy * home banking FDI coefficients (from Table A4a, reg. (b))								
	Intensive margin			Extensive margin			Heckman intensive margin		
Financial dependence	0.073[b]	0.022[a]		0.126[a]	0.164[a]		0.100[a]	0.094[a]	
	(0.027)	(0.008)		(0.023)	(0.030)		(0.031)	(0.017)	
Investment inefficiency		0.008[b]	-0.005		0.014	-0.000		0.011c	-0.009
		(0.004)	(0.016)		(0.017)	(0.013)		(0.006)	(0.016)
Rating agency disagreement on corporate bonds		0.016	-0.234[a]		0.083	0.017		0.257[a]	0.130[a]
		(0.018)	(0.043)		(0.108)	(0.061)		(0.029)	(0.042)
Number of subsectors		0.005[a]	0.004[a]		0.000	0.001		0.005[a]	0.005[a]
		(0.000)	(0.001)		(0.001)	(0.001)		(0.000)	(0.001)
Observations	35	99	196	35	99	196	35	99	196
R-squared	0.230	0.859	0.305	0.266	0.203	0.016	0.320	0.664	0.435

Robust standard errors in parentheses. a: p<0.01, b: p<0.05, c: p<0.1.

that sectors which benefit more from home banking are also more likely to be dependent on external financing. There is also some evidence that complex sectors as measured by the number of distinct identifiable sub-sectors benefit more.

10. Estimating the effect of the sale of a major international bank

Figure 4 below plots the stock of outward FDI between 2003 and 2009. Clearly visible is the drop in banking FDI after 2007. The drop in banking FDI was followed by a modest decline in non-financial FDI a year later (but a large departure from trend). The decline in banking FDI was however not entirely due to the recent crisis which started in 2007. Just before the crisis erupted, on October 17th 2007, it was agreed that a major multinational bank, ABN AMRO Holding N.V. with in excess of 1,508 billion USD in assets on its balance sheet[27], was to be sold to a consortium of three foreign banks consisting of Royal Bank of Scotland (RBS) from the UK, Fortis from Belgium and Santander from Spain. Bases on the results above, this could lead to an 8% drop in FDI.

All shares were acquired in early 2008 and delisted from the stock exchange on 25 April 2008 (ABN AMRO, 2008). In principle this event could provide a quasi experiment to estimate the hypotheses by means of for example difference-in-difference estimation. However, the sale, split and integration of the business units takes time, as explained below.

[27] In 2006 it had 3,868 offices and branches in 56 countries and territories. Of these, 449 were in North America, 2,154 in Latin America and the Caribbean, 1,144 were in Europe, 8 were in the Middle East and Africa and 113 were in the Asia Pacific Region. It had a branch in Brazil since 1917 (ABN AMRO, 2008).

In December 2007, the buying consortium agreed on separating and transferring ABN AMRO businesses to the new owners. RBS would acquire North America, Asia, and Europe (excluding Antonveneta in Italy), global clients (except Latin American), Netherlands wholesale clients and wholesale clients in Latin America (excluding Brazil). Fortis acquired Netherlands private clients, private clients (excluding Latin American) and asset management. Santander received Latin America (excluding wholesale clients outside Brazil), Antonveneta[28] and private clients in Latin America. The plan was approved by the Dutch Central Bank on 10 March 2008, after which integration started (ABN AMRO, 2008).

If rebranding is the final phase of integration then it may take a year or more for an acquired subsidiary to have adapted its corporate governance to its new parent. For example, in September 2009, RBS rebranded the Morgans sharedealing business in Australia as RBS Morgans. Rebranding of the ABN AMRO Australia unit to RBS Australia was done in March that year and only on 10 February 2010, RBS announced that branches of the businesses it owned in India and the United Arab Emirates would be rebranded under its name, the former soon to be sold on to HSBC. ABN AMRO was partly bought back by the Dutch government after the nationalization of Fortis which had severe problems during the recent crisis. However, this concerned only the Dutch operations with a few foreign branches and no

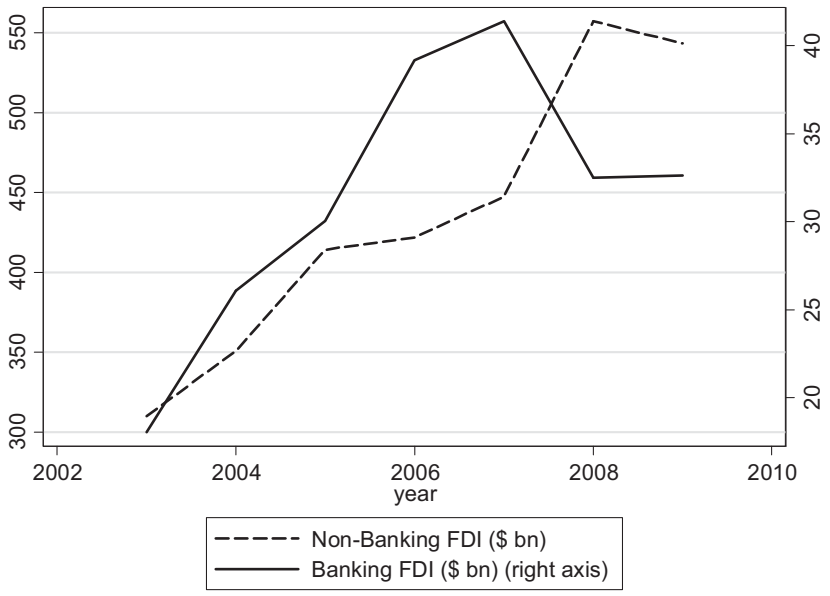

Figure 4: Outward banking and non-financial FDI from 2003 to 2009

[28] On 8 November 2007 Santander announced it had reached an agreement with Banco Monte dei Paschi di Siena from Italy with respect to the sale of Antonveneta.

foreign subsidiaries.[29]

Over time, as the former Dutch controlled subsidiaries change management and adopt corporate governance and business strategies from their new parents, it may be that other Dutch non-financial multinationals will find it harder to do business abroad. However, this will probably start to take effect a year or longer from the moment of sale, consistent with this paper's finding that long run effects are more robust than short run effects. Given the estimated effects and the decline in the stock of aggregate banking FDI totalling 21%, non-financial multinationals will invest 2.2 to 8.4 percent less, everything else equal, although (at most) 2.8% could be made up for by the similar services offered by the new owners.[30] However, this masks variation at the country level, where the mean rate of change was -12% from 2007 to 2008 with exit in five countries and a decline in FDI in 16 countries. A year later the decline was again 7% on average and negative for 21 countries. Furthermore, corruption and rule of law also determine how important home banking is for FDI.

11. Conclusion

While conventional wisdom has it that banks follow customers abroad, this paper provides, to the best of my knowledge, the first evidence that the presence of foreign banks subsequently boosts foreign investment by non-financial firms, and in particular when from the same home country. On average, a one standard deviation year-on-year increase in the stock of home origin banking FDI (of about 60%) leads, if permanent, to 24% more non-financial foreign direct investment from the same country, in the long run. This paper does not however claim that this is the only catalyser of investment. There is positive FDI in 121 countries *not* serviced by banking FDI, and countries themselves, aware of the difficulty of dealing with various institutions, for example set up investment promotion agencies (Javorcik and Harding, *forthcoming*) and free trade zones. Companies may also hire workers familiar with foreign markets (Javorcik et al., 2011). Nonetheless, banking FDI makes investment easier and less risky. Home banks have a larger and more significant effect than third-country or host domestic banks and that this effect is stronger in more risky markets. In addition, local soft information as captured by banks' direct investment in branches and subsidiaries is more important than relatively hard information-based cross-border lending. Since acquiring

[29] See http://en.wikipedia.org/wiki/ABN_AMRO.
[30] Based on the range of estimates from Table 8.

information takes time, the effects tend to apply at relatively longer horizons. At the sector level, there is a positive correlation between the effect of home banking FDI on non-financial FDI and sectors' reliance on external financing (which are therefore also more likely to have bank relationships), and sectors' investment in more distinct sub-sectors. Combined, these results suggest that banks intermediate FDI through increasing the size and quality of the pool of potential subsidiaries and bridging institutional distance. Although it cannot be ruled out, the evidence is somewhat less strong for banks' ability to efficiently organize internal capital markets or provision of direct financing. To attract both established and future multinational companies, it seems to make sense for a well-known British bank to advertise as 'the world's local bank', but more so for its British clients. Future research linking bank and loan level data to firm level data in home and host countries may shed more light on the details of the specific mechanism behind this effect.

References

Abiad, A., E. Detragiache and T. Tressel (2010). A New Database of Financial Reforms, IMF Staff Papers 57(2), 281-302.

ABN AMRO Holding N.V., Annual Report, 25 March 2008, pp.316.

Alfaro, L., A. Rodriguez-Clare, A. Chanda, S. Kalemli-Ozcan and S. Sayek (2004). FDI and Economic Growth: The Role of Local Financial Markets, Journal of International Economics 64(1), 89–112.

Anderson, J.E. and E. van Wincoop (2003). Gravity with gravitas: a solution to the border puzzle, American Economic Review 93, 170-192.

Anselin, L. (1988). Spatial Econometrics: Methods and Models, The Netherlands, Kluwer Academic Publishers, Dordrecht.

Antràs, P., M. Desai and F. Foley (2009). Multinational Firms, FDI Flows and Imperfect Capital Markets, Quarterly Journal of Economics 124(3), 1171-219.

Baier, S.L. and J.H. Bergstrand (2007). Do free trade agreements actually increase members' international trade?, Journal of International Economics 71, 72-95.

Baltagi, B.H., G. Bresson and A. Pirotte (2007a). Panel unit root tests and spatial dependence, Journal of Applied Econometrics 22, 339-360.

Baltagi, B.H., P. Egger and M. Pfaffermayr (2007b). Estimating models of complex FDI: are there third-country effects, Journal of Econometrics 140(1), 260-281.

Banerjee, A. and M. Wagner (2009). Panel methods to test for unit roots and cointegration, in T.C. Mills and K. Patterson (eds.) Palgrave Handbook of Econometrics: Volume 2 Applied Econometrics, Palgrave Macmillan, Basingstoke.

Bank for International Settlements (2008). Guidelines to the international consolidated banking statistics, Basel.

Barro, R.J. and J.-W. Lee (2010). A New Data Set of Educational Attainment in the World, 1950-2010, NBER Working Paper No. 15902.

Beck, T. (2002). Financial Development and International Trade. Is There a Link?, Journal of International Economics 57, 107-131.

Bekaert, G., C.R. Harvey, C. Lundblad and S. Siegel (2007). Global Growth Opportunities and Market Integration, Journal of Finance 62(3), 1081-1137.
Berger, A.N., L.F. Klapper, and G.F. Udell (2001). The ability of banks to lend informationally opaque small businesses, Journal of Banking and Finance 25, 2127–2167.
Blonigen, B.A., R.B. Davies, G.R. Waddell and H.T. Naughton (2007). FDI in space: spatial autoregressive relationships in foreign direct investment, European Economic Review 51, 1303-1325.
Bustos, P. (2011). Trade Liberalization, Exports and Technology Upgrading: Evidence on the impact of MERCOSUR on Argentinian Firms, American Economic Review 101(1), 304-340.
Cameron, A.C., J.B. Gelbach and D.L. Miller (2010). Robust inference with multi-way clustering, Journal of Business and Economic Statistics, *forthcoming*.
Card, D. (2001). Estimating the return to schooling: progress on some persistent econometric problems, Econometrica 69, pp. 1127–1160.
Carr, D.L., J.R. Markusen and K.E. Maskus (2001). Estimating the knowledge-capital model of the multinational enterprise, American Economic Review 91(3), 693-708.
Claessens, S. and L. Laeven (2003). Financial Development, Property Rights, and Growth, Journal of Finance 58(6), 2401-2437.
Daude, C. and M. Fratzscher (2008). The pecking order of cross-border investment, Journal of International Economics 74(1), 94-119.
Desai, M., F. Foley and J. Hines (2004). A Multinational Perspective on Capital Structure Choice and Internal Capital Markets, Journal of Finance 59, 2451-2488.
Djankov, S., R. La Porta, F. Lopez-de-Silanes and A. Shleifer, (2002). The Regulation of Entry, Quarterly Journal of Economics 117, 1–37.
Durnev, A., R. Morck and B. Yeung (2004). Value-enhancing capital budgeting and firm-specific stock return variation, Journal of Finance 59(1), 65-105.
Ekholm, K., R. Forslid and J.R. Markusen (2007). Export-platform foreign direct investment, Journal of the European Economic Association 5(4), 776-795.
Florax, R.J.G.M., H. Folmer and S.J.Rey (2003). Specification searches in spatial econometrics: the relevance of Hendry's methodology, Regional Science and Urban Economics 33(5), 557-579.
Froot, K.A. and J.C. Stein (1991). Exchange rates and foreign direct investment: an imperfect capital markets approach, Quarterly Journal of Economics 106(4), 1191-1217.
Goldberg, L.G., Grosse, R. (1994). Location choice of foreign bank in the United States. Journal of Economics and Business 46(5), 367–379.
Goldberg, L.S. (2009). Understanding Banking Sector Globalization, IMF Staff Papers 56, 171–197.
Golub, S.S., (2009). Openness to foreign direct investment in services: an international comparative analysis, The World Economy 32(8), 1245-1268.
Grossman, G.M. and E. Helpman (2002). Integration versus Outsourcing in Industry Equilibrium, Quarterly Journal of Economics 117, 85–120.
Grossman, G.M. and E. Helpman (2005). Outsourcing in a global economy, Review of Economic Studies 72, 135-159.
Heckman, J.J. (1979). Sample selection bias as a specification error, Econometrica 47, 153-161.
Helpman, E., M.J. Melitz and S.R. Yeaple (2004). Export versus FDI with heterogeneous firms, American Economic Review 94, 300-316.
Helpman, E., M.J. Melitz and Y. Rubinstein (2008). Estimating trade flows: trading partners and trade volumes, Quarterly Journal of Economics 123(2), 441-487.

Heston, A., R. Summers and B. Aten (2006). Penn World Table 6.2, Center for International Comparisons of Production, Income and Prices, University of Pennsylvania.
Im, K. S., M. H. Pesaran and Y. Shin (2003). Testing for unit roots in heterogeneous panels, Journal of Econometrics 115, 53-74.
International country risk guide (2006). Political Risk Services, Institutional Re- form and Informational Sector, 2006 and earlier years, East Syracuse, NY.
Javorcik, B.S. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages, American Economic Review 94(3), 605-627.
Javorcik, B.S. and T. Harding (forthcoming). Roll out the Red Carpet and They Will Come: Investment Promotion and FDI Inflows, Economic Journal.
Javorcik, B.S., C. Ozden, M. Spatareanu and C. Neagu (2011). Migrant Networks and Foreign Direct Investment, Journal of Development Economics 94(2), 231-241.
Kao, C., and M.-H. Chiang (1999). On the estimation and inference of a cointegrated regression in panel data, Advances in Econometrics 15, 179-222.
Kelejian, H.H. and I.R. Prucha (1999). A generalized moments estimator for the autoregressive parameter in a spatial model, International Economic Review 40(2), 509-533.
Klein, M.W., J. Peek and E.S. Rosengren (2002). Troubled Banks, Impaired Foreign Direct Investment: The Role of Relative Access to Credit, American Economic Review 92(3), 664-682.
Kose, M.A., E.S. Prasad, K. Rogoff and S-J. Wei (2009). Financial globalization: a reappraisal, IMF Staff Papers 56(1), 8-62.
Kroszner, D., L. Laeven and R. Klingebiel (2007). Banking Crises, Financial Dependence, and Growth, Journal of Financial Economics 84(1), 187-228.
Levin, A., C.-F. Lin, and C.-S. J. Chu (2002). Unit root tests in panel data: Asymptotic and finite-sample properties, Journal of Econometrics 108, 1-24.
Lee, L.-F. (2004). Asymptotic distributions of quasi-maximum likelihood estimators for spatial econometric models, Econometrica 72 (6), 1899-1925.
Lewbel, A. (2007). Endogenous Selection or Treatment Model Estimation, Journal of Econometrics 141, 777-806.
Manova, K., S-J. Wei and Z. Zhang (2011). Firm Exports and Multinational Activity under Credit Constraints, mimeo.
Markusen, J.R. (1984). Multinationals, multi-plant economies, and the gains from trade, Journal of International Economics 16(3-4), 205-226.
Markusen, J.R. and K.E. Maskus (2002). Discriminating among alternative theories of the multinational enterprise, Review of International Economics 10(4), 695-707.
Mian, A. (2006). Distance Constraints: The Limits of Foreign Lending in Poor Economies, Journal of Finance 61(3), 1465-1505.
Morgan, D.P. (2002). Rating banks: risk and uncertainty in an opaque industry, American Economic Review 92(4), 874-888.
Mundlak, Y. (1978). On the pooling of time series and cross-sectional data, Econometrica 46, 69–86.
Neary, J.P. (2009). Trade costs and foreign direct investment, International Review of Economics and Finance 18, 207-218.
Nunn, N. (2007). Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade, Quarterly Journal of Economics 122(2), 569-600.
Pesaran, M.H. (2007). A simple panel unit root test in the presence of cross-section dependence, Journal of Applied Econometrics 22(2), 265-312.

Petersen, M.A. and R. Rajan (1994). The benefits of firm-creditor relationships: Evidence from small-business data, Journal of Finance 49, 3–37.
Petersen, M.A. and R. Rajan (2002). Does distance still matter? The information revolution in small business lending, Journal of Finance 57, 2533–2570.
Phillips, P.C.P. and H.R. Moon (1999). Linear regression limit theory for nonstationary panel data, Econometrica 67(5), 1057-1112.
Rajan, R. and L. Zingales (1998). Financial Dependence and Growth, American Economic Review 88, 559-86.
Santos Silva, J.M.C. and S. Tenreyro (2006). The log of Gravity, Review of Economics and Statistics 88, 641-658.
Spence, A.M. (1976). Product Selection, Fixed Costs, and Monopolistic Competition, The Review of Economic Studies 43(2), 217-235.
UNCTAD (2008). World Investment Report, New York and Geneva.
Wacziarg, R. and Welch, K.H. (2008) Trade liberalization and growth: new evidence, World Bank Economic Review 22, 187-31.
Wooldridge, J.M. (1995). Selection Corrections for Panel Data Models under Conditional Mean Independence Assumptions, Journal of Econometrics 68(1), 115-32.
Wooldridge, J.M. (2002). Econometric analysis of cross-section and panel data, Cambridge: MIT Press.
World Bank (2009). World development indicators, Washington, D.C.
Yeaple, S.R. (2003). The complex integration strategies of multinational firms and cross-country dependencies in the structure of foreign direct investment, Journal of International Econoimcs 60, 293-314.

Appendix A: Data definitions and sources, countries included

Table A1: Variable definitions and sources

Variable	Description	Source
ln FDI	ln value of outward foreign direct investment from The Netherlands in current mln USD, by country, year and sector, see also text	DNB (2010)
ln foreign owned banking assets	Banking assets owned by foreign banks in host country.	Micco et al. (2007)
ln host owned banking assets	Total banking assets in host country minus foreign owned banking assets.	idem
ln home lending, foreign currency	foreign currency lending by consolidated branches and subsidiaries owned by Netherlands resident banks, by host country-year	DNB (2010)
ln home lending, local currency	local currency lending by consolidated branches and subsidiaries owned by Netherlands resident banks, by host country-year	idem
ln population	ln of total population	World Bank (2009)
Trade liberalization	= 1 if liberalized, dummy	Wacziarg & Welch (2008)
ln human capital	average years of schooling age 25+	Barro and Lee (2010)
ln distance	Vincenty distance in km between country centroids	CID data and Vincenty (1975)
ln GDP per capita	ln GDP per capita in current USD	World Bank (2009)
ln GDP surrounding market potential	distance weighted ln GDP in current USD	authors' calculation
FTA	=1 if a country has a free trade agreement with The Netherlands in year *t*	Baier and Bergstrand (2007)
Institutions	Sum of the following institution indices: Government Stability, Investment Profile, Corruption, Law and Order, Bureaucracy Quality. See also text.	International Country Risk Guide
Real exchange rate	Real exchange rate with Netherlands based on GDP price level	PWT6.2, from Heston et al. (2006)
Implicit tax rate	Government share of GDP	World Bank (2009)
Financial development	Private credit as a share of GDP	idem
Baking sector entry	See text, Section 6.	Abiad et al. (2010)
Capital account transactions regarding financial credits	See text, Section 6.	idem
Banking supervision	See text, Section 6.	idem
Security markets	See text, Section 6.	idem
Procedures + days to form a business	dummy equal to 1 if the number of procedures plus the number of days it takes to form a business is above the sample median	Djankov et al. (2002)
ln mean distance to coast or river	ln mean geographical distance to the nearest coast or river within a country	Center for International Development (2001)
Financial dependence	The fraction of capital expenditures not financed with cash flow from operations during the 1980s.	Rajan and Zingales (1998)

Rating agency disagreement on corporate bonds	Measures the degree to which Moody's and S&P disagree on the rating of corporate bonds issued by firms between 1983 and 1993 in 9 sectors relative to banks. Coefficient estimates from Table 3, regression (6). A higher number implies more disagreement.	Morgan (2002)
Investment inefficiency	=|mq-1|, where *mq* is Tobin's marginal q ratio. It estimates the deviation from the optimal level of the change in firm value due to unexpected changes in investment scaled by expected changes, for 196 industries between 1993 and 1997. A small number implies greater (capital budgeting) investment efficiency.	Durnev et al. (2004)

Table A2: Countries within sample of Table 6

Argentina	India	Portugal
Australia	Indonesia	Romania
Austria	Ireland	Russian Federation
Barbados	Italy	Singapore
Belgium	Japan	Slovak Republic
Bolivia	Kazakhstan	South Africa
Brazil	Kenya	Spain
Bulgaria	Korea, Rep.	Sri Lanka
Canada	Luxembourg	Sweden
Chile	Malaysia	Switzerland
China	Mexico	Thailand
Colombia	Morocco	Turkey
Denmark	New Zealand	Ukraine
Ecuador	Norway	United Kingdom
France	Pakistan	United States
Germany	Panama	Uruguay
Greece	Paraguay	Venezuela
Hong Kong, China	Philippines	
Hungary	Poland	

Appendix B: Estimating spatial lags

With N potential host countries and T years of observation, the term $\ln FDI_{it}\mathbf{W}\rho$ is added to equations (1) and estimate with maximum likelihood, where:

$$\mathbf{W} \equiv \begin{pmatrix} \mathbf{W}_1 & 0 & 0 \\ 0 & .. & 0 \\ 0 & 0 & \mathbf{W}_T \end{pmatrix}, \quad \mathbf{W}_t \equiv \begin{pmatrix} 0 & 115.4/d_{1,2} & .. & 115.4/d_{N,1} \\ 115.4/d_{2,1} & 0 & .. & 115.4/d_{N,2} \\ .. & .. & .. & .. \\ 115.4/d_{N,1} & 115.4/d_{N,2} & .. & 0 \end{pmatrix},$$

The block-diagonal matrix **W** corresponds to the spatial lag weighting matrix with each block along the diagonal corresponding to a single year. The blocks along the matrix **W** depend on distances, so are identical for each year. The off-diagonal elements in each block contain the spatial inverse-distance weights between any two potential host countries, where the distances are the Vincenty differences in kilometers between country centroids and are normalized by the shortest distance between two host countries (the distance between Netherlands and Belgium, i.e., 115.4 km). As an alternative to a spatial AR(1) process suggested by theory there may be statistical reasons to include a spatial MA(1) error term instead, which would add the term $v_{it}\mathbf{W}\rho$ to equation (1). The analysis follows Florax et al. (2003) and performs robust Likelihood Multiplier (LM) tests: if they both reject the null of no spatial correlation the specification implied by the test with the highest score is used.

Estimation is based on maximum likelihood (Anselin, 1988) and involves calculation of the determinant of large matrices. For example, the matrix **W** reaches a dimension of 632×632 within the present sample. Kelejian and Prucha (1999) warn that calculation of the eigenvalues of **W** may be hampered by lack of accuracy. Fortunately, all estimated eigenvalues of matrices **W** for different samples had zero imaginary parts allowing standard methods of estimation. The properties of the weighting matrix may also violate consistency of the maximum likelihood estimates: the row and column sums should not diverge faster to infinity than the sample size N. Since **W** is an inverse distance matrix, it satisfies this condition (Lee, 2004).

Appendix C: An alternative measure of FDI entry restrictions as IV

This section presents an alternative measure of FDI entry restrictions collected by Golub (2009), which further demonstrates the robustness of the main result. He collected information on *de facto* FDI entry restrictions for 23 OECD countries for the years 1981, 1986, 1991, 1998 and 2005, ranked between zero and one, for the sectors business services, telecommunications, construction, distribution, electricity, banking, insurance, tourism and transport. Of these, banking FDI restrictions provides an alternative instrument for home banking FDI, although for a smaller sample. A control for simultaneous liberalization of other services sectors, in addition to the measure for trade liberalization, is constructed: *Services liberalization* equals total services liberalization minus finance liberalization using weights from Golub (2009). Because some years are missing, intermediate years are imputed with the last known value, resulting in initial services liberalization.

The results is given in table C1 below. Banking liberalization has a positive effect on banking FDI entry with 96% confidence and is not weak judging from the F-test which is above 10. The second stage in levels shows an equally strong effect of banking FDI on non-financial FDI within OECD countries compared to the larger sample of Table 7a, while market size and trade liberalization no longer have significant effects. The long-run effect is robust to allowing for short-run dynamics which are also not significant for these OECD countries.

Table C1: Instrumenting banking FDI with an alternative instrument, OECD countries only

Dependent variable:	(a) 1st stage ln home banking FDI (t-1)	(b) 2nd stage ln non-financial FDI	(c) 2nd stage Δ(1) ln non-financial FDI
ln non-financial FDI (t-1)			-0.346***
			(0.061)
ln home banking FDI (t-1) (instrumented)		**0.350****	**0.248****
		(0.146)	**(0.103)**
ln total population (t-1)	7.024	-1.853	-1.213
	(4.236)	(1.904)	(1.542)
Trade liberalization (t-1)	-1.143**	0.035	0.191
	(0.473)	(0.212)	(0.173)
ln GDP per capita (t-2)	1.559	0.443	0.214
	(1.055)	(0.439)	(0.314)
Real exchange rate (t-1)	-0.285	-0.470	-0.857**
	(0.722)	(0.583)	(0.386)
Institutions, 5 year initial (t-1)	-0.028	-0.004	-0.006
	(0.042)	(0.026)	(0.009)
Services liberalization (initial, except finance) (t-1)	0.541	1.156	-0.040
	(1.579)	(1.668)	(0.777)
Banking liberalization (t-1)	*1.323**		
	(0.635)		
Short-run dynamics:			
Δ(1) ln non-financial FDI (t-1)			-0.018
			(0.109)
Δ(1) ln home banking FDI (t-1) (instr.)			**0.220**
			(0.150)
Δ(1) ln total population			11.934**
			(5.260)
Δ(1) Trade liberalization			-0.091
			(0.152)
Δ(1) ln GDP per capita (t-1)			0.299
			(0.245)
Δ(1) Real exchange rate			-0.007
			(0.421)
Δ(1) Institutions, 5 year initial			-0.028
			(0.020)
Δ(1) Services liberalization (initial, except finance) (t-1)			-0.708
			(0.709)
Observations (countries)	325 (20)	308 (20)	284 (20)
R-squared	0.614	0.795	0.303
Cragg-Donald F-stat	11.33		

Standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year and country effects and constant term included in all models. Excluded instrument in italics.

Appendix D: Testing and correcting for incidental truncation and selection bias

The estimation so far has ignored several other potential sources of bias: left censoring of FDI and incidental truncation over time. Correcting for these yields the results that the positive effect of banking FDI is more robust than that of trade liberalization, and that the short run effects are not robust.

The distributions of both banking and non-financial FDI are heavily left skewed, contain zeros and (in principle) unbounded positive values. Taking logs yields in both cases a normal distribution but censors the distribution at zero. Simply running the estimation on the (log) positive values may miss-specify the conditional mean if censoring is non-random and if censoring occurs often. Firms have good reasons to invest in only particular countries, suggesting that they enter according to their productivity and prevailing market conditions. This creates selection bias similar to problems encountered in health and labor economics (Heckman, 1979). Similarly, gravity equations to estimate bilateral trade flows (e.g., Anderson and Wincoop, 2003) have been corrected for sample selection bias by allowing for extensive and intensive margins in international trade (Helpman et al., 2008). The new gravity approach can explain 'zeroes', i.e., that no firm may be productive enough to export from one country to another country, and asymmetric bilateral trade patterns. They find evidence that the decision to export is well determined by measures of the cost of entry in a foreign market, while entry costs do not affect the amount of trade. The advantage of this method is that the model for the decision to investment abroad and the amount of investment are determined separately. Alternative methods that have featured in the (trade) literature are simple OLS on the selected sample, which assumes that both models are independent, while a Tobit regression makes the strong assumption that both margins can be captured by the same model. A third model is the nonlinear Poisson model (used in the context of trade by Santos Silva and Tenreyro (2006)), which allows inclusion of both zero and non-zero trade flows but also makes the assumption that one model applies to both margins.[31] The two-stage method is favoured here, because it does not make additional assumptions on the determinants of each model.

Censoring in one of the regressors (banking FDI) could be endogenous to the function that determines non-financial FDI. This also requires instrumentation of banking FDI, even if the

[31] The non-linear Poisson model tends to underestimate the number of zeros. A two-part zero-inflated model with a negative binomial density corrects this. However, just as with OLS on the selected sample, it also relies on the assumption that entry and the amount of trade are independent.

log amount of banking FDI was actually exogenous in the main equation (Wooldridge, 2002). To complicate matters further, the panel of FDI after taking logs is unbalanced due to observations with zero FDI. The zeros occur mostly at the beginning of the sample, although they occasionally also occur in later periods, suggesting some exit from foreign markets as well. There may be unobserved time-invariant factors that both determine the amount of FDI and the decision to invest in each period, making entry and exit endogenous.[32] This requires modification of the Heckman model, which is provided by Wooldridge (1995).[33]

Here, the population of outward FDI is investigated at the sectoral level, where the problem of zeroes is potentially much less severe. Conditioning on positive banking FDI and other main control variables leaves no zeros in non-financial FDI. Replacing log banking FDI by a dummy equal to one if banking FDI is larger than zero still only excludes 10% of possible destinations for non-financial FDI, although banking FDI is positive for only 33% of observations. This compares to as many as 55 percent zeroes in the 1986 cross Section of bilateral trade flows of Helpman et al. (2008).

The interest is on estimating the effect of the censored variable banking FDI on the censored variable non-financial FDI, where separate models capture the non-financial sector's decision to invest (7) and the amount of FDI invested (5).

$$\ln FDI_{it}^{NF} = \mathbf{X}_{it}\beta_1 + \ln FDI_{i,t-1}^{B}\gamma_1 + c_{i1} + \tau_t + v_{it1} \tag{5}$$

$$\ln FDI_{it}^{B} = \mathbf{X}_{it}\beta_2 + Z_{it}\delta_2 + c_{i2} + \tau_t + v_{it2} \tag{6}$$

$$I_{it}^{NF} = \begin{cases} 1 & \text{if} \quad \mathbf{X}_{it}\beta_3 + Z_{it}\delta_3 + \overline{\mathbf{X}}_i\eta_3 + \overline{Z}_i\mu_3 + \tau_t + v_{it3} > 0 \\ 0 & \text{if} \quad \mathbf{X}_{it}\beta_3 + Z_{it}\delta_3 + \overline{\mathbf{X}}_i\eta_3 + \overline{Z}_i\mu_3 + \tau_t + v_{it3} \leq 0 \end{cases}. \tag{7}$$

Equation (7) is the selection equation that determines selection into the sample of (5), where the conditional mean of individual unobserved effects in the selection equation (7) is a linear projection of the within means of the **X** and Z, following Mundlak (1978). To test for selection in equation (5) the method by Heckman (1979) is used by first obtaining $\hat{\beta}_3, \hat{\delta}_3, \hat{\eta}_3$,

[32] This is sometimes also referred to as an 'incidental truncation problem' (Wooldridge, 2002).

[33] A benefit of this estimator over others such as for example Lewbel (2007) is that it parametrically estimates the selection equation which allows interpreting the difference between deciding to invest versus the amount invested and allows for explicit controls for the extensive margin. Lewbel (2007) proposes to estimate (5) in first differences to get rid of the fixed effects and weighing all the observations for which $FDI^{NF} > 0$ in the linear second stage by one over the conditional density of a regressor that is conditionally independent of unobservables in (7) and has strong support, encompassing the supports of the other variables. No assumptions need to be made on the functional form of equation (7). However, such a variable with strong support is not readily available.

and $\hat{\mu}_3$ from a probit regression of I^{NF} on **X**, Z and their within means and calculating the inverse Mills ratio

$\hat{\lambda}_{it} = \lambda\left(\phi(\mathbf{X}_{it}\hat{\beta}_3 + Z_{it}\hat{\delta}_3 + \bar{\mathbf{X}}_i\hat{\eta}_3 + \bar{Z}_i\hat{\mu}_3 + \tau_t)\big/\Phi(\mathbf{X}_{it}\hat{\beta}_3 + Z_{it}\hat{\delta}_3 + \bar{\mathbf{X}}_i\hat{\eta}_3 + \bar{Z}_i\hat{\mu}_3 + \tau_t)\right)$, where $\phi(\cdot)$ denotes the standard normal density function and $\Phi(\cdot)$ indicates the cumulative normal density function. Then, using the subsample for which $FDI^B > 0$ the following equation is estimated by 2SLS using as instruments Z and $\hat{\lambda}_{it}$ for $\ln FDI^B_{it}$ (adding $\hat{\lambda}_{it}$ to equations (5) and (7)):

$$\ln FDI^{NF}_{it} = \mathbf{X}_{it}\beta_1 + \ln FDI^B_{i,t-1}\gamma_1 + \hat{\lambda}_{it}\gamma_2 + c_{i1} + \tau_t + \varepsilon_{it} \tag{8}$$

Although the non-linearity of the Mills ratio allows the equation to be just identified in principle, in practise a second instrument is needed to avoid multicollinearity among the IVs. Z is therefore expanded to include at least one instrument determining banking FDI and a second instrument determining selection into positive non-financial FDI. A simple t-test on γ_2 provides a test for sample selection. For $\gamma_2 \neq 0$ a correction for sample selection is needed, which for the Heckman estimator is simply (8), using the result in Wooldridge (2002) that instrumenting $\ln FDI^B_{it}$ also corrects for non-random censoring in this variable. However, to deal with incidental truncation equation (8) requires further modification. Wooldridge (1995), suggests first estimating equation (7) and adding the collected Mills ratios to equation (5) in the following way, where $\tau_2 ... \tau_T$ are time dummies, together with the within means of the explanatory variables:

$$\ln FDI^{NF}_{it} = \mathbf{X}_{it}\beta_1 + \ln FDI^B_{i,t-1}\gamma_1 + c_i + \hat{\lambda}_{it}\gamma_{12} + \tau_2\hat{\lambda}_{it}\gamma_{22} + ... + \tau_T\hat{\lambda}_{it}\gamma_{T2} + \tau_t + \varepsilon_{it}.^{34} \tag{9}$$

The result is presented in Table D1. Column (a) reports the estimates of the first stage probit model (7) where the volume of banking FDI is replaced by an indicator dummy equal to 1 if banking FDI is positive. The variables that determine entry in foreign markets are two observed fixed effects (a measure of remoteness and distance to the home market), the distance weighted level of GDP in surrounding host markets and an indicator of high cost-of-entry host markets. So far the results suggest that non-financial FDI is on average of the horizontal variety, meaning that firms invest in host markets to jump trade costs. Such costs are higher for longer distances, predicting more FDI. On the other hand, countries with

[34] If the γ_{t2} are constant across *t* one can also simply include $\hat{\lambda}_{it}$ by itself.

limited internal access as measured by the average distance to a coast or waterway may make its market potential less accessible and less attractive. Surrounding market potential could affect the investment decision if multinationals potentially intend to use the host market as an export platform. High cost-of-entry host markets are defined following Helpman et al. (2008). This dummy takes on the value 1 if the number of days plus the number of legal procedures to start up a business are above the median. It is expected that these affect the fixed costs of entry positively and therefore predict less FDI.[35]

This is indeed what column (a) of Table D1 finds. Long and many entry procedures, inaccessible internal markets and distant or small surrounding markets lower the probability of non-financial FDI. Although non-financial FDI is always positive if banking FDI is positive, there is no clear evidence that banking FDI makes it more likely that a multinational invests in a new host market, suggesting that banking FDI provides more benefits for the variable costs of investment or expansion in existing markets. To correct for possible endogeneity and non-random censoring of banking FDI it is instrumented again with measures of financial liberalization but also includes the inverse Mills ratio. Column (c) reports the second stage where banking FDI is instrumented and controls are added for the extensive margin as suggested by Helpman et al. (2008), which is a polynomial expansion of the predicted probability to invest. These controls (not reported) are jointly significant as reported by an F-test. The Mills ratio is significant in the second stage, and cannot reject the null of endogenous sample selection of the Wooldridge (1995) test.[36] Equation (9) is therefore estimated with the results given in column (d). The yearly inverse Mills ratios are jointly highly significant, giving us a final estimate that a 10% permanent increase in banking FDI results in 6% higher equilibrium level of non-financial FDI. Compared to regression (f) of Table 6 which does not control for selection bias banking FDI is more important than trade liberalization and the short run positive effects of growth are not robust. Transitory shocks also affect FDI positively in the short run, but the estimate is less precisely estimated at only 90% confidence.

[35] The data is from Djankov et al. (2002) and only observed for 1999, although used in Helpman et al. (2008) to (successfully) determine trade in 1986. This paper also assumes that legal procedures do not change much over time. However, the indicator for the monetary costs to set up a business (as a percentage of GNI) is not used because these probably change much more over time. Other regulatory changes that might affect the decision to invest are unfortunately not available. Official equity market openness from Bekaert et al. (2007), for example, covers 54 countries since 1980, but Dutch FDI is non-zero in 99.5% of these observations, leaving too little variation.

[36] As an imperfect test for the exclusion of the selection variables from the second stage there is no evidence that they significantly predict the amount of non-financial FDI.

Table D1: Robustness to sample selection and incidental truncation

	(a) Probit	(b) 1st stage	(c) 2nd stage		(d) 2nd stage	
Dependent variable:	non-fin. FDI dummy (t-1)	ln home banking FDI (t-1)	Δ(1) ln non-fin. FDI		Δ(1) ln non-fin. FDI	
			long run	in Δ(1)	long run	in Δ(1)
home banking FDI dummy (t-2)	0.068					
	(0.047)					
ln home banking FDI (t-1) (instrumented)			**0.304*** (0.060)**	**0.135* (0.079)**	**0.267*** (0.069)**	**0.139 (0.084)**
ln non-financial FDI (t-1)			-0.486***	-0.065	-0.433***	-0.088*
			(0.077)	(0.042)	(0.086)	(0.045)
ln total population (t-1)	-0.355**	4.886**	-1.906***	-2.234	-1.622**	1.840
	(0.149)	(2.029)	(0.703)	(8.036)	(0.744)	(7.312)
Trade liberalization (t-1)	0.055**	-0.970**	0.199	-0.157	0.234	0.090
	(0.028)	(0.461)	(0.144)	(0.291)	(0.159)	(0.383)
ln GDP per capita (t-2)	-0.027	0.144	0.514***	0.467**	0.429**	0.357
	(0.029)	(0.493)	(0.176)	(0.188)	(0.173)	(0.217)
Real exchange rate (t-1)	0.031	0.336	-0.915**	0.160	-0.774*	0.297
	(0.060)	(0.837)	(0.434)	(0.458)	(0.419)	(0.453)
ln mean dist. to coast or river	-0.046***					
	(0.011)					
ln distance (km)	0.054					
	(0.049)					
ln GDP surrounding market potential(t-1)	0.605***					
	(0.214)					
Proc.+days to form business (= 1 if > median)	-0.061**					
	(0.029)					
Baking sector entry (t-1)		-0.199*				
		(0.109)				
Banking supervision (t-1)		0.214**				
		(0.105)				
Capital account transactions regarding fin. credits (t-1)		0.171				
		(0.112)				
Security markets (t-1)		0.545***				
		(0.185)				
Inverse Mills ratio (t-1)		**-0.444**	**-4.811***	**-1.231**		
		(0.541)	**(1.543)**	**(2.569)**		
F test for joint sign. of controls for extensive margin			3.50***		2.14*	
F test for joint sign. of yearly inverse Mills ratios					128.64***	
including within means of RHS variables	yes	no	no		no	
Observations (1;0)	2036;215	720	595		595	
R-squared, pseudo in (a)	0.426	0.582	0.320		0.388	
Number of countries	131	51	49		49	
Cragg-Donald F-stat.		16.37				
Robust test of OIR (p-value)			0.767		0.829	

Standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year and country effects and constant term included in all models. Column (a) are marginal effects. Excluded instruments in italics. Controls for extensive margin: predicted outcome of column (a), its square and its cube.

Appendix E: Sector-specific effects of banking on FDI

This Section repeats the main specification of Section 6 for the effect of (instrumented) banking FDI on long run non-financial investment, where the dependent variable is split by sector. The dependent variable therefore becomes a column vector of 13 stacked sectors by 52x18 country-years. Controlling for year, sector, country and sector-year fixed effects regression (a) shows the average positive and significant effect of banking FDI on non-financial FDI.[37] Column (b) interacts the banking FDI variable with the sector dummies and shows that most sectors benefit significantly from banking FDI. In addition, columns (c) and (d) show the effect on the extensive margin using entry procedures interacted with the sector dummies as excluded instruments and a test for sample selection bias, respectively. The ranking of sectors is different for the extensive margin and there is no evidence for selection bias.

Table E1: Which sectors benefit most from banking FDI?

	(a)	(b)	(d) 1st stage probit marginal effects		(e) 2nd stage
Dependent variable:	ln sector FDI	ln sector FDI	sector FDI dummy		ln sector FDI
ln home banking FDI, instrumented (t-1)	0.280*				
	(0.143)				
Interactions (column variable * row sector dummy):		*ln home banking FDI (instr.)*	*I: home banking FDI dummy (instr.)*	*Procedures + days*	*ln home banking FDI (instr.)*
Real estate		0.492***	0.186***	-0.001	0.392**
		(0.172)	(0.054)	(0.001)	(0.157)
Transportation and communication		0.403***	0.089*	-0.001**	0.267*
		(0.142)	(0.053)	(0.001)	(0.154)
Utilities		0.312	-0.152***	0.000	0.201
		(0.248)	(0.056)	(0.000)	(0.207)
Retail		0.307*	0.121**	-0.001	0.306*
		(0.166)	(0.056)	(0.001)	(0.162)
Machines, electronics, automotive		0.301*	0.279***	-0.000	0.292*
		(0.180)	(0.054)	(0.001)	(0.167)
Business services, other services		0.288*	0.127**	-0.000	0.148
		(0.173)	(0.050)	(0.001)	(0.157)
Other manufacturing (paper, textile, medical, furniture)		0.273*	0.075	-0.002***	0.165
		(0.166)	(0.052)	(0.000)	(0.152)
Chemicals, rubber, plastics		0.244*	0.281***	-0.000	0.199
		(0.147)	(0.050)	(0.001)	(0.128)
Natural resources extraction and refining		0.183	0.071	-0.000	0.176
		(0.164)	(0.052)	(0.001)	(0.161)
Construction, installation		0.128	0.009	-0.000	-0.034

[37] The standard errors are clustered on countries, years and sectors. Non-nested clustering is possible following the procedure by Cameron et al. (2010).

		(0.186)	(0.050)	(0.001)	(0.173)
Food processing, beverages, tobacco		0.111	0.143***	0.001	0.064
		(0.188)	(0.054)	(0.001)	(0.179)
Private agents		-0.036	0.020	-0.000	-0.102
		(0.236)	(0.052)	(0.000)	(0.213)
Agriculture, fisheries		-0.224	-0.117**	0.000	-0.368**
		(0.165)	(0.052)	(0.000)	(0.177)
Inverse Mills ratio					-3.266
					(2.008)
Predicted prob. I>0					-1.366
					(1.222)
(Predicted prob. I>0)^2					0.504**
					(0.212)
(Predicted prob. I>0)^3					-0.053***
					(0.016)
ln total population	-1.208*	-1.299*	-0.259*		-1.707**
	(0.661)	(0.671)	(0.154)		(0.815)
Trade liberalization	-0.283	-0.299	-0.007		-0.226
	(0.421)	(0.413)	(0.029)		(0.343)
ln GDP per capita (t-1)	0.283	0.312	0.058**		0.319
	(0.382)	(0.379)	(0.023)		(0.376)
Real exchange rate	0.243	0.231	0.003		0.129
	(0.624)	(0.626)	(0.029)		(0.638)
Institutions, 5 year initial	0.025	0.024	0.002		0.015
	(0.018)	(0.019)	(0.003)		(0.019)
Observations	5860	5860	22269		5860
(countries, sectors, years)	(52,13,18)	(52,13,18)	(106,13,19)		(52,13,18)
Adj. R-squared	0.659	0.669	0.545		0.677

Regressions include a constant, year, sector, country and sector-year effects. Standard errors clustered on year, sector and country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The variables *ln third-country foreign banking assets (excl. local currency)*, *ln host banking assets*, and *ln home lending, foreign currency* were not significant in regression (b).

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