Do global banks facilitate foreign direct investment?

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Abstract

The pre-crisis wave of globalization in finance led to the rise of global banks. Are these in times of crisis merely costly liabilities to the countries that supervise them, or is their global reach also beneficial for the real economy and for FDI in particular? The recent literature has focused on the risks, emphasizing transmission of shocks from one country to many countries. However, if global banks make foreign investment easier for firms from the same origin country, then global banks also provide a source of comparative advantage for their home countries. Through foreign branches and subsidiaries, banks can offer services in many different countries. This paper hypothesize that this has made investing abroad easier and more successful for their home-market clients. Using a new detailed data set of outward FDI and exploiting heterogeneity in banking sector deregulation across countries and time, this paper finds that banks' direct investment abroad increased the volume of non-financial FDI from the same home-market. This effect is stronger in countries where investing is more hazardous, those with worse corruption and rule of law. Importantly, we do not find that host-market domestic or third-country foreign banks facilitate FDI.

Keywords: outward FDI, banks, asymmetric information, panel non-stationarity
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1 Introduction

The pre-crisis wave of globalization in finance led to the rise of global banks. Are these in times of crisis merely costly liabilities to the countries that supervise them, or is their global reach also beneficial for the real economy? Through their foreign branches and subsidiaries, they can offer services to their home market clients in many different countries.[1] We hypothesize that this has made investing abroad easier and more successful, resulting in a larger volume of outward FDI.

Recent literature has emphasized the risks of financial globalization, through which shocks are transmitted from one country to many countries (i.e.: Cetorelli and Goldberg (2012); Kalemli-Ozcan et al. (2013ab). The recent crisis has also turned public opinion against too-big-to-fail multinational banks, because saving them has turned out to be costly for taxpayers. However, this paper argues that one undervalued benefit of large international banks is their role in facilitating direct 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 information asymmetry and foreign market frictions. Retrenchment of banks will thus have real costs. For example, Hale (2012) shows the importance of banking networks to overcome home bias in investment, which itself can be rationalized by information asymmetry.[2] International banks decrease information asymmetry and thereby lower barriers to invest abroad. Moreover, openness to foreign banks develops financial markets in host countries. In turn, this improves the efficiency of FDI by creating more backward linkages (Alfaro et al., 2010), making FDI more profitable. Because local financial frictions and host market risk affect the capital structure and constrain investment decisions of multinationals (Desai et al. 2004; 2008), they may well benefit from improved intermediation through increased banking FDI. This may explain why foreign firms tend to use foreign banks (Gianetti and Ongena, 2012).

This paper provides, to the best of our knowledge, the first evidence that the presence of foreign banks subsequently boosts foreign direct investment by non-financial firms. This paper documents that the pre-crisis increase in banking FDI – as predicted by heterogeneity in banking sector deregulation across countries and time – subsequently increased non-financial FDI. This is a novel addition to the conventional notion that

[1] Milesi-Ferretti and Tille (2011) document the growth of international banking before 2007.

[2] See Veldkamp and Van Nieuwerburgh (2009) for a model on home bias and information asymmetry.

banks follow customers abroad (i.e. Goldberg and Grosse, 1994).[3] Banks may indeed first enter a foreign market in the wake of one of their clients, but once the bank has entered, its services may attract other firms. Once having a presence abroad, it therefore makes sense for one particular bank out of many such banks – HSBC – to advertise as '*the world's local bank*' and claim that they can '*connect your business to new opportunities on six continents*'. Arguably, the latter would be quite a feat for a manufacturer on its own.

In order to test the hypothesis, data is required that separately identifies banking FDI and non-financial FDI and has enough variation across years and host countries. Usually such data is confidential or plagued by missing and suppressed observations. Through access at the central bank of The Netherlands (DNB), this paper employs a new dataset of outward FDI from The Netherlands, which not only covers many more countries and years than similar publicly available data for the US, but also uniquely allows us to separate banking FDI from non-financial FDI. For example, the foreign positions of US multinationals as collected by the US Bureau of Economic Analysis, is mostly based on *surveys* and not publicly available. That implies many more missing or suppressed observations, which would severely limit the analysis. Moreover, the DNB data allow us to exclude from the analysis other financial FDI such as financial holding and letter box companies, which purely for tax reasons register in The Netherlands. The data represent the *population* of outward FDI and cover 19 years (1984-2002) and 190 host countries. Dutch FDI represents almost 6% of world FDI, ranking fifth after the US (which represents 18%) according to UNCTAD (2008).

Our empirical strategy first establishes that outward FDI is non-stationary and integrated of order 1, which allows us to separate equilibrium from short-run effects. We then show that (lagged) banking FDI predicts non-financial FDI, conditional on fixed year and country effects and a range of control variables including the volume of lending. Next, we use a recently compiled dataset by Abiad et al. (2010) on the deregulation of the banking sector across years and countries along several dimensions of regulation, as an instrument set – conditional on other reforms and determinants of FDI – for banking FDI. IV regressions support the main finding that banking FDI predicts non-financial FDI. A one standard deviation permanent increase in the stock of banking FDI (of about 60%) increases the long-run equilibrium level of non-financial FDI by up to 19%. An independent second instrument from Golub (2009) on barriers to foreign entry in the banking sector for

[3] More recent research finds that banks, just like other firms, are sensitive to distance and local market potential in host countries and do not necessarily follow customers (Focarelli and Pozzolo, 2008).

OECD countries confirms the main finding. The paper then establishes that the effect is much stronger in countries with weak institutions where information asymmetry is larger and investing is more hazardous, but that the same does not hold true for the extend of third-country banks in the host-country, which could have provided a substitute for home country bank services.

Taken at face value, the implication for policy makers is that countries and firms benefit from internationalization of their banking sector. However, the presence of home-country banks in host countries is a novel but not the only determinant of FDI. Moreover, a welfare assessment will have to weigh the possible financial risks – such as those related to contagion – against the real benefits of an international banking system found in this paper.

The paper is structured as follows. Section 2 discusses the literature and Section 3 the data. Section 4 describes the estimation strategy. In Section 5 we perform preliminary regressions, separate equilibrium from short-run effects and instrument banking FDI. Section 6 presents extensions which explore heterogeneity in terms of bank nationality, institutions and sector-specific effects. Section 7 concludes.

2 Related Literature

This paper relates to several strands of literature. First, to explain the pattern of foreign direct investment across countries, models of FDI have mostly focussed on gravity models of market potential, and the spatial organization between parent firms and affiliates in which local production cost advantages are traded off with transportation costs.[4] More recently, the evidence suggests that only the most productive firms can successfully expand abroad on their own while less productive firms serve domestic markets (i.e. Helpman et al., 2008). This view has also been applied to model the cross-border activities of international banks (Buch and Lipponer, 2007; Niepmann, 2013). However, fewer models have considered uncertainty and information

[4] 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). 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).

asymmetry and the potential costly search for suitable affiliates directly (Grossman and Helpman, 2002). Although the multinational initiates the search for affiliates based on technological requirements it cannot easily assess other dimensions of the target firm necessary for successful investment, such as financial soundness, corporate governance and valuation of the target firm.[5] The spread of FDI across countries with various institutions implies that multinationals have to deal with varying degrees of investor protection and market frictions. 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. They may thereby increase the size and quality of the pool of potential affiliates and widen the range of firms who are productive enough to invest abroad. Distance-related agency and informational costs are very substantial for non-financial multinationals as suggested by the fact that even banks face these costs (Mian, 2006). In Beck (2002), information asymmetry and search costs are some of the main reasons for financial intermediation. These can have large effects on investment decisions. Also, Antràs et al. (2009) suggest that 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. However, unless the multinational's activities are very specialized, banks may well be better at monitoring. This paper adds to this literature by considering the potential beneficial role of banks. Also, we relax the common assumption that FDI across years is independent (i.e. Blonigen et al., 2007) by testing and allowing for non-stationarity.

Second, the banking literature has mostly focused on the implications of bank globalization for host countries (Goldberg, 2009). The main areas of research have been the transmission of shocks, financial sector technology spillovers (which improve the efficiency of host-country 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. Home banking sector shocks also affect outward FDI directly: Klein et al. (2002) show that firms initiate fewer FDI projects if their home bank is in distress. We add to this literature by investigating whether banking FDI increases the foreign investment opportunities of firms, and thereby increases non-financial FDI. Bank-firm relationships may increase such opportunities. The literature explains

[5] Neary (2009) notes that mergers and acquisitions constitute by far the largest part of the value of foreign direct investment.

firm-bank relationships (such as repeated lending) by the opportunity to exploit a soft information advantage over other banks (Boot, 2000; Degryse and Van Cayseele, 2000).[6] This implies that banks know a lot about their clients, their sectors and markets, and about their investment opportunities abroad. This flow of information can bridge the institutional distance between home and host countries.[7] The effective collection of soft information is harder at greater distances (Petersen and Rajan, 2002), which implies that banks' local presence by means of subsidiaries and branches (through FDI) should be more important than the volume of arm's length cross-border lending which tends to rely on easily collected hard information. While margins on competitive lending are small (at least for large companies), (universal) banks can package loans with more profitable fee generating services (de la Torre et al., 2010), such as those relating to FDI. For example, one large Dutch multinational bank states on its website:

"*Our international network provides more than financial services. Through our contacts with local Chambers of Commerce, embassies, consulates, local governments and legal agencies we make sure our Dutch clients are introduced to the right networks. Which means we provide expertise not just on legal and tax issues, but also on laws and regulations, local developments, economic data and funding opportunities*".[8]

These services may be strategic complements to lending (in the sense of Spence (1976)), and can increases the expected return on the bank's loan portfolio to parent firms. Domestic host-country banks also collect soft

[6] Soft information is proprietary and creates the possibility to extract rents. Conversely, so called hard information is freely available and does not require a relationship with a firm.

[7] For example, Berger et al. (2001) find that South American foreign banks are more likely to lend to small Argentine businesses than other foreign banks.

[8] http://www.rabobank.com/content/products_services/business_clients/International_Dutch_Business_Clients/index.jsp Another advertises: "*International business can be complicated business. There's currency fluctuation, M&A valuation, local legislation […]. So why make it even more complicated by working with multiple banks?" and: "As a multinational company you have complex banking needs. You want […] A bank that understands your business, your markets and your goals. […] If you are a multinational, you will be assigned a local relationship manager in each major region in which you operate.*" (http://www.ingcommercialbanking.com/bottomline) A third multinational bank targets domestic clients directly on its international site: "*Commercial & Merchant Banking offers customised financial advice and solutions to Netherlands-based companies and their international operations. Its client base includes business start-ups, established SMEs and larger corporate clients*" (http://www.abnamro.com/en/clients/commercial-merchant-banking/index.html).

information, as do other foreign banks. However, because the information is proprietary, it may not be shared as easily with the acquiring firm because domestic and other foreign banks are less likely to have a banking relationship with the *parent* firm. This may explain why foreign firms tend to use foreign banks (Gianetti and Ongena, 2012). If this is the case, then we should find that *home* banks, if they have a local presence through FDI, have an advantage over domestic and other banks and should therefore have a more significant effect on non-financial FDI from the same origin country.

Third, a related literature stresses the benefits of general financial development, which is partly driven by financial sector technology spillovers from foreign banks (Goldberg, 2009). Financial development, in turn, improves opportunities for FDI. 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). Although the evidence on direct growth effects of foreign direct investment is mixed, it has positive effects on investment.[9] Alfaro et al. (2004) show that FDI has only a positive effect on growth in combination with a higher level of financial development. 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. Foreign affiliates then depend heavily on the multinational's internal capital market for their financing. Banks which are familiar with the parent firm's operations *and* local imperfections in the host-country external capital market may be able to help arrange financing in the most efficient way.[10] This paper aims to add to the literature by shifting the focus to the benefits of multinational banking to other international firms, motivated by the premise that countries benefit from FDI.

3 Data

3.1 Foreign direct investment

Since publicly available FDI data sets either have large gaps in them for reasons of confidentiality or includes only aggregate data, this paper uses a new dataset on outward FDI from the Netherlands collected by the

[9] Javorcik (2004) for example finds compelling evidence of positive productivity spillovers of FDI on local firms.

[10] Another related literature investigates how non-bank intermediaries facilitate international trade (Ahn et al., 2011).

central bank, which is also the supervisory authority. This dataset benefits from all firms being legally required to report their current-account transactions, including foreign investment flows and positions, stating the balance sheet current value of FDI stocks and flows. The main reason to choose this data source is that the widely-used alternative, the foreign positions of US multinationals as collected by the US Bureau of Economic Analysis (BEA), is mostly based on *surveys* and not publicly available. That implies many more missing or suppressed observations, which would severely limit the analysis.[11] Dutch aggregate FDI and disaggregated FDI data for several broad sectors and large host countries are available through the central bank's website.[12] At a more detailed level, the data is confidential and accessible by permission. Home banking FDI is defined as the stock of outward FDI by Dutch resident banks (where inter-company loans and deposits are netted out) for which the supervisory authority is also Dutch in each host country. Non-financial FDI is defined as the stock of total Dutch outward FDI net of banking FDI, and net of insurance companies and pension funds, other financial institutions including financial holding companies and letter box companies, bourses and brokers. By aggregating sectors into non-financial FDI, we initially focus on the average effect of foreign banking. Section 6 explores the effect of banking FDI on sector-level non-financial FDI, which leads to very similar results. Non-financial FDI covers 190 host countries for the years 1984 to 2002 for the whole population of affiliates of multinationals; and 71 countries received banking FDI between 1984 and 2002. Unfortunately, since the method of reporting changed in 2003 which still results in major revisions, the available 2003-2011 data is not reliable.[13] Also data on the degree of banking sector regulation, which is observed up to 2005, limits the available time span (see further down).

[11] The BEA conducts a census every five years, but uses smaller surveys for the years in between and extrapolates data for the firms that are not sampled. Moreover, the data is on a historical cost basis, and not at current costs. See Mataloni (1995) for further details on the latest data collection method.

[12] http://www.statistics.dnb.nl/en/balance-of-payents-and-international-investment-positions/index.jsp

[13] Before this date, all data was reported through the banking system, since banks 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 smaller sample covering major investments.

Five of these firms were among the 100 largest non-financial multinationals in the world in 2002 by foreign assets.[14] Dutch FDI represented 6% of world FDI in 2007 (driven by a persistent current account surplus), 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.

3.2 Deregulation of the banking sector

Our identification strategy requires us to be able to predict banking FDI in a way that is unrelated to non-financial FDI directly. Abiad et al. (2010) have collected detailed data on the degree of banking sector regulation along several dimensions. Since these are specific to the banking sector, these should not affect non-financial FDI directly other than through banking, while controlling for other market reforms. Other important market reforms that we are able to control for are trade liberalization (from Wacziarg and Welch, 2008) and the level of institutions (from the International Country Risk Guide, 2006).

The banking sector was up until the 1980s and1990s one of the most widely-regulated sectors, with common state ownership, entry restrictions, and capital flow and interest rate regulations in place. The database tracks and grades actual policy changes that affected the banking sector-specifically, in 91 countries between 1973 and 2005 in integer steps between zero and three on several dimensions, three being fully liberalized. These are: credit controls and reserve requirements, credit ceilings, interest rates, banking sector entry, capital account transactions, privatization of banks, securities markets and banking sector supervision.

Four of these stand out for the purpose of this paper. In particular, *Lower entry barriers/pro-competition measures* (with the weight of sub-components in brackets) reaches a maximum with majority foreign ownership of domestic banks (2/5), free entry of new domestic banks (1/5), no 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

[14] 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)

system is unified (1/3), foreign borrowing by banks is unrestricted (1/3), and 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), and supervision covering all banks (1/6). The liberalization of *securities 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 bonds, equity, and derivatives markets, including deregulated institutional investors. A further two-fifths of the score can be achieved by allowing majority foreign ownership. The first component of the securities markets variable will mostly affect portfolio investment, although the latter component will also affect the outcome variable and is therefore not our best instrument. Identification of the effect does however not depend on this variable. The analysis will experiment allowing the securities markets variable to affect the outcome directly as well. Unfortunately, they do not publish the sub-components separately. However, Abiad et al. (2010) note that in many low income countries information about foreign ownership restrictions was not available and values were imputed based on the level of the first component's development.

A second dataset by Golub (2009) focuses on the *de facto* liberalization of each *service* sector for FDI, for a sample of OECD countries. This database offers a second independent assessment of regulation and allows us to control for changes in entry restrictions in non-financial service sectors that may accompany reforms in the banking sector.

3.3 Alternative measures of the extend of foreign banking

Banking services in host countries can be offered by home country banks with a presence in the host-country, by purely domestic host-country banks, and by third-country banks. Our main measure of the former is Dutch banking sector FDI: the balance sheet value of direct investment in branches and subsidiaries. Ideally, we would also like to be able to measure the extend of lending done by these banks in the host market, and the volume of cross-border loans, as an alternative measure of the extend of banking operations in the host market. The value of FDI and the volume of lending should both be positively correlated to the amount of soft and hard information collected by banks. This is partly available from DNB which collects data for reporting

to the banking statistics of the Bank for International Settlements (BIS). We can distinguish between so called international claims (which consists of cross-border lending by consolidated home-country resident banks and local lending in foreign currency by their affiliates), and the volume of local lending in the local currency by Dutch banks' affiliates. The latter is only available for developed countries from 2002.[15] Therefore, to construct local lending in local currency for the remaining years in BIS-reporting countries, we calculate the ratio of lending to banking FDI in 2002 for each country, and use this ratio and banking FDI to construct lending in other years.

Next, we need information on the size of the host-country domestic banking sector and the extend of third-country banking in the host market. Both these groups of banks may be perfect substitutes for banking services offered by home country banks since they also lend and collect information. Unfortunately, a full set of bilateral banking sector FDI statistics for all countries and years does not exist. Our main source of information is Micco et al. (2007) who collected annual data between 1995 and 2005 on the volume of banking assets and the share which is held by foreign and domestic banks for a large number of developed and developing countries.[16] Their main data source is Bankscope augmented with individual annual reports to track ownership over time.[17] To construct the share of third-country foreign banking in destination countries we subtract all local lending in local currency in the host country by Dutch banks' affiliates from the total of foreign assets from Micco et al. (2007).

Control variables, such as overall financial development, come from a variety of standard sources as specified in detail in Appendix A.

[15] Reporting to the BIS on lending in other BIS-reporting countries was not required before this date. The affected countries are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, United States.

[16] The foreign share of assets in a country is based on the actual fraction of shares owned by shareholders in the foreign country.

[17] Unfortunately, the total balance sheet of a bank as reported in Bankscope measures only the volume of loans, but not the country where these loans are outstanding (McGuire and Tarashev, 2008). We assume that most of these are outstanding in the resident country of the bank in question.

3.4 Descriptive statistics

The top five destination countries for Dutch 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. Both show a remarkably similar trend. FDI has grown rapidly in terms of overall volume and number of destination countries. By 2002 Dutch firms had invested in almost every country in the world for a total volume of 250 billion dollars, over four times as much as in 1984. Banks were present in about 60 countries by 2002, many of which are developing countries, as listed in Appendix A, Table A2, and not obvious host markets for lending.

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.

Deregulation of the banking sector has taken off in the 90s as shown in Figure 3 and is similar to the pattern for banking FDI in Figure 2. On average, regulation changed form an index levels of less than 1 (heavily regulated) in 1973 to a level of 2.5 (liberalized) by 2005 on a scale of 0 to 3. Even so, Table 2 shows that there is still substantial heterogeneity in regulation across countries by 2005.

The extend of non-Dutch foreign banking has on average increased from 20% of the banking sector in 1995 to 30% of the banking sector in 2002, as shown in Figure 4. Local lending in host countries by Dutch banks has followed this trend and comprises on average 1.2% of total banking assets in 2002. These trends also mask variation at the country-year level as reported in Table 3. The largest banking sector in 2002 is the United States with over ten trillion dollars in assets (=exp(16.15)). The share of the banking sector which is domestic ranges from almost 100% to as little as 1%. On average, the foreign market penetration by banks amounts to 22% of the banking sector, but with a large standard deviation. The volume of banking assets is much larger than the value of FDI; where Dutch FDI is 4 billion at most, local lending reaches 221 billion.

4 Econometric specification

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

$$NFDI_{it} = \mathbf{X}_{it}\beta + BANKFDI_{i,t-1}\gamma + c_i + \tau_t + v_{it} \quad (1)$$

where $NFDI_{it}$ is the log of the stock of outward non-financial FDI in year *t* to host-country *i*, $BANKFDI_{i,t-1}$ 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, which can be interpreted as an elasticity. If $\gamma > 0$, then banking FDI predicts an increase in non-financial FDI. The matrix **X** contains a constant and a set of exogenous regressors such as market potential. We additionally control for banking crises, the real exchange rate, financial development, FDI from other countries, trade liberalization, human capital, free trade agreements, government share of GDP, and institutions. The c_i are country fixed effects which may be correlated with the **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 capturing global shocks. We always cluster the standard errors at the country level.

We extend the model in several ways. First, in order to test for which form of foreign market presence by home-country banks matters most, we add the volume of local lending and the volume of international claims. The latter requires relatively more hard information and, if not significant, helps to shed light on why banking FDI may promote non-financial FDI. If only bank FDI is significant, then soft information is a better explanation, pointing in the direction of information asymmetry as a potential obstacle to FDI. Second, in Section 6 we test for bank nationality (by including measures of domestic and third-country banking, which may each substitute for home-country banking services), for institutional effects (by interacting banking FDI with institutional risk factors, which allows differential effects for more difficult host markets), and for sector-heterogeneity (by reshaping the data to a panel of sectors).

There are several potential issues with estimating equation (1), which we will all address explicitly. These are: endogeneity of banking FDI, non-stationarity of FDI, and 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, is the main reason we instrument banking FDI. Our preferred instrument, from Abiad et al. (2010), captures changes in regulation that determine the growth of banking FDI across countries in hitherto heavily restricted banking sectors. These are specific to banking, and should not affect non-financial FDI, other than through banks.

Recent studies do not explicitly take into account the upward trend in FDI observed in Figures 1 and 2. These 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 determinants of US outward FDI stocks and affiliate sales between 1989 and 1999. 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 across 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) do not allow for cross-sectional dependence and treat each host-country as an independent destination, and are thus susceptible to a similar critique.

Simple OLS on the levels of FDI may lead to spurious estimates if the variables are non-stationary. Testing for non-stationarity and for cointegration is therefore necessary. In Appendix B we establish that the variables are non-stationary, but also cointegrated. Because the variables follow a common trend, the equation of interest can be estimated in error-correction form, adding lags for the equilibrium effects, and first differences for the short-run effects:

$$\begin{aligned}\Delta NFDI_{it} &= \xi[NFDI_{i,t-1} - \mathbf{X}_{i,t-1}\beta - BANKFDI_{i,t-2}\gamma] \\ &+\Delta NFDI_{i,t-1}\kappa_1 + \Delta\mathbf{X}_{i,t-1}\kappa_2 + \Delta BANKFDI_{i,t-2}\omega + c_i + \tau_t + v_{it}\end{aligned} \tag{2}$$

In equation (2), the error-correction coefficient $\xi < 0$ captures the rate of convergence to steady state, γ captures the equilibrium effect of banking FDI on NFDI (which occurs at a rate of ξ per period), and ω the short run effect. In other words, a 1% increase in banking FDI leads to an ω-percent increase in non-financial FDI if the shock is temporary, and to an increase of γ-percent if the shock is permanent.

Models of FDI predict that distance, host market potential 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 test for cross-sectional dependence, equations (1) and (2) are augmented with a spatial lag of the dependent variable, $NFDI_{it}\mathbf{W}\rho_1$, where the matrix **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 maximum likelihood instead of OLS, as explained in more detail in Appendix C.

In further results available on request (Appendix D) we deal with several additional potential sources of bias. These are: left censoring of the dependent variable and possible sample selection bias ('zeros in FDI'); left censoring of the main explanatory variable which could be non-random with respect to the equation of interest, and the possibility that the panel is unbalanced due to endogenous entry and exit. None of these affect the main results of the paper.

5 The effect of banking FDI on non-financial FDI

5.1 Preliminary results

Table 4 presents the preliminary regression results. We start in column (a) with a regression of non-financial FDI on standard determinants of FDI. Market potential and trade liberalization boost FDI, as do free trade agreements and low taxes as proxied by a small government.[18] The spatial lags in the dependent variable and

[18] Because data on *effective* corporate tax rates is not available we use government spending as a share of GDP as a proxy.

in market potential are not significant, which may imply that spatial effects are absorbed by the country fixed effects. In column (b) we add banking FDI and estimate equation (1) for the same sample. The result is that lagged banking FDI has a significant and positive effect on the subsequent level of non-financial FDI. Moreover, there are no other qualitative differences between regressions (a) and (b). General financial development does not benefit FDI, suggesting that the size of the financial sector does not matter *per se*. 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 equilibrium effects on FDI can be deduced. In appendix B we formally test for a unit root in each variable, and test for co-integration. We conclude from this exercise that all variable are I(1), and that the panel is co-integrated. This means that regression (a) of Table 4 can be treated as co-integrated, representing a relationship that is stable over time and thus allowing the coefficients to be interpreted as the equilibrium, or 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) – which is here estimated with ML.[19]

Column (b) in Table 4 adds first-differenced leads and lags of the independent variables to equation (1). This results (for a smaller sample) in a slightly larger effect of banking FDI and the estimated effect of some control variables changes precision. Local market potential, trade liberalization, and free trade agreements attract FDI. Together with the insignificant spatial lag this suggests that non-financial FDI is on average horizontal in nature, where firms seek out the best market. 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

[19] 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. $T \leq 25$).

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.

Overall, controlling for the time-series properties of the data and cross-sectional dependence does not affect the main result that banking FDI significantly predicts a subsequent increase in non-financial FDI.

5.2 Panel error-correction estimates: separating equilibrium from short-run effects

The properties of the data allow us to estimate both the short- and long-run dynamics of the panel error-correction model (equation 2). In addition, we control for several other potential determinants of FDI. The results are reported in Table 5.

The error-correction coefficient ξ is always 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 capita are statistically significant. For example, trade liberalization has no immediate effect on FDI, although it raises the equilibrium volume of FDI, while a one percent positive shock to income boosts FDI by 0.5% the next year and, if permanent, raises the equilibrium volume of FDI by 0.651/0.418 = 1.6%. In column (a) we also examine whether banking FDI picks up general positive effects from financial development, but this is not the case. In column (b) we further test for the effects of total trade as a percentage of GDP and the stock of FDI from the rest of the world as proxied by the cumulative inflow of FDI since 1980.[20] Neither are significant while the effects of trade liberalization and banking FDI are still significant determinants of FDI. Columns (c) and (d) furthermore control for the volume of lending by home-country banks 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., 2011) as shown by regession (e).

[20] 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.

This implies that it is less likely that firms need banks for local financing in foreign markets, and that soft knowledge (collected through branches) rather than hard knowledge (collected for international lending) that benefits FDI. None of the additional tests yield significant 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%.[21] [22] Moreover, long-run effects are larger and more significant than short-run effects. Banks provide benefits for non-financial firms, but only after banks have been present in the host-country for some time. This also suggests that information collection, which takes time, is part of the explanation.

5.3 Predicting banking FDI with banking sector regulation

The fact that banks specialize in screening and monitoring their clients suggests that they have insider information about multinationals' plans for international expansion, and 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 product and services locally and simply react to unobserved improvements in the investment climate or market potential. Banking FDI therefore has to be instrumented. This section finds that the main effect is robust across several instrumental variable strategies.

Banks investing in the US during the 1980s were partly following their clients and partly responding to fewer entry restrictions, according to Goldberg and Grosse (1994). More recently, banking FDI has responded strongly to liberalization of the banking sector (such as in Latin America during the 1990s), and after local crises required recapitalization of the banking sector. Recapitalization was partly done through allowing entry of foreign banks (Goldberg, 2009). This is also reflected in the data by the jump in destination countries for Dutch banks after 1990 and 1995 (see Figure 2). Sometimes, foreign banks were already present before

[21] =60*0.069/0.418. The results are robust to excluding Barbados, Hong-Kong, Panama and Singapore, which are defined as offshore centres by the Bank for International Settlements.

[22] The list of countries included is provided in Appendix A, Table A2.

regulation became tighter and they could only expand again after later liberalization.[23] This suggests that changes in banking sector regulation should successfully predict entry (the extensive margin) and *expansion* of foreign banks (the intensive margin).

The changes in regulation by year and country are available from Abiad et al. (2010). Because these reforms are specific to the banking sector, they should not affect the outcome directly. For example, allowing banks to borrow abroad or improved banking supervision has nothing to do with FDI in any other sector. However, there is a concern that such reforms may have resulted from wider World Bank or IMF led reforms which may simultaneously make a country more attractive to non-financial FDI. The IV regressions will therefor explicitly control for systemic banking crises (from Laeven and Valencia, 2008) which were often accompanied by substantial recessions and IMF-led reforms affecting both banking and non-financial FDI. Moreover, the regressions will always control for 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.[24]

Although Abiad et al. (2010) have collected various dimensions of regulation, we find that not all of these turn out to predict banking FDI as well as others. Because inclusion of weak instruments biases the results (Stock and Yogo, 2005), we select the four best predictors of banking FDI. The regressions therefore focus on four measures of financial reform that stand out for the purpose of predicting banking FDI and the services that banks offer to multinationals.[25]

The result is reported in Table 6. Column (a) reports the first stage where banking FDI is instrumented with: liberalized capital account transactions regarding financial credits, imporved banking supervision, and liberalized securities markets. We control for trade liberalization, institutions, and systemic banking crises. All

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

[24] In addition, the data show no correlation between reforms of entry barriers or supervision and trade liberalization events. Reform of capital account transactions and securities markets correlate positively with trade liberalization, but tend to *lag* trade liberalization by several years, implying that it is sufficient to control for an indicator of trade liberalization.

[25] Other measures such as interest rate liberalization, credit controls and privatization were also tested but these were not significant, even if combined into a single index of financial reform.

the instruments have the expected sign and liberalized capital accounts and developed securities markets are most significant. While free entry of banks allows also foreign banks to invest, it also increases competition from domestic banks in the banking sector, which may cause banks to invest less on average. Because this variable also correlates with non-financial FDI we include it in both stages. The Cragg-Donald F-statistic (which is much higher than the rule of thumb of 10) suggests that the instruments are strong; the IV estimate has less than 5% bias relative to the un-instrumented case. The second stage error-correction representation in column (b) confirms the statistically significant effect of banking FDI on non-financial FDI. The robust overidentifying restrictions test cannot reject that there is no correlation between the instruments and the second stage error, supporting the IV specification. The estimate corresponds to up to a 19% increase in the volume of FDI after a permanent one standard deviation increase in banking FDI. One might expect a positive correlation between banking FDI and unobserved components affecting non-financial FDI which would bias the OLS estimate upwards. On the other hand, since the book value of banking FDI is a proxy for the value of bank services to parent firms, measurement error may bias the OLS estimate *downwards*.[26] Moreover, a second source of downward bias in the OLS estimate arises from possibly heterogenous treatment effects. This may happen if the instrument of banking sector reforms assigns more 'treatment' of banking FDI to countries with otherwise relatively higher costs of investment for foreign banks. Such countries are likely those with substantial banking sector reforms. If for example corruption or institutional differences (which are controlled for) remain large in these (developing) countries then the benefits of banking services may be higher than in industrialised countries. The IV estimate will then represent the local average treatment effect, suggests that IV estimators based on removing investment costs for banks will yield estimated returns to banking FDI above the average marginal return to banking FDI in the population.[27] Section 6 will look explicitly at heterogeneous effects in more detail and conclude that the effect of banking FDI depends on the

[26] For example, let V_{it}^0 represents the observed value of banking services as measured by banking FDI, and V_{it} the true value of bank services relevant for FDI, which differ by a zero mean, variance σ_ε^2, error ε_{it} that is uncorrelated with FDI. Then the probability limit of the OLS estimate will be multiplied by a factor $R_0 = \text{cov}[V_{it}^0, V_{it}] / \text{var}[V_{it}^0]$. If measurement error is orthogonal to the true value of bank services, then $R_0 = \text{var}[V_{it}] / (\text{var}[V_{it}] + \sigma_\varepsilon^2) < 1$, and the OLS estimate will be downward biased (Card, 2001).

[27] See Card (2001) for a similar line of reasoning in the context of the returns to schooling.

institutional characteristics of countries, and that controlling for sectors-specific effects does not affect the main result.

Nevertheless, to address concern that the quality of institutions and trade liberalization insufficiently capture reforms 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, we regress *manufacturing* FDI (which we label MFDI) on banking FDI.[28] Column (c) presents a regression where the dependent variable is manufacturing sector FDI only. The results are very similar, lending further support to the main set of results. Moreover, columns (d) and (e) explore an alternative instrument from Golub (2009) on the *de facto* liberalization of each *service* sector for FDI, for a sample of OECD countries. This data set provides an explicit control for non-financial service sector reforms. The main result is qualitatively robust to this exercise.

Given worries that securities market liberalization 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 10.07, but it affects the result neither qualitatively nor quantitatively, nor does securities market liberalization enter significantly in the second stage. We conclude that banking FDI significantly predicts non-financial FDI and that this result is not due to reverse causality.

6 Extensions: bank nationality, institutional variation, and sector-specific effects

6.1 Do multinationals use home banks or any foreign banks?

So far the analysis shows a strong positive effect of banking FDI on non-financial FDI of the same origin country. Multinationals need not rely on home banks for their investments abroad. They may use domestic banks to provide financial services and local host market knowledge. Other foreign banks, which are foreign both from the perspective of the host-country and the home country of the multinational can also provide

[28] MFDI is defined as the log of the stock of outward FDI for manufacturing of machines, electronics, automotive, other manufacturing (paper, textile, medical, furniture), chemicals, rubber, plastics, refining, and food processing, beverages, and tobacco.

similar services. However, both these banks are less likely to have a banking relationship with the parent firm. A firm may also 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, year fixed effects 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 domestic and third-country foreign banks in host countries has to be to controlled for. A full set of bilateral data on the level of FDI by banks by host and origin country is unfortunately not available. We approximate the extent of third-country banking assets by subtracting local lending by Dutch banks from total foreign banking assets as collected by Micco et al. (2007) from Bureau Van Dijk's Bankscope data set, which covers the years 1995-2002.

Column (a) of Table 7 includes the log of the volume of total foreign assets and the log of host-country domestically owned banking assets.[29] The result is a strong significant positive effect of foreign banking in general on the equilibrium level of non-financial FDI. However, when instrumented in column (b) with banking sector reforms, the effect disappears. Column (c) splits total foreign assets into third-country banking assets, and home-country local lending, while controlling for home-country direct investment, and home-country international claims. The result is that only home banking FDI is statistically significant with 99% confidence. Column (d) instruments each measure of foreign banking with regulatory reform. The F-tests conclude that each of the instruments are strong. Even after instrumenting, we still find that only home country banking FDI promotes non-financial outward FDI from the same home country. In column (e) we drop the insignificant measures of third-country foreign banking and domestic banking which allows inclusion of ten more years of data. The basic result is unchanged. The conclusion is that Dutch multinationals prefer the presence of home-country bank branches and subsidiaries in foreign markets to services provided by other banks.

6.2 Is banking FDI more important in countries with weak institutions?

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

If the channel through which banks grease the wheels for multinationals is by employing their superior information advantage about 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 (ICRG). Because the data set is outward FDI from one country, we always control for parent country institutions.

The ICRG assesses the risk of doing business along several categories. *Corruption* is a composite of financial corruption, such as special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans, and corruption in the form of excessive patronage, nepotism, job reservations, 'favor-for-favors', and suspiciously close ties between politics and business. *Policy stability* refers to quality of the bureaucracy as a shock absorber that tends to minimize revisions of policy when governments change. In countries with high scores the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. *Law and order* is an assessment of the strength and impartiality of the legal system, and observance of the law. *Government's general attitude towards investment* (or 'investment profile') is an assessment of factors affecting the risk to investment that are not covered by other political, economic and financial risk components. These are contract viability and risk of expropriation, possibility of profits repatriation, and the extend of payment delays. *Government unity, legislative strength, and popular support* track the government's ability to carry out its declared program(s), and its ability to stay in office.

These institutional dimensions may be relevant for several reasons. Although it is unlikely that banks can 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. More monitoring may also be required after the acquisition is made. We test this by extending equation (1) with an interaction between each measure of risk and (instrumented) banking FDI, both lagged by one period. In addition, since multinationals can choose to bank with their home-country bank, or a third-

country foreign bank, we interact each measure of risk with each. The result is summarized in Table 8, where each cell represent a separate regression. Each regression is similar to equation (1) except that we add third-country banking assets and split institutions into one subcomponent each time and the sum of all other subcomponents. Both are included in each regression, but the separate subcomponent listed in the first column is interacted with either home-origin banking FDI or third-country banking. We also instrument both BANKFDI and log 3rd-country foreign banking assets, as in the previous section, to account for possible endogeneity. The underlying regression is therefore similar to regression (d) in Table 7, except that the insignificant volumes of lending and domestic assets are not included.

The first result that stands out is that the sum of institutions does not interact significantly with either home banking FDI or third-country banking, but this masks heterogeneity at the level of subcomponents. Secondly, we find most significant interactions of subcomponents with home-country banking FDI, and not with third-country foreign banks. The only exception is law and order. The table suggests that both Dutch banking FDI and third-country foreign banks are more beneficial for non-financial FDI in countries with weak rule of law. The table also suggests that home-country banks are only beneficial if the country's government is at least to some degree in favour of investment. If official expropriation is commonplace, or if profits cannot be repatriated, then banks cannot make FDI any easier for their clients. These are situations in which an information advantage may not matter much. However, interactions of home-country banking FDI with less risk of corruption, better rule of law, and the quality of the bureaucracy are significant. The slopes are negative, indicating that the marginal effect of banking FDI on non-financial FDI increases in the risk of corruption, weakness of the rule of law and risk from a policy instability of a poorly functioning bureaucracy.

However, to examine whether the interactions are meaningful, we have to calculate the marginal effects for different levels of institutions, since both the point estimate and standard error of the marginal effect changes for different levels of institutions.

Figure 5 plots the marginal effect of an increase in home banking FDI on non-financial FDI from the same source country, for different levels of corruption and law and order. The marginal effect is significant for countries with corruption scores worse than 4.6. The effect is also significant for varying degrees of law and order except for countries with the highest scores on rule of law. The marginal effect is up to 0.64 for the most corrupt countries (top graph), and 0.71 for countries with the worst law enforcement (bottom graph). The

picture is very similar for policy stability (not reported). This means that banking FDI matters a lot more in these countries than in the average country. A 10% increase in banking FDI would lead to an increase in non-financial FDI of up to 7%; the effect can be more than two times larger than for the average country.[30]

In contrast, Figure 6 plots the marginal effect of an increase in third-country foreign banking. Although the *interaction* is significant, we find that there are no countries where the *marginal* effect is significant. Only banks serving firms from the same home country provide an advantage in countries that are either corrupt, have weak rule of law, or suffer from poor bureaucratic quality.

6.3 Does controlling for sector-specific effects matter?

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-banks' international networks to facilitate investment. It may also be that international investment is harder for some *sectors*, because of unobserved sector-specific characteristics. These include for example financial dependence, the opaqueness of a sector, sector-level demand shocks, average productivity growth, and market structure such as competition. This section controls for sector specific factors by reshaping the data into a panel of sector-country observations, for 13 broad sectors, including manufacturing and service sectors. This allows us to additionally control for sector effects and sector-year effects. However, this comes at the important drawback that this panel is much more unbalanced because not every sector invests in each host-country and year. This makes it much harder to deal with the time series properties of the data (since each sector may have its own trend), and increases potential selection bias when taking logs. These results are therefore presented as an extension.

We observe the following non-financial sectors: real estate, transportation and communication, retail, business services incl. other services, machines and electronics and automotive, utilities, other manufacturing (paper, textile, medical, furniture), chemicals and rubber and plastics, natural resources extraction and refining, construction and installation, food processing and beverages and tobacco, private agents, and agriculture and fisheries. We observe FDI in 13 different sectors, 18 years, and 52 countries where also banks invest. Nevertheless, we can only include 5764 observations when taking logs, which amounts to 47%. We run the

[30] Compare the coefficient of 0.71 to the coefficients in table 6, column (b), where the long run effect is 0.146/0.460 = 0.317.

same regression as equation (1), except that the unit of observation is a host-country-sector-year, and we add sector dummies, and sector-year dummies. We instrument banking FDI as before and control for a set of country characteristics. Moreover, we allows for correlated errors and cluster at the country, the year, *and* the sector level, following the methodology of Cameron et al. (2011). The result is presented in Table 9, column (a).

We find that the average effect of banking FDI is still significant and positive across sectors. The size of the effect is 0.268, which is not significantly different from the long-run estimate from Table 6, which is 0.146/0.460 = 0.317.

In columns (b) and (c) we attempt to deal with the fact that we censor observations where FDI is zero when taking logs. 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 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 'zeros', 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 same applies to foreign direct investment. 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 by treating it as a count variable, but also makes the assumption that one model applies to both margins.[31] The two-stage

[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.

method is favoured here, because it does not make additional assumptions on the determinants of each model, although the result is robust to specifying a PPML model.[32]

As an instrument to determine entry into foreign countries we follow Helpman et al. (2008), who defined countries with high cost of entry as those where the number of days plus the number of procedures to start up a business are above median, which we label $ENTRY_i$.[33] These barriers to entry should affect the fixed costs of entry positively and predict less FDI. Since this measure is observed at the country level, we interact it with sector dummies s_s such that entry barriers can have heterogenous effects by sector. This implies that even though each sector faces the same barriers to entry in each country, they may not be equally affected, since some sectors are more productive and better able to overcome such fixed costs.

The following equation is the selection equation that determines selection into the sample of (1), where d_{its} is a matrix of year, country, sector and sector-year dummies, $I_{its}^{NFDI} = 1$ if non-financial FDI > 0 and zero otherwise, and $BANKFDId_{i,t-1}$ is a dummy equal to one if banking FDI is positive and zero otherwise.

$$I_{its}^{NFDI} = \begin{cases} 1 & \text{if} \quad \mathbf{X}_{it}\beta_2 + BANKFDId_{i,t-1}\gamma_2 + ENTRY_i s_s \gamma_s + d_{its} + v_{its} > 0 \\ 0 & \text{if} \quad \mathbf{X}_{it}\beta_2 + BANKFDId_{i,t-1}\gamma_2 + ENTRY_i s_s \gamma_s + d_{its} + v_{its} \leq 0 \end{cases}$$

From a probit regression of this model we calculate the inverse Mills ratio

$\hat{\lambda}_{its} = \lambda\left(\phi(\mathbf{X}_{it}\hat{\beta}_2 + BANKFDId_{it}\hat{\gamma}_2 + ENTRY_i s_s \hat{\gamma}_s + d_{its}) \big/ \Phi(\mathbf{X}_{it}\hat{\beta}_2 + BANKFDId_{it}\hat{\gamma}_2 + ENTRY_i s_s \hat{\gamma}_s + d_{its})\right)$, where $\phi(\cdot)$ denotes the standard normal density function and $\Phi(\cdot)$ indicates the cumulative normal density function. Then, using the subsample for which $NFDI_{its} > 0$ the following equation is estimated by OLS:

$$NFDI_{its} = \mathbf{X}_{it}\beta_3 + BANKFDI_{i,t-1}\gamma_3 + \hat{\lambda}_{its}\gamma_4 + d_{its} + \varepsilon_{its}$$

[32] 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 log amount of banking FDI was actually exogenous in the main equation (Wooldridge, 2002).

[33] 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.

A simple t-test on γ_4 provides a test for sample selection. The result is presented in column (b) and (c) of Table 9.

Column (b) reports marginal effects of the first-stage probit regression. Countries where home-origin banks are present are more likely to receive non-financial investment as well. The $ENTRY_i s_s$ variables are jointly highly significant as concluded by the F-test. From this regression we calculate the inverse Mills ratio and include it in the second stage in column (c). In addition we follow Helpman et al. (2008) and add a polynomial of the predicted probabilities of entry, to control for unobserved firm heterogeneity, which, through investment frictions and country characteristics, determines the proportion of firms that do FDI.

The first-stage suggests that firms are more likely to enter a foreign market where no other firms from the same sector have invested so far, if banks are already present in that market. As expected, entry restrictions decrease the probability of entry. The result of the second stage is a significant and positive effect of banking FDI on non-financial FDI. Since the coefficient of the inverse Mills ratio $\hat{\lambda}_{its}$ is insignificant we find no evidence of sample selection bias. However, it does appear important to control for unobserved firm heterogeneity, although it does not affect the main result.

In column (d) we also perform a PPML regression. This allows inclusion of both positive and zero observations of FDI, which is reflected in the larger sample. This does not change the main result.

We conclude that home-origin banks facilitate non-financial FDI even when considering heterogeneity of sectors.

7 Conclusion

While conventional wisdom has it that banks follow customers abroad, this paper provides, to the best of our knowledge, the first set of 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 up to 19% more non-financial foreign direct investment from the same country. This novel finding adds to literature on the determinants and global pattern of FDI. This paper does not however claim that only banks make FDI easier and more successful. There is positive non-financial FDI in 121 countries where no Dutch

banks have branches or subsidiaries. Countries themselves, aware of the difficulty of dealing with various institutions, for example set up investment-promotion agencies (Harding and Javorcik, 2011) 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 difficult 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 information takes time, the effects tend to apply at relatively longer horizons. The importance of soft information point in the direction that bank intermediate FDI for example through increasing the size and quality of the pool of potential subsidiaries and bridging institutional distance. 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. Moreover, these results suggest that a country's financial sector, if international, can become a source of comparative advantage for its multinational firms, and for the home-country if outward FDI increases the productivity of the home-country multinational firms. The negative effects of retrenchment by banks are thus not negligible. However, a welfare assessment will have to weigh the possible financial risks – such as those related to contagion – against the real benefits of an international banking system found in this paper.

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Figures

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

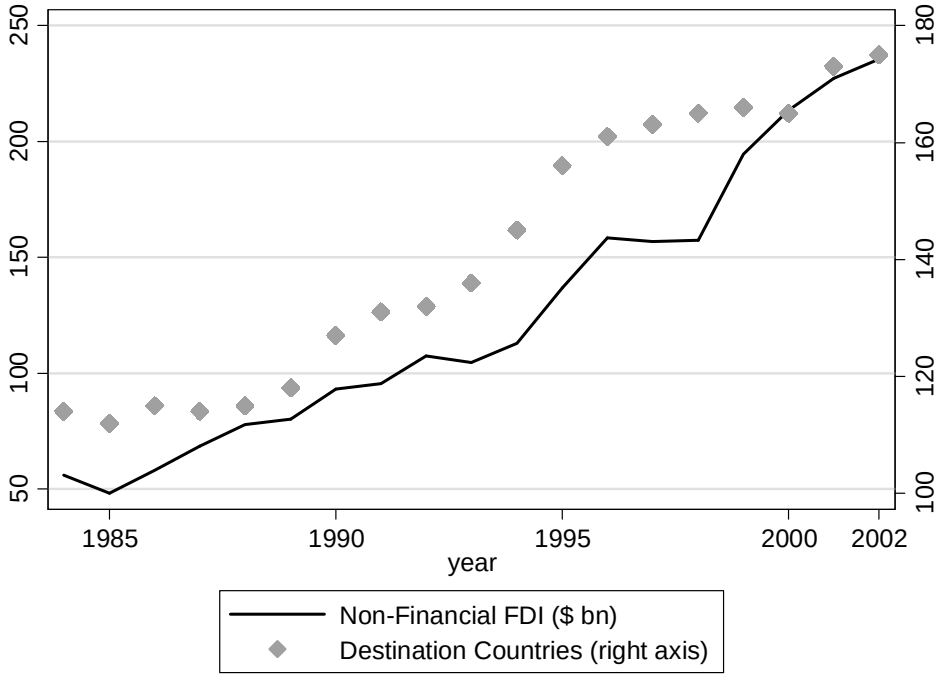


Figure 1 plots the evolution of the stock of total non-financial outward FDI from the Netherlands across the 1984-2002 period (in billions of constant USD dollars), and the number of destination countries in which we observe positive non-financial FDI in each year. Non-financial FDI is defined as the stock of total Dutch FDI net of banking FDI, and excluding also insurance companies and pension funds, other financial institutions including financial holding companies and letter box companies, bourses and brokers.

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

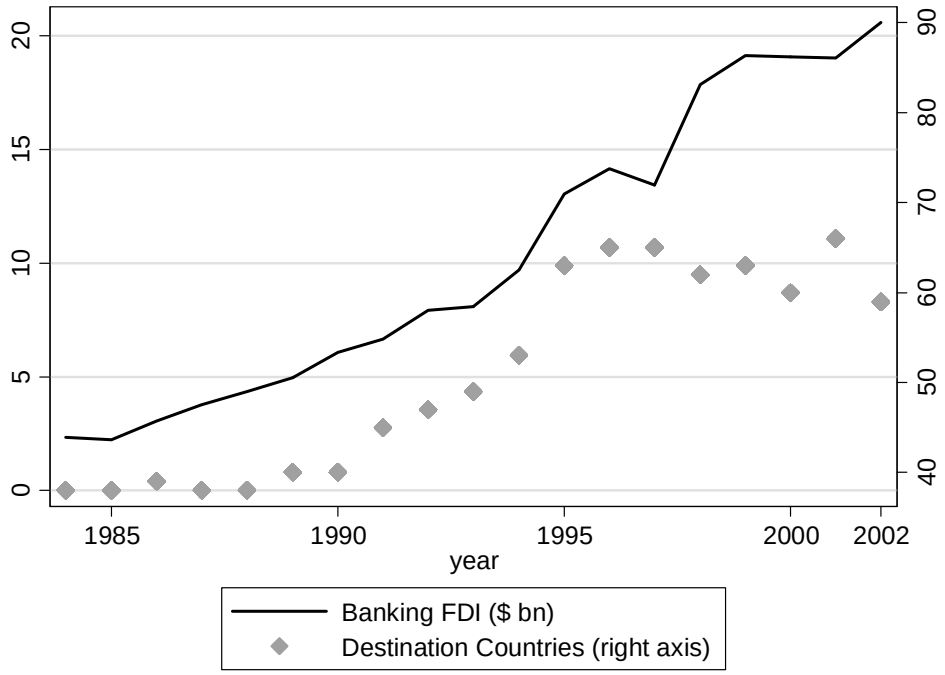


Figure 2 plots the evolution of the stock of total banking outward FDI from the Netherlands across the 1984-2002 period (in billions of constant USD dollars), and the number of destination countries in which we observe positive banking FDI in each year. Banking FDI is defined as the stock of FDI by Dutch resident banks (where inter-company loans and deposits are netted out) for which the supervisory authority is also Dutch.

Figure 3: Average index levels of four banking sector regulations across countries of the world

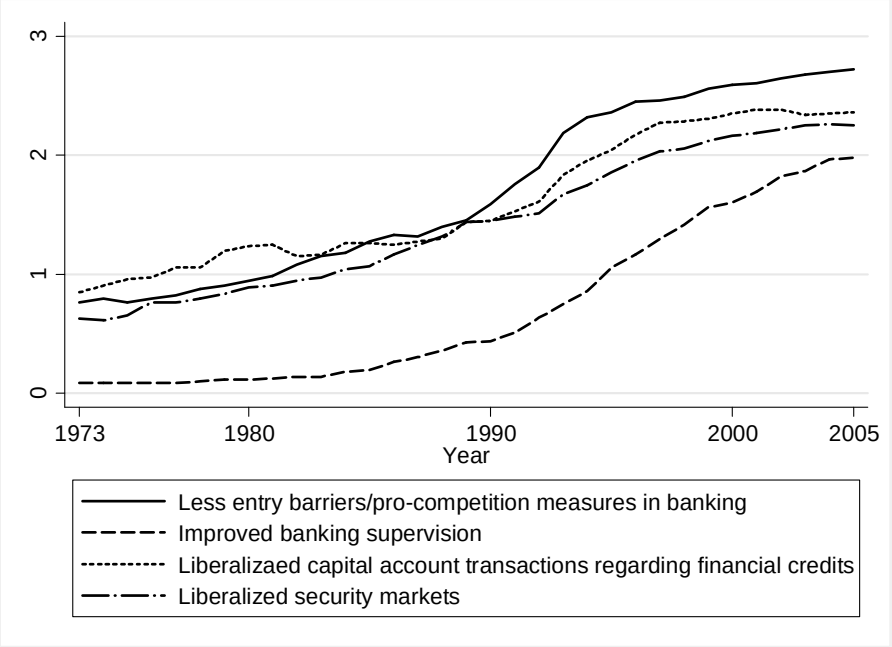


Figure 3 plots the average across countries of the level of regulation of the banking sector, for each year and for four dimensions of regulation, between 1973 and 2005. Each dimension is an integer index ranging from 0 to 3. *Less entry barriers/pro-competition measures in banking* (with the weight of sub-components in brackets) reaches a maximum with majority foreign ownership of domestic banks (2/5), free entry of new domestic banks (1/5), no branching restrictions (1/5), allowing universal banks (1/5). *Liberalized capital account transactions regarding financial credits* are considered liberalized if the exchange rate system is unified (1/3), foreign borrowing by banks is unrestricted (1/3), and banking capital outflow is free (1/3). *Banking sector supervision* 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), and supervision covering all banks (1/6). *Liberalized securities markets* measures if a country has a liberalized market for treasury bills, corporate bond, equity, and derivatives markets, including deregulated institutional investors (3/5), and allowing majority foreign ownership (2/5). Source: Abiad et al. (2010).

Figure 4: Banking assets by origin as a share of total banking assets, averaged across countries

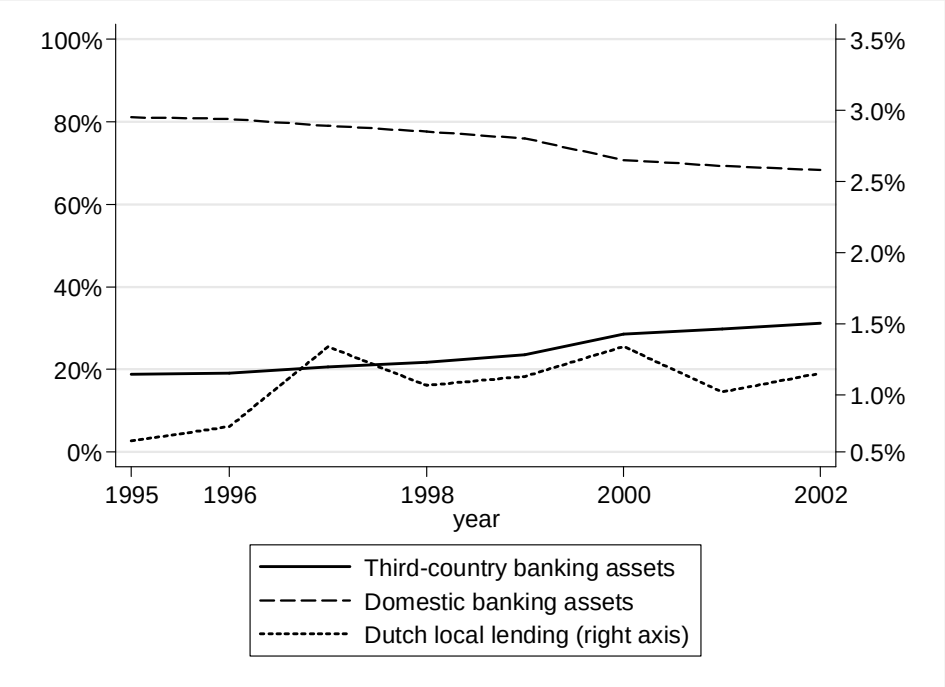
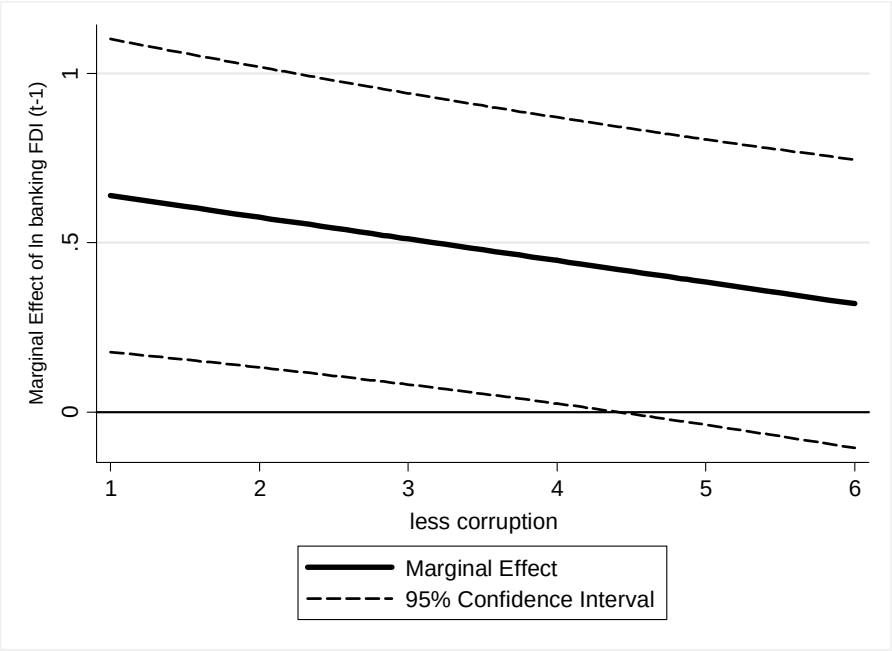


Figure 4 plots the size of banking assets by origin as a share of total banking assets, averaged across countries. Third-country banking assets are foreign banking assets minus Dutch local lending. Dutch local lending is local lending by Dutch branches and affiliates in the host country in the local currency. Source: Micco et al. (2007) and DNB).

Figure 5: Marginal effect of log banking FDI
for levels of corruption (top) and rule of law (bottom)



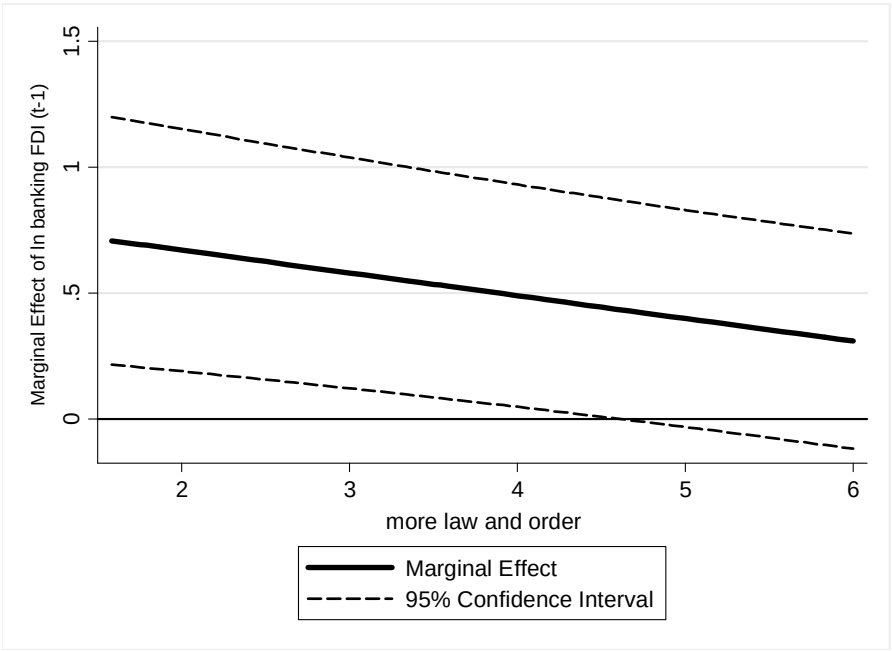


Figure 5 plots for two measures of institutions, corruption and rule of law, the marginal effect of log banking FDI (BANKFDI) on log non-financial FDI (NFDI) and their confidence bands. Corruption and rule of law are indices measured on a scale of 1 to 6, where 6 is least corrupt and highest rule of law. Source: International Country Risk Guide (2006).

Figure 6: Marginal effect of log 3rd-country foreign banking assets for law and order

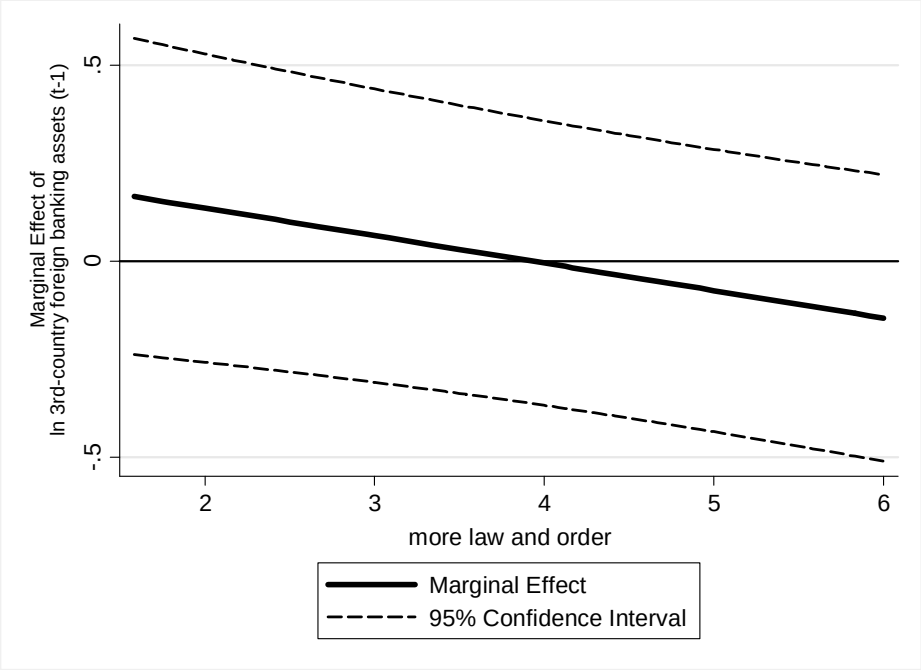


Figure 6 plots for different levels of law and order, the marginal effect of log 3rd-country foreign banking assets on log non-financial FDI (NFDI) and their confidence bands. Law and order is measured on a scale of 1 to 6, where 6 is highest rule of law. Source: International Country Risk Guide (2006).

Tables

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

The table reports the sum of the stock of outward Dutch FDI (in millions of constant USD) across countries for each year and region reported, for both banking FDI and non-financial FDI. Source: DNB

Table 2: Summary statistics of four banking sector regulations in 2005

	countries	mean	std. dev.	min	max
Less entry barriers/ pro-competition measures in banking	91	2.73	0.62	0	3
Improved banking supervision	91	1.98	0.75	1	3
Liberalized capital account transactions regarding financial credits	91	2.36	0.89	0	3
Liberalized securities markets	91	2.25	0.82	0	3

The table reports summary statistics for four measures of banking sector regulation for the year 2005. Each measure is an integer index on a scale of 0 to 3. For details on the construction of all variables see Section 3. Source: Abiad et al. (2011)

Table 3: Summary statistics

Variable	obs.	mean	std. dev.	Min	max
log non-financial FDI (NFDI*)*	649	6.32	2.08	-0.16	11.07
log home banking FDI (BANKFDI)	649	3.74	1.98	-4.88	8.30
log population	649	17.02	1.45	12.47	20.97
Trade liberalization	649	0.87	0.34	0.00	1.00
log GDP per capita	649	8.68	1.41	5.41	10.81
Real exchange rate	649	0.67	0.35	0.11	1.68
log total banking assets	372	11.81	2.16	6.71	16.15
log domestic banking assets	372	11.53	2.33	5.59	16.11
log 3rd-country banking assets	333	9.29	2.09	3.11	13.08
log home-origin local lending	576	6.09	2.59	-1.80	12.31
log home-origin international claims	649	7.25	1.82	0.00	11.32
Share of domestic banking assets	333	78.1%	22.3%	4.5%	99.9%
Share of third-country banking assets	333	20.7%	21.8%	0.0%	94.8%
Share of home-origin local lending	333	1.1%	1.5%	0.0%	10.4%

The table reports summary statistics for the sample of regression (f) of Table 5. See Appendix A for variable descriptions. Share of domestic banking assets are those of banks who are not foreign owned as a share of total banking assets, where total banking assets is the sum of assets on the balance sheets of all banks. Share of third-country banking assets is defined as foreign banking assets minus home-origin (Dutch) local lending, as a share of total banking assets. Share of home-origin local lending is local lending by Dutch branches and affiliates in the host country in the local currency, as a share of total banking assets. For shares the sample is restricted to those country-years where third-country banking assets are positive.

Table 4: Long-run determinants of FDI

Dependent variable: log non-financial FDI (NFDI)	(a): ML	(b): ML	(c): D-ML; adding leads and lags
log home banking FDI (t-1)		0.068***	0.083**
(BANKFDI)		(0.025)	(0.035)
log population	-0.369	-0.482	-0.263
	(0.839)	(0.878)	(1.246)
Trade liberalization	0.276**	0.288**	0.555***
	(0.124)	(0.127)	(0.202)
log human capital	-0.269	-0.204	-0.660
	(0.429)	(0.415)	(0.476)
log GDP per capita (t-1)	1.099***	1.046***	2.143***
	(0.231)	(0.226)	(0.412)
log GDP surrounding market potential	0.509	0.375	0.755
	(1.067)	(1.058)	(1.331)
Real exchange rate	-0.174	-0.095	-1.961***
	(0.461)	(0.466)	(0.712)
Institutions	0.009	0.008	0.001
	(0.013)	(0.013)	(0.011)
Fin. development (private credit/GDP)	-0.003*	-0.003	-0.004**
	(0.002)	(0.002)	(0.002)
FTA	0.362***	0.296**	0.155
	(0.132)	(0.126)	(0.209)
Implicit tax rate (Government % GDP*100)	-0.059***	-0.057***	0.004
	(0.019)	(0.018)	(0.027)
spatial lag: log non-financial FDI (NFDI) (i-1)	-0.317	-0.319	-0.403
	(0.197)	(0.197)	(0.262)
Country fixed effects	yes	yes	yes
Robust LM test for spatial lag	0.943	1.536	5.673**
Robust LM test for spatial error	1.179	0.630	0.619
Observations	632	632	494
Log-likelihood	-329.2	-324.8	-176.6
Variance ratio	0.962	0.962	0.972
Number of countries	46	46	46

Standard errors clustered by country in parentheses. Spatial lag is the distance weighted effect of NFDI in other countries, which requires estimation by maximum likelihood. The D-ML regression in column (b) includes 1 lead and 1 lag of all right-hand side variables. 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 The unit of observation is a host-country-year.

Table 5: Panel error-correction estimates

Dependent variable: Δ(1) log non-financial FDI (NFDI)					2-way clustering	
	(a)	(b)	(c)	(d)	(e)	(f)
log non-financial FDI (*t*-1)	-0.423***	-0.461***	-0.444***	-0.426***	-0.426***	-0.418***
(NFDI)	(0.069)	(0.072)	(0.074)	(0.066)	(0.087)	(0.067)
log home banking FDI (*t*-2)	0.070***	0.084***	0.058**	0.060***	0.060***	0.069***
(BANKFDI)	(0.017)	(0.019)	(0.026)	(0.018)	(0.021)	(0.017)
log population (*t*-1)	-0.578	-1.053*	-0.499	-0.622	-0.622	-0.583
	(0.508)	(0.617)	(0.571)	(0.566)	(0.675)	(0.533)
Trade liberalization (*t*-1)	0.303***	0.437***	0.252*	0.318***	0.318**	0.321***
	(0.112)	(0.127)	(0.146)	(0.114)	(0.131)	(0.106)
log GDP per capita (*t*-2)	0.664***	0.627***	0.589***	0.596***	0.596***	0.651***
	(0.184)	(0.194)	(0.207)	(0.181)	(0.223)	(0.179)
Real exchange rate (*t*-1)	-0.907**	-1.043*	-0.727	-0.837*	-0.837*	-0.944**
	(0.433)	(0.526)	(0.465)	(0.421)	(0.468)	(0.418)
Fin. development (private credit/GDP) (*t*-1)	-0.001					
	(0.002)					
Total trade share of GDP		-0.000				
		(0.002)				
log cumulative FDI inflow ROW (*t*-1)		0.083				
		(0.058)				
log home-origin international claims (*t*-1)			0.097**	0.077**	0.077	
			(0.045)	(0.038)	(0.054)	
log home-origin local lending (*t*-1)			0.001			
			(0.021)			
Δ(1) log non-financial FDI (*t*-1)	-0.082	-0.071	-0.111**	-0.083	-0.083	-0.085
(NFDI)	(0.053)	(0.053)	(0.047)	(0.051)	(0.083)	(0.052)
Δ(1) log home banking FDI (*t*-1)	0.062**	0.069**	0.069*	0.059**	0.059*	0.062**
(BANKFDI)	(0.027)	(0.029)	(0.036)	(0.027)	(0.031)	(0.027)
Δ(1) log population	-1.372	-3.267	-4.195	-1.088	-1.088	-0.305
	(4.868)	(9.032)	(4.622)	(4.846)	(5.246)	(4.792)
Δ(1) Trade liberalization	0.188	0.280	0.149	0.201	0.201	0.193
	(0.198)	(0.206)	(0.207)	(0.198)	(0.283)	(0.197)
Δ(1) log GDP per capita (*t*-1)	0.504***	0.503**	0.389**	0.462***	0.462	0.505***
	(0.179)	(0.190)	(0.177)	(0.172)	(0.321)	(0.174)
Δ(1) Real exchange rate	0.599	0.263	0.649	0.585	0.585	0.536
	(0.424)	(0.498)	(0.462)	(0.409)	(0.452)	(0.413)
Δ(1) Fin. development (private credit/GDP)	0.001					
	(0.001)					
Δ(1) Total trade share of GDP		-0.005				
		(0.004)				
Δ(1) log cumulative FDI inflow ROW		-0.268				
		(0.203)				
Δ(1) log home-origin international claims (*t*-1)			0.088*	0.045	0.045	
			(0.052)	(0.048)	(0.060)	
Δ(1) log home-origin local lending (*t*-1)			0.018			
			(0.015)			
Observations	639	610	586	649	649	649
R-squared	0.261	0.289	0.297	0.264	0.315	0.259
Number of countries	55	54	53	55	55	55

Standard errors clustered by country in parentheses in columns (a) to (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. The unit of observation is a host-country-year.

Table 6: Instrumenting banking FDI with banking sector regulatory reform

	Instruments from Abiad et al. (2010)			Alternative instrument from Golub (2009) for OECD countries	
	(a) 1st stage	(b) 2nd stage	(c) 2nd stage	(d) 1st stage	(e) 2nd stage
Dependent variable:	BANKFDI	Δ_1 NFDI	Δ_1 MFDI	BANKFDI	Δ_1 NFDI
log non-financial FDI (*t*-1) (NFDI)		-0.460***			-0.362***
		(0.082)			(0.075)
log manufacturing FDI (*t*-1) (MFDI)			-0.474***		
			(0.079)		
log home banking FDI (t-1)		0.146***	0.148**		0.212**
(BANKFDI) (instrumented)		(0.050)	(0.064)		(0.090)
log total population	3.106	-0.756	-0.654	6.958	-0.921
	(1.990)	(0.533)	(0.728)	(4.190)	(1.302)
Trade liberalization	-0.769	0.369***	0.365**	-1.083**	0.159
	(0.466)	(0.123)	(0.170)	(0.472)	(0.143)
log GDP per capita (*t*-1)	-0.064	0.614***	0.793***	1.480	0.267
	(0.553)	(0.199)	(0.276)	(1.059)	(0.316)
Real exchange rate	-0.063	-0.884**	-0.844	-0.288	-0.846**
	(0.743)	(0.420)	(0.538)	(0.739)	(0.351)
Institutions	-0.002	-0.000	0.001	-0.030	-0.008
	(0.024)	(0.008)	(0.010)	(0.044)	(0.009)
Systemic banking crisis dummy	-0.021	-0.202**	-0.088	0.637***	-0.255
	(0.152)	(0.090)	(0.102)	(0.212)	(0.163)
Entry barriers/pro-competition	-0.183*	-0.103**	-0.045		
measures in banking	(0.104)	(0.040)	(0.041)		
Δ_1 log non-financial FDI (*t*-1)		-0.077			0.009
(NFDI)		(0.047)			(0.121)
Δ_1 log manufacturing FDI (*t*-1)			-0.049		
(MFDI)			(0.040)		
Δ_1 log home banking FDI		0.067	0.056		0.190*
(*t*-1) (BANKFDI) (instr.)		(0.071)	(0.062)		(0.108)
Liberalized capital account	*0.236***				
transactions regarding fin. credits	*(0.112)*				
Improved banking supervision	*0.192**				
	(0.106)				
Liberalized securities markets	*0.601****				
	(0.184)				
Freer foreign entry in services (non-				-0.056	-0.269
finance)				(1.654)	(0.675)
Freer foreign entry in banking				*1.459***	
				(0.639)	
Observations (countries)	732 (52)	610 (50)	600 (50)	325 (20)	284 (20)
R-squared	0.570	0.292	0.331	0.626	0.318
Cragg-Donald F-stat	25.61			13.96	
Robust test of overidentifying restrictions (p-value)		0.636	0.619		

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, as are all control variables in lagged first-differences in columns (b), (c), and (e) (not reported). Instruments in italics.

Table 7: Robustness to other foreign banking

	1995-2002				1985-2002
Dependent variable: log non-financial FDI (NFDI)	OLS	IV	OLS	IV	IV
	(a)	(b)	(c)	(d)	(e)
log *total* foreign owned banking assets (*t*-1)	0.166***	0.204			
	(0.058)	(0.210)			
log *3rd-country* foreign banking assets (*t*-1)			0.040	-0.031	
			(0.043)	(0.175)	
log *home*-banking FDI (*t*-1) (BANKFDI)			0.142***	0.607**	0.327**
			(0.040)	(0.263)	(0.123)
log *home-origin* international claims (*t*-1)			0.124	0.795	0.033
			(0.103)	(0.570)	(0.305)
log *home-origin* local lending (*t*-1)			0.042	-0.424	-0.104
			(0.039)	(0.301)	(0.249)
log *host* (domestic) banking assets (*t*-1)	-0.021	-0.023	0.036	0.093	
	(0.068)	(0.068)	(0.065)	(0.073)	
C-D F-test log *total* foreign owned banking assets		24.68			
C-D F-test log *home*- banking FDI				25.61	
C-D F-test log *3rd-country* foreign banking assets				16.06	
C-D F-test log *home-origin* international claims				32.91	
C-D F-test log *host* (domestic) banking assets				12.58	
Observations	502	497	283	282	588
R-squared	0.265	0.238	0.278	0.267	0.714
Number of countries	80	80	50	50	50

3rd-country foreign banking assets in column (c) are defined as *total foreign owned banking assets* net of *home-origin* local lending. Year and country effects always included. Standard errors clustered by country in parentheses. Constant included but not shown. Other included controls in all regressions and first stages: log population, trade liberalization, log GDP per capita (*t*-1), real exchange rate, institutions, systemic banking crisis dummy, and entry barriers/pro-competition measures in banking. *** p<0.01, ** p<0.05, * p<0.1. First stage for BANKFDI as in Table 7. First stages for log total and third-country banking assets use *capital account transactions regarding financial credits* as IV. For log *home-origin* international claims the instrument is *liberalized credit controls*, and for *home-origin* local lending it is *improved banking supervision*, which was a stronger IV than any other measure of liberalization. The unit of observation is a host-country-year.

Table 8: Interactions of measures of risk with banking FDI and third-country banking

Dependent variable: log non-financial FDI (NFDI)		
Interaction of lack of risk measure with: (weight in brackets)	BANKFDI (instrumented)	log 3rd-country foreign banking assets
Institutions (sum of below; 40)	0.003	0.002
less corruption (6)	-0.064**	0.005
law and order (6)	-0.090***	-0.070**
policy stability (bureaucracy quality; 4)	-0.192***	0.060
government's general attitude towards investment (less risk of contract viability/expropriation, profit repatriation, payment delays; 12)	0.024*	0.008
government unity, legislative strength, popular support (12)	0.004	-0.006

*** p<0.01, ** p<0.05, * p<0.1. Sample years: 1996-2002. Each *cell* represents a separate regression. NFDI is regressed on lagged BANKFDI (instrumented, as in column (a) of Table 7), population, trade liberalization, lagged GDP per capita, real exchange rate, systemic banking crisis dummy, entry barriers/pro-competition measures in banking, one lag of the sum of those components of institutions that are not interacted, and one lag of direct effects of interacted variables, and log third-country foreign banking assets. The latter are total foreign banking assets minus home-origin local lending. Controlling for financial development does not affect the results. The unit of observation is a host-country-year.

Table 9: Controlling for sector-heterogeneity

	(a): OLS	(b): Probit entry stage	(c): OLS 2nd stage	(d): PPML
Dependent variable:	NFDI	NFDI dummy	NFDI	NFDI
log home banking FDI (t-1) (BANKFDI)	0.268**		0.252**	0.311***
(instrumented)	(0.131)		(0.114)	(0.076)
home banking FDI dummy (t-1)		0.079**		
		(0.034)		
Inverse Mills ratio ($\hat{\lambda}_{its}$)			-3.922	
			(2.628)	
Predicted prob. NFDI>0			-1.546	
			(1.525)	
(Predicted prob. NFDI>0)^2			0.638**	
			(0.288)	
(Predicted prob. NFDI>0)^3			-0.064***	
			(0.020)	
F-test joint significance $ENTRY_i s_s$		28.81***		
Observations	5764	17069	5764	8905
(countries, sectors, years)	(52, 13, 18)	(82, 13, 18)	(52, 13, 18)	(52, 13, 18)
Adj. R-squared	0.654	0.537	0.664	

Standard errors clustered on year, sector and country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regressions include a constant, year, sector, country and sector-year effects. Column (a) regresses the log of non-financial FDI on lagged and instrumented banking FDI and control variables. First stage for banking FDI as in Table 7, column (a). Control variables are: population, trade liberalization, lagged GDP per capita, real exchange rate, systemic banking crisis dummy, entry barriers/pro-competition measures in banking. Column (b) is the first stage of a two-stage Heckman selection procedure and regresses a dummy variable equal to one if non-financial FDI is positive, zero otherwise, on a dummy of banking FDI equal to one if banking FDI is larger than one and zero otherwise, control variables, and 12 instruments. The instruments $ENTRY_i s_s$ are constructed by interacting sector dummies with a dummy equal to one if the sum of days and procedures it takes to start up a business is above median. These are jointly highly significant as reported by an F-test. Coefficient in column (b) is the marginal effect of a probit regression. Column (c) is the second stage of a two-stage Heckman selection procedure and adds to the specification of column (a) the inverse Mills ratio and a polynomial of the predicted probabilities of positive non-financial FDI. Column (d) reports a regression based on PPML, estimated with GLM and a log-link function, where the dependent variable is transformed into a count variable with zeros and positive values.

Appendix A: Data definitions and sources, countries included

Table A1: Variable definitions and sources

Variable	Description	Source
log non-financial FDI (NFDI)	log value of outward non-financial foreign direct investment from The Netherlands in current millions USD.	DNB
log home-banking FDI (BANKFDI)	log value of outward banking foreign direct investment from The Netherlands in current millions USD.	idem
log manufacturing FDI (MFDI)	log value of outward foreign direct investment from The Netherlands in current millions USD for manufacturing of machines, electronics, automotive, other manufacturing (paper, textile, medical, furniture), chemicals, rubber, plastics, refining, and food processing, beverages, and tobacco.	idem
log total foreign owned banking assets	Banking assets owned by all foreign banks in host-country in current millions USD.	Micco et al. (2007)
log third-country foreign banking assets	Total foreign banking assets in host-country minus home-origin local lending in current millions USD.	idem and DNB
log home-origin international claims	cross-border lending plus local lending in foreign currency by consolidated branches and subsidiaries owned by Netherlands resident banks, by host-country-year in current millions USD.	DNB
log home-origin local lending	local lending in local currency by consolidated branches and subsidiaries owned by Netherlands resident banks, by host-country-year in current millions USD.	idem
log population	log of total population	World Bank (2009)
Trade liberalization	= 1 if liberalized, dummy	Wacziarg & Welch (2008)
log human capital	average years of schooling age 25+	Barro and Lee (2010)
log distance	Vicenty distance in km between country centroids	CID data
log GDP per capita	log GDP per capita in current USD	World Bank (2009)
log GDP surrounding market potential	distance weighted log 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. Values are set to the value of the beginning of non-overlapping five year periods unless otherwise stated.	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
Total trade share of GDP	Exports + imports over GDP	idem
log cumulative FDI inflow ROW	sum if FDI inflow since 1980 minus Dutch FDI, in current millions USD.	idem and DNB
Systemic banking crisis dummy	Defined as an event with a large number of defaults, non-performing loans increase sharply, aggregate banking system capital is exhausted, depressed asset prices (such as equity and real estate prices), sharp increases in real interest rates, and a slowdown or reversal in capital flows.	Laeven and Valencia, (2008).
Entry barriers/pro-competition measures in banking	Sum of (with weight in parentheses) majority foreign ownership of domestic banks (2/5), free entry of new domestic banks (1/5), no branching restrictions (1/5), allowing universal banks (1/5).	Abiad et al. (2010)
Liberalized capital account transactions regarding financial credits	Sum of (with weight in parentheses) exchange rate system is unified (1/3), foreign borrowing by banks is unrestricted (1/3), and banking capital outflow is free (1/3).	idem
Improved banking supervision	Sum of (with weight in parentheses) 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), and supervision covering all banks (1/6)	idem
Liberalized securities markets	Sum of (with weight in parentheses) liberalized market for treasury bills, corporate bonds, equity, and derivatives markets, including deregulated institutional investors (3/5), majority foreign ownership (2/5).	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)
log mean distance to coast or river	log mean geographical distance to the nearest coast or river within a country	Center for International Development (2001)
Freer foreign entry in services (except financial sector)	*De facto* FDI entry restrictions for the years 1981, 1986, 1991, 1998 and 2005, ranked between zero and one. Equals total services liberalization minus finance liberalization using weights from Golub (2009). Intermediate years are imputed with the last known value.	Golub (2009)
Freer foreign entry in banking	Idem, for the banking sector.	Golub (2009)

Table A2: Countries within sample of Table 5

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: Testing for non-stationarity and cointegration

In this appendix we test the time series properties of the data. We suspect that FDI is non-stationary. 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.[34] [35] Table B1 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 B1 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 B2 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 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 B3 tests the null of no co-integration between non-financial FDI, banking FDI and control variables, using the residuals from regression (a) of Table 4. Because there is no evidence for cross-sectional dependence in de dependent variable, nor in the residuals, according to the robust LM tests, 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.

[34] Baltagi, Bresson and Pirotte (2007a) 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.

[35] 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.

We conclude that all variables are non-stationary and integrated of order 1. However, the panel is also cointegrated, allowing estimation of the equation with variables in levels.

Table B1: 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			
log 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]
log 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
log population	-8.2[a]	1.5	-59.6[a]	-9.0[a]	14.9	0.7	8.7	8.1	17.8	1.8
log human capital	-1.2	4.2	4.0	-0.7	4.1	4.5	-1.5	8.9	-3.6[a]	-3.1[a]
log 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]
log 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
log 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 B2: Panel unit root tests on first differences

	$CADF_i(0)$	$CADF_i(1)$	IPS(0)	IPS(1)	LLC(0)	LLC(1)
Δlog non-financial FDI	-8.2[a]	9.6	-8.9[a]	-5.7[a]	-12.6[a]	-9.3[a]
Δlog 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]
Δlog population	2.8	5.2	4.0	-5.5[a]	-9.4[a]	-3.3[a]
Δlog human capital	0.4	6.3	-10.1[a]	-5.8[a]	-17.1[a]	-11.7[a]
Δlog GDP per capita (*t*-1)	-6.6[a]	2.8	-8.2[a]	-6.1[a]	-8.8[a]	-8.4[a]
Δlog 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]
Δlog 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.

Table B3: 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

Supplementary Appendix C: 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:

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

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 Lagrange 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).

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

As mentioned in the main text, the estimation potentially suffers from several other potential sources of bias: left censoring of FDI ('zeros') and incidental truncation over time.

For data on the *population* of outward FDI at the country level, such as employed by this paper, these issues are less severe than in the typical data set on bilateral trade. 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 zeros in the 1986 cross section of bilateral trade flows of Helpman et al. (2008). Indeed, this appendix finds that correcting for censoring and truncation yields the results that the positive long-run effect of banking FDI is still robust, although that the short-run effects are not robust.

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 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.[36] This requires modification of the Heckman two-step model, which is provided by Wooldridge (1995).

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 (D3) and the amount of FDI invested (D1), where BANKFDI is instrumented with the set of instruments *Z*. *Z* contains measures of banking sector regulation as described in Section 5. $I_{it}^{NFDI} = 1$ if non-financial FDI > 0 and zero otherwise, and $BANKFDId_{i,t-1}$ is a dummy equal to one if banking FDI is positive and zero otherwise.

$$NFDI_{it} = \mathbf{X}_{it}\beta_1 + BANKFDI_{i,t-1}\gamma_1 + c_{i1} + \tau_t + v_{it1} \quad \text{(D1)}$$

$$BANKFDI_{it} = \mathbf{X}_{it}\beta_2 + Z_{it}\delta_2 + c_{i2} + \tau_t + v_{it2} \quad \text{(D2)}$$

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

$$I_{it}^{NFDI} = \begin{cases} 1 & \text{if} \quad \mathbf{X}_{it}\beta_3 + BANKFDId_{i,t-1}\gamma_3 + \bar{\mathbf{X}}_i\eta_3 + \overline{BANKFDId}_i\mu_3 + Z_{it}\delta_3 + \tau_t + v_{it} > 0 \\ 0 & \text{if} \quad \mathbf{X}_{it}\beta_3 + BANKFDId_{i,t-1}\gamma_3 + \bar{\mathbf{X}}_i\eta_3 + \overline{BANKFDId}_i\mu_3 + Z_{it}\delta_3 + \tau_t + v_{it} \leq 0 \end{cases} \qquad \text{(D3)}$$

Equation (D3) is the selection equation that determines selection into the sample of (1), where the conditional mean of individual unobserved effects in the selection equation (D3) is a linear projection of the within means of the **X** and BANKFDId, following Mundlak (1978). To test for selection in equation (1) the method by Heckman (1979) is used by first obtaining $\hat{\beta}_3$, $\hat{\gamma}_3$, $\hat{\eta}_3$, $\hat{\mu}_3$, and $\hat{\delta}_3$ from a probit regression of I^{NFDI} on **X**, BANKFDId, **E** and their within means and calculating the inverse Mills ratio

$$\hat{\lambda}_{it} = \lambda\left(\frac{\phi(\mathbf{X}_{it}\hat{\beta}_3 + BANKFDId_{it}\hat{\delta}_3 + \bar{\mathbf{X}}_i\hat{\eta}_3 + \overline{BANKFDId}_i\hat{\mu}_3 + Z_{it}\hat{\delta}_3 + \tau_t)}{\Phi(\mathbf{X}_{it}\hat{\beta}_3 + BANKFDId_{it}\hat{\delta}_3 + \bar{\mathbf{X}}_i\hat{\eta}_3 + \overline{BANKFDId}_i\hat{\mu}_3 + Z_{it}\hat{\delta}_3 + \tau_t}\right),$$

where $\phi(\cdot)$ denotes the standard normal density function and $\Phi(\cdot)$ indicates the cumulative normal density function. Then, using the subsample for which $BANKFDI > 0$ the following equation is estimated by 2SLS using as instruments Z and $\hat{\lambda}_{it}$ for $BANKFDI_{it}$ (adding $\hat{\lambda}_{it}$ to equations (D1) and (D2)):

$$NFDI_{it} = \mathbf{X}_{it}\beta_1 + BANKFDI_{i,t-1}\gamma_1 + \hat{\lambda}_{it}\gamma_2 + c_{i1} + \tau_t + \varepsilon_{it} \qquad \text{(D4)}$$

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 (D4), using the result in Wooldridge (2002) that instrumenting $BANKFDI_{it}$ also corrects for non-random censoring in this variable. However, to deal with incidental truncation equation (D4) requires further modification. Wooldridge (1995), suggests first estimating equation (D3) and adding the collected Mills ratios to equation (D1) in the following way, where $\tau_2 ... \tau_T$ are time dummies, together with the within means of the explanatory variables.[37]

$$NFDI_{it} = \mathbf{X}_{it}\beta_1 + BANKFDI_{i,t-1}\gamma_1 + c_i + \hat{\lambda}_{it}\gamma_{12} + \tau_2\hat{\lambda}_{it}\gamma_{22} + ... + \tau_T\hat{\lambda}_{it}\gamma_{T2} + \tau_t + \varepsilon_{it} \qquad \text{(D5)}$$

The result is presented in Table D1. Column (a) reports the estimates of the first stage probit model (D3) where the volume of banking FDI is replaced by an indicator dummy equal to 1 if banking FDI

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

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 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.

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.[38] The estimate of equation (D5) is presented 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 4.6% higher equilibrium level of non-financial FDI. Compared to regression (f) of Table 5 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.

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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)	log home banking FDI (t-1)	Δ(1) log non-fin. FDI		Δ(1) log non-fin. FDI	
			long-run	in Δ(1)	long-run	in Δ(1)
home banking FDI dummy (t-2)	0.069					
	(0.046)					
log home banking FDI (t-1) (instrumented)			0.232***	0.072	0.196***	0.085
			(0.052)	(0.093)	(0.065)	(0.094)
log non-financial FDI (t-1)			-0.474***	-0.071*	-0.428***	-0.088**
			(0.079)	(0.041)	(0.089)	(0.042)
log total population (t-1)	-0.357**	5.164**	-1.323*	-1.327	-1.055	2.586
	(0.149)	(2.001)	(0.711)	(8.686)	(0.764)	(8.172)
Trade liberalization (t-1)	0.056*	-0.969**	0.149	-0.059	0.194	0.209
	(0.030)	(0.478)	(0.139)	(0.296)	(0.151)	(0.379)
log GDP per capita (t-2)	-0.028	0.177	0.546**	0.408*	0.463**	0.295
	(0.029)	(0.502)	(0.204)	(0.214)	(0.204)	(0.242)
Real exchange rate (t-1)	0.037	0.217	-0.982**	0.065	-0.845**	0.226
	(0.060)	(0.808)	(0.407)	(0.438)	(0.386)	(0.425)
Systemic banking crisis dummy	0.002	-0.035	-0.172*	-0.115	-0.150	-0.100
	(0.019)	(0.142)	(0.088)	(0.079)	(0.105)	(0.085)
log mean dist. to coast or river	-0.046***					
	(0.011)					
log distance (km)	0.058					
	(0.048)					
log GDP surrounding market potential(t-1)	0.597***					
	(0.216)					
Proc.+days to form business (= 1 if > median)	-0.063**					
	(0.027)					
Banking supervision (t-1)		0.223*				
		(0.113)				
Capital account transactions regarding fin. credits (t-1)		0.147				
		(0.113)				
Securities markets (t-1)		0.510***				
		(0.182)				
Inverse Mills ratio (t-1)		-0.690	-4.590***	-0.038		
		(0.460)	(1.357)	(2.690)		
F test joint sign. of controls for extensive margin			2.813**		1.57	
F test joint sign. of yearly inverse Mills ratios					85.14***	
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	0.577	0.322		0.392	
Number of countries	131	51	49		49	
Cragg-Donald F-stat.		18.9				
Robust test of OIR (p-value)			0.579		0.599	

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.