Clustering or Competition? The Foreign Investment Behavior of German Banks*

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Banks often concentrate their foreign direct investment (FDI) in certain countries. This clustering of activities could reflect either the attractiveness of a particular country or agglomeration effects. To find out which of the two phenomena dominates, we need to control for country-specific factors. We use new bank-level data on German banks' FDI for the 1996–2003 period. We test whether the presence of other banks has a positive impact on the entry of new banks. Once we control for the attractiveness of a country through fixed effects, the negative impact of competition dominates. Hence, pure clustering effects are rather unimportant.

JEL Codes: F0, F21.

1. Motivation

International banking has grown rapidly in the past few decades. Merger and acquisition activity in the banking sector and cross-border lending have been on the rise. However, regional patterns of entry into foreign markets vary. Spanish banks, for instance, have made significant inroads into the banking markets of Latin America. Austrian and German banks are quite active in the transition

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economies of central and eastern Europe. And, despite advances in technology, banks' activities abroad tend to remain concentrated on countries hosting financial centers.

These regional concentration patterns suggest that the presence of other banks in a given market matters for entry. In assessing the value of the presence of other banks in their locational choice, though, banks face a trade-off. While a larger presence of other banks implies more competition and thus lower profits for new entrants, positive spillover between the activities of new and old entrants could increase profits. This could create clustering effects. Empirically, it is important to distinguish such spillover effects from general factors that affect the attractiveness of a country.

This paper studies how German banks decide to expand their operations abroad. We focus on the following questions: What characteristics of the local market attract German banks? Do other banks' activities influence new entrants' investment decisions? Is this impact positive or negative, i.e., does the competition or the clustering effect dominate?[1] Are there differences between small and large banks?

It is important for bank regulators to understand whether the observed concentration of international banking activities reflects the attractiveness of a particular country or clustering effects. If clustering effects dominate, regulators could stimulate the emergence of financial centers by attracting some major players to a particular market. Our research thus helps to answer the question of whether financial centers attract banks because they provide a favorable regulatory framework or because banks enjoy positive spillovers from other banks' activities.

In the theoretical literature, different reasons for clustering effects are discussed. These reasons include knowledge spillover between firms, access to labor markets in specialized factors, the scope for backward and forward linkages, and signaling effects that lower information costs (Barry, Görg, and Strobl 2001).

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[1]Note that we cannot study clustering *within* host countries. However, in most of the countries in our study, international banking activity is concentrated in a few cities or only one large city. We can, therefore, take country-level clustering effects as proxies for regional clustering.

To the best of our knowledge, this paper is the first to test the role of clustering in banks' foreign direct investment (FDI) decisions. For nonfinancial firms, there is a large body of empirical evidence demonstrating the importance of agglomeration effects. Empirical work finds evidence in favor of clustering effects for British and U.S. investment in Ireland (Barry, Görg, and Strobl 2001), foreign direct investment in France (Crozet, Mayer, and Mucchielli 2003), Japanese investment in Europe (Head and Mayer 2004), or Japanese firms in the United States (Head, Ries, and Swenson 1995). Crozet, Mayer, and Mucchielli (2003) is one of the few studies to find evidence of competition effects.

In the banking literature, a formal theory of financial centers is largely absent. Kindleberger (1978) identifies economies of scale, location, transportation costs, the presence of headquarters of multinational firms, and cultural and regulatory factors as variables contributing to the emergence of (international) financial centers. Information costs might play a role as well. Barron and Valev (2000) have formalized the idea that high costs of acquiring information might induce small banks to follow large banks into foreign markets. If investing abroad requires a (fixed) investment in information, small banks (being more wealth constrained than larger banks) may not be able to pay this fixed cost. Hence, they have an incentive to follow the behavior of larger, better-informed banks. The empirical results on cross-border lending reached by Barron and Valev (2000) confirm this hypothesis.

Our research differs because we use firm-level data on banks' foreign direct investment rather than data on cross-border lending. We use a new and unique data set on FDI and on the balance sheets and income statements of German banks (Deutsche Bundesbank 2005), which enables us to analyze whether and where banks invest abroad and how such decisions are influenced by bank-specific factors. Studying the German banking sector is interesting because of a significant dichotomy between some large internationally active banks and a number of small local and regional banks. For the large banks, foreign borrowing or lending accounted for about half of their balance sheet total in 2001; the corresponding number for the (comparatively small) savings banks was less then 5 percent (OECD 2005). We therefore test whether internationalization patterns differ for small and large banks. We also shed more light on the channels

through which clustering might arise by decomposing other banks' activities into the number of competitors and the volume of investment. Moreover, we use a set of explanatory variables that captures the factors identified by Kindleberger (1978).

In section 2, we review earlier empirical evidence on clustering and FDI. In section 3, we describe our data as well as differences in the international activities of small and large banks. Section 4 presents our regression results. We start by explaining the FDI of banks for the full sample and for banks of different sizes. We then test whether banks cluster in specific markets and whether clustering effects are more important for smaller banks. Once we take into account omitted country factors by including a full set of country fixed effects, the impact of other banks' activities on the activities of new banks is insignificant or even negative, which contradicts the hypothesis that German banks seek agglomeration benefits by moving into foreign markets.

2.   Earlier Empirical Evidence on Clustering

The clustering of investors in foreign markets and herding behavior have been important areas of research in the finance literature.[2] Yet there is hardly any evidence on clustering in the FDI decisions of banks. Barron and Valev (2000) study banks' foreign activities but focus on cross-border lending. They use data on U.S. banks' short-term foreign assets for the 1982–94 period to test whether small banks follow large banks abroad. Granger noncausality tests show that lending by large banks tends to lead lending by small banks but not vice versa.

Chang, Chaudhuri, and Jayaratne (1997) test whether banks cluster at the national level.[3] Using data for bank branches in

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[2]See Bikhchandani and Sharma (2001) for a review of the literature on herding in financial markets. This literature shares similarities to our work, since it addresses the interdependence of the actions of different investors. However, the literature differs in its focus on information costs as a reason for herding and in its empirical focus on time-series evidence for stock markets and markets for securitized financial assets.

[3]De Juan (2003) likewise studies the clustering of bank branches at a national level. Using detailed data on branches of every bank in all Spanish towns, she identifies the optimal size of banking markets.

New York City opened between 1990 and 1995, they find that banks are more likely to open branches in areas where other banks are already active. Applying a similar reasoning to FDI, their empirical analysis is based on a profit function for (foreign) affiliates that takes the following form:

$$\pi_{ijt} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 X_{jt} + \alpha_3 FDI_{jt} + \varepsilon_{ijt}, \tag{1}$$

where π_{ijt} are the profits for bank i from operating a branch in country j, X_{it} is a vector of bank-specific factors for bank i, X_{jt} is a vector of country-specific factors, FDI_{jt} is a proxy for the activities of other banks in country j, and ε_{ijt} is an error term. Rather than estimating the above profit equation directly, Chang, Chaudhuri, and Jayaratne (1997) use the investment of bank i in a given region (FDI_{ijt}) as the dependent variable. The underlying assumption is that higher profits translate to more investment:

$$FDI_{ijt} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 FDI_{jt} + \varepsilon_{ijt}. \tag{2}$$

The expected coefficient on the activities of other banks (β_3) depends on the relative strength of the clustering and the competition effect. If the competition effect dominates, β_3 is negative. If agglomeration effects lead to the clustering of banks, β_3 is positive. This would be the case if, for instance, the presence of other home-country banks creates some externality in the form of lower information costs or a greater pool of skilled labor (see also Crozet, Mayer, and Mucchielli 2003).

Our empirical setup is also closely related to work by Chang, Chaudhuri, and Jayaratne (1997), who study clustering in FDI decisions made by nonfinancial firms. One key insight of this literature is that country fixed effects must be included in order to control for possible unobserved factors at the country level.[4] Head and Mayer (2004) use FDI by *other* Japanese firms to explain the FDI by Japanese firms in Europe. The number of Japanese affiliates in Europe has a positive and significant impact on FDI, even if a full set of country dummies is included. Studying the locational choice

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[4]A similar problem occurs in the literature on herding in financial markets in isolating "spurious" herding, which is driven by market fundamentals, from "intentional" herding (Bikhchandani and Sharma 2001).

of British and U.S. investors in Ireland, Barry, Görg, and Strobl (2001) find evidence of information spillover, a so-called demonstration effect, for investment by British and U.S. firms. A clustering effect, in turn, is found only for U.S. firms.

Finally, Crozet, Mayer, and Mucchielli (2003) study the locational choices of foreign investors in France. They show that firms cluster with their competitors. At the same time, there is heterogeneity in these effects among investors from different countries. For some investors, they even find a negative competition effect of proximity to other firms on the probability of entry.

3. The Data

In this paper, we test whether clustering is important for German banks' foreign investment activity. Since the empirical analysis in this paper is based on a new bank-level data set, we describe the data in this section.

3.1 Construction of the Bank-Level Data Set

We use balance sheet statistics, income statements, and FDI statistics for German banks. The combined data set contains data for eight years (1996–2003). However, due to missing observations for some of the explanatory variables, most of our regressions are based on a reduced data set for the years 1998–2002. Furthermore, OECD countries account for 92 percent of German banks' FDI. For this reason, and because of better data availability than for the non-OECD countries, we restrict our analysis to the OECD region.

We use the monthly balance sheet statistics for German banks to construct a data set containing *all* German banks in existence throughout the period under review. For each of these banks, year-end information on equity capital, total assets, yields from operational business (taken from the income statements), and the claims against and liabilities to resident and nonresident banks and non-banks is retrieved. The latter are used to calculate the ratio of aggregated cross-border claims and liabilities to total assets as a measure of the internationalization of the individual bank.

The FDI data set contains data from annual full-sample surveys of FDI stocks. (For details see Lipponer 2002, 2003.) The data set

starts in 1989 but includes time series for individual banks only from 1996 to 2003. The data mainly contain information from affiliates' balance sheets that is needed to calculate banks' primary and secondary FDI stocks. From this data set, we add the consolidated amounts of primary and secondary outward FDI per foreign affiliate. Some banks have several affiliates in a given host country. However, since we do not have information on the exact location of these affiliates, we aggregate FDI stocks by the country of the foreign affiliate.

We include only banks that report at least one foreign affiliate in at least one year. Hence, we exclude those banks that have domestic affiliates only. Overall, some 5,500 reports by 110 German banks are included in the data set. In 2003, these banks returned reports on some 800 foreign affiliates residing in twenty-eight OECD countries, resulting in around 245 country-level FDI reports.

3.2   Stylized Facts

Our aim in this paper is to explore the determinants of German banks' foreign direct investments, the importance of the presence of other banks, and differences in the behavior of small and large banks. Before turning to regression-based empirical evidence, this section provides descriptive statistics. Unless otherwise stated, all data are for 2003. Table 3, shown in the appendix, provides summary statistics. We define small banks as those with total assets below €31.4 billion (eighty-three banks) and large banks as those with assets exceeding €31.4 billion (twenty-seven banks). These cut-off points roughly correspond to the 75 percent quantile of the asset values of the banks in the sample.

Comparing the internationalization patterns of German banks and nonfinancial firms shows that banks' FDI tends to be more concentrated (this information is not shown in the table). There is, for instance, a large discrepancy between the number of countries in which all German firms maintain foreign affiliates (142) and the corresponding number for banks (65). As already mentioned, German banks' FDI is concentrated in the OECD countries. Moreover, the six OECD host countries with the largest amount of German banks' FDI account for around 91 percent of German banks' FDI stocks in the OECD. The share of the three largest destination countries is

still 79 percent. These numbers show that clustering is potentially important for the FDI decisions of German banks.

Some differences also exist between small and large banks. One is that large banks account for 98 percent of FDI and for 88 percent of the number of foreign affiliates. Hence, the average size of foreign affiliates is much smaller for small banks. The average FDI per affiliate of small banks is only around 15 percent of the amount invested per affiliate by large banks.

Another difference concerns the average number of countries in which small and large banks are active and the average number of affiliates per country. (Again, this information is not shown in the table.) While small banks are active—on average—in only 1.7 countries, the corresponding number for the large banks is 6.7 countries. In terms of the number of affiliates per country that banks maintain, the difference is less pronounced (1.3 and 2.3 for the small and large banks, respectively).

A third difference is that FDI is less important for the small German banks than for the large German banks, relative to their balance sheet total (see table 3, panel B).

Hence, measured in terms of total volumes, FDI by small banks makes up only a fraction of all FDI. However, the small banks account for a quite significant percentage of the number of foreign affiliates of German banks. In fact, about 12 percent of all foreign affiliates are affiliates of small banks. Hence, despite its small overall volume, FDI of small banks is important in terms of the number of foreign investments undertaken by German banks abroad.

In summary, the low average volume of activities and the small number of countries in which small banks are present suggest that entry costs are important. Larger banks seem to find it easier to shoulder these costs. However, borders do not prohibit small banks from going abroad altogether. Hence, in the following sections, we will analyze whether foreign activities of small and large banks have different determinants and whether clustering and agglomeration effects are more important for the smaller banks.

4.   Empirical Results

This section analyzes the determinants of FDI by German banks. We apply a two-step approach. In a first step, we estimate baseline

regressions for the determinants of FDI by banks. We also estimate these regressions separately for small and large banks. In a second step, we test whether banks invest more in countries where other German banks are already present.

4.1   Empirical Model

The empirical analysis is based on an extended gravity equation. Gravity equations relate the magnitude of bilateral economic activities between countries to geographical distance and the size of the economies. The standard gravity model, designed to explain bilateral linkages between a large number of source and host countries, has also been used frequently to explain one source country's FDI in a large set of host countries (see, e.g., Feenstra, Markusen, and Rose 2001 or Egger 2002). When applied to FDI, gravity equations are enriched by a number of variables that capture barriers to the integration of markets, such as regulations and proxies for information costs (i.e., by variables that affect the profitability of investing abroad).

We essentially estimate equation (2) above. In addition to a vector of bank-specific control variables and a vector of country-specific control variables, we also include time fixed effects to capture possible time trends.

We also include a variable that captures the activities of other German banks in a particular host country to test for clustering effects. Interpreting the signs of this variable, however, also requires the inclusion of a full set of country fixed effects. Otherwise, we might falsely attribute a positive effect of the activities of other banks to a clustering effect even though this variable, in fact, proxies omitted country factors.

Since we have bank-level data for *all* German banks, we can model not only the determinants of FDI by banks but also the characteristics of banks that go abroad relative to banks that stay national. Hence, we can distinguish the entry decision (the extensive margin) from the volume of FDI (the intensive margin). The natural candidate for studying this choice is a tobit model (see, e.g., McDonald and Moffit 1980). This model allows us to separate banks' decisions on whether to expand internationally from their decisions on how much to invest in a given market. Hence,

the marginal effects of each coefficient indicate the change in the probability of being uncensored (i.e., having a positive value) and the change in the amount invested. In qualitative terms, we obtain the same results for the two marginal effects, i.e., for the probability of being uncensored and for the expected value of the dependent variable conditional upon being uncensored. Therefore, and in order to save space, we report the two marginal effects only for the baseline regression results and restrict ourselves to the tobit coefficients thereafter. We also check the robustness of our results by using a panel probit model, which essentially replicates the first stage of the tobit model. The results are largely the same for the probit and the tobit model.

4.2   Baseline Regression Results

Before testing for clustering effects, we run a set of baseline regressions for banks of different sizes. We regress the amount of FDI on bank-specific and country-specific variables as well as on variables capturing the structure of the domestic banking system.

4.2.1   Bank-Level Explanatory Variables

Table 1 summarizes our first set of regression results. We use the *size* of banks (*assets*), their *profitability*, and their degree of *internationalization* as bank-specific determinants of FDI.[5] Additionally, we include dummy variables for the *bank type* (commercial, savings, and cooperative banks). Foreign banks (i.e., dependent German branches of banks headquartered outside Germany), building and loan associations, and the Bundesbank, its affiliates, and branches are excluded. Special-purpose banks owned by the federal government, also known as "promotional banks," are included. Omitting them does not significantly affect any of the results.

Our findings confirm earlier work on the determinants of international banking activities (see, e.g., Berger et al. 2004). Larger banks maintain larger affiliates abroad (Focarelli and Pozzolo 2001). We also control for the profitability of the reporting bank by including banks' yields from operational business, scaled by total assets.

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[5]Table 4 in the appendix provides more detailed definitions and data sources.

Table 1. Regression Results: Baseline Specification

	All Banks		Small Banks		Large Banks	
	M.E. 1	M.E. 2	M.E. 1	M.E. 2	M.E. 1	M.E. 2
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES	YES	YES
Internationalization	6.65e−04***	5.76e−03****	4.19e−05	4.42e−04	7.51e−03***	7.63e−02***
	(5.83e−05)	(5.05e−04)	(4.53e−05)	(4.78e−04)	(7.03e−04)	(7.15e−03)
Assets	2.19e−02***	1.90e−01***	7.07e−03***	7.45e−02***	2.06e−01***	2.09e+00***
	(7.96e−04)	(6.90e−03)	(7.55e−04)	(7.96e−03)	(1.57e−02)	(1.59e−01)
Profitability	3.94e−03***	3.42e−02***	1.18e−03***	1.25e−02***	1.02e−02**	1.04e−01**
	(3.41e−04)	(2.95e−03)	(2.30e−04)	(2.43e−03)	(4.73e−03)	(4.81e−02)
Distance	−7.09e−03**	−6.14e−02**	−8.28e−03***	−8.73e−02***	−5.73e−03	−5.82e−02
	(2.78e−03)	(2.41e−02)	(2.49e−03)	(2.63e−02)	(1.97e−02)	(2.00e−01)
Inflation	2.49e−03***	2.16e−02***	1.08e−03*	1.14e−02*	1.75e−02***	1.78e−01***
	(6.92e−04)	(5.99e−03)	(6.48e−04)	(6.83e−03)	(4.77e−03)	(4.85e−02)
GDP	8.60e−03***	7.45e−02***	1.61e−03	1.70e−02	8.43e−02***	8.57e−01***
	(2.18e−03)	(1.88e−02)	(1.86e−03)	(1.97e−02)	(1.55e−02)	(1.58e−01)
Trade	1.26e−03***	1.09e−02***	3.99e−04*	4.21e−03*	1.03e−02***	1.05e−01***
	(2.53e−04)	(2.20e−03)	(2.37e−04)	(2.50e−03)	(1.74e−03)	(1.77e−02)
Risk	−8.93e−05	−7.74e−04	−1.29e−04	−1.36e−03	1.37e−03	1.39e−02
	(3.18e−04)	(2.75e−03)	(2.84e−04)	(3.00e−03)	(2.25e−03)	(2.29e−02)

Table 1 (continued). Regression Results: Baseline Specification

	All Banks		Small Banks		Large Banks	
	M.E. 1	M.E. 2	M.E. 1	M.E. 2	M.E. 1	M.E. 2
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES	YES	YES
Freedom	$-1.48e{-}03$ (2.41e$-$03)	$-1.29e{-}02$ (2.09e$-$02)	$-2.05e{-}03$ (2.26e$-$03)	$-2.16e{-}02$ (2.38e$-$02)	7.46e$-$03 (1.67e$-$02)	7.58e$-$02 (1.70e$-$01)
Supervision	8.09e$-$04 (1.07e$-$03)	7.01e$-$03 (9.24e$-$03)	$-1.06e{-}03$ (9.54e$-$04)	$-1.12e{-}02$ (1.01e$-$02)	1.90e$-$02** (7.48e$-$03)	1.93e$-$01** (7.61e$-$02)
Transparency	1.60e$-$02*** (2.18e$-$03)	1.39e$-$01*** (1.89e$-$02)	7.15e$-$03*** (2.03e$-$03)	7.54e$-$02*** (2.14e$-$02)	1.14e$-$01*** (1.50e$-$02)	1.16e+00*** (1.53e$-$01)
Capital Controls	$-5.53e{-}03$ (4.50e$-$03)	$-4.59e{-}02$ (3.90e$-$02)	$-1.01e{-}02$** (5.00e$-$03)	$-1.04e{-}01$** (5.28e$-$02)	1.19e$-$02 (2.94e$-$02)	1.22e$-$01 (2.99e$-$01)
EU	$-3.54e{-}03$ (7.35e$-$03)	$-3.08e{-}02$ (6.37e$-$02)	$-1.09e{-}02$* (6.40e$-$03)	$-1.17e{-}01$* (6.75e$-$02)	6.07e$-$02 (5.27e$-$02)	6.10e$-$01 (5.36e$-$01)
Number of Non-German Banks	1.83e$-$03** (7.41e$-$04)	1.58e$-$02** (6.42e$-$03)	1.11e$-$03* (6.22e$-$04)	1.17e$-$02* (6.56e$-$03)	1.42e$-$02*** (5.46e$-$03)	1.44e$-$01*** (5.55e$-$02)
Banking System Assets/GDP	3.26e$-$06 (1.10e$-$05)	2.83e$-$05 (9.51e$-$05)	1.13e$-$05 (9.39e$-$06)	1.20e$-$04 (9.91e$-$05)	$-8.83e{-}05$ (7.78e$-$05)	$-8.98e{-}04$ (7.92e$-$04)
Return on Average Equity	$-1.06e{-}05$ (5.19e$-$05)	$-9.20e{-}05$ (4.50e$-$04)	$-1.85e{-}05$ (7.42e$-$05)	$-1.95e{-}04$ (7.83e$-$04)	$-9.59e{-}06$ (3.12e$-$04)	$-9.75e{-}05$ (3.18e$-$03)

(*continued*)

Table 1 (continued). Regression Results: Baseline Specification

	All Banks		Small Banks		Large Banks	
	M.E. 1	M.E. 2	M.E. 1	M.E. 2	M.E. 1	M.E. 2
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES	YES	YES
Concentration	$-8.80e{-}04$***	$-7.63e{-}03$***	$-6.10e{-}04$***	$-6.44e{-}03$***	$-4.03e{-}03$***	$-4.09e{-}02$***
	$(1.28e{-}04)$	$(1.11e{-}03)$	$(1.18e{-}04)$	$(1.25e{-}03)$	$(8.97e{-}04)$	$(9.12e{-}03)$
Value Added	$-3.30e{-}03$***	$-2.86e{-}02$***	$-2.33e{-}03$***	$-2.46e{-}02$***	$-2.25e{-}02$***	$-2.29e{-}01$***
	$(1.01e{-}03)$	$(8.74e{-}03)$	$(8.41e{-}04)$	$(8.87e{-}03)$	$(7.36e{-}03)$	$(7.49e{-}02)$
Employment Share	$1.84e{-}02$***	$1.59e{-}01$***	$7.66e{-}03$**	$8.09e{-}02$**	$1.50e{-}01$***	$1.53e{+}00$***
	$(4.00e{-}03)$	$(3.46e{-}02)$	$(3.38e{-}03)$	$(3.57e{-}02)$	$(2.87e{-}02)$	$(2.92e{-}01)$
Constant	$-8.29e{-}01$***	$-7.19e{+}00$***	$-1.81e{-}01$**	$-1.91e{+}00$**	$-8.33e{+}00$***	$-8.47e{+}01$***
	$(8.63e{-}02)$	$(7.48e{-}01)$	$(7.14e{-}02)$	$(7.53e{-}01)$	$(7.34e{-}01)$	$(7.47e{+}00)$
Number of Observations (N*T)	12,540	12,540	9,943	9,943	2,597	2,597
Adjusted R^2	0.19	0.19	0.14	0.14	0.17	0.17

Note: This table gives the results of tobit regressions for German banks' FDI. M.E. 1 = marginal effect on the probability of being uncensored, M.E. 2 = marginal effect on the expected value, conditional on being uncensored. The dependent variable, total assets, distance, GDP, and risk are in logs. All censored observations are left-censored at zero. Standard errors are shown in parentheses. *, **, and *** are significant at the 10 percent, 5 percent, and 1 percent levels, respectively. Note that $1.34e{-}02 \equiv 1.34 \cdot 10^{-2} \equiv 0.0134$.

We find a positive coefficient. More-profitable banks have more cash flow to finance foreign investments. This is consistent with the Barron and Valev (2000) model, which implies that wealth constraints impede the international expansion of banks.

We include a measure for the degree of internationalization of the reporting bank. To compute this measure, we use the sum of cross-border lending and borrowing, scaled by total lending and borrowing. It might be objected that this variable is endogenous because our dependent variables capture proxies for the internationalization of banks as well. However, we do not believe that endogeneity is a serious concern because we use aggregated data for the individual bank rather than bilateral assets and liabilities in a given host country. Our results strongly suggest that more-international banks also hold larger investments abroad. Moreover, dropping the internationalization variable leaves all remaining results unaffected, with regard to both the signs and the significance levels of the other coefficients.

4.2.2   Characteristics of the Financial System

Whereas the characteristics of the individual bank affect the decision on *whether* to invest abroad, characteristics of the local banking and financial system are likely to affect the choice of *where* to invest. Hence, we include several proxies for the structure of the host country's banking system.

We use three measures for the size of the banking and financial system. The first, the size of the banking system assets relative to host-country GDP (*banking system assets/GDP*), is insignificant if we additionally include the employment in the financial system as a percentage of total employment. Employment in the financial system (*employment share*) is positive and significant throughout. If we exclude the employment share, the size of the banking system is positive and significant.[6] Hence, while the size of the banking sector matters, the effect comes through employment in the financial sector. This supports the hypothesis that specialized labor markets increase the attractiveness of locations for FDI by banks.

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[6]We also experimented with a measure of stock market capitalization over GDP. This variable (*traded stocks*) has a negative impact on FDI of German banks, which would be consistent with the interpretation that German banks focus on countries with bank- rather than market-based financial systems.

As a third measure for the size of the financial system, we include value added in financial services (*value added*) as a percentage of total value added. Again, the expected impact is not clear cut. A high percentage of value added in financial services may indicate a large demand for financial services, but it may also indicate that the financial system is quite developed and that new entrants are finding it difficult to find a market niche. We indeed find a negative impact of value added in the financial services sector.

We include two additional measures of the degree of competition in the host country's banking system: the number of banks (*number of non-German banks*) and the degree of concentration (*concentration*). The number of banks serves as a proxy for the competitive environment in the host country. We exclude the number of German banks from this measure. The competitive impact of the presence of other banks may differ from that of German banks if German banks have a comparative advantage in servicing German nonfinancial firms.[7] The number of other, non-German banks is positive in the baseline regression, which would be consistent with the interpretation that a large number of banks increases the attractiveness of a particular country rather than increasing competitive pressure.

The degree of concentration can have two opposite effects on the profitability of entry. On the one hand, high concentration ratios can be an indication that profitability in the host-country banking system is high. This should encourage entry. On the other hand, high measures of concentration may indicate that the contestability of local markets is limited. This should discourage entry. Our results suggest that the latter effect dominates.

Finally, we include *return on average equity* as a measure of the profitability of the local banking system. This variable has no significant impact on German banks' entry decisions.

The degree of regulation in the host country's banking system is captured through different indicators. The degree of economic freedom (*freedom*) in banking assigns a lower index number to countries that heavily regulate banks. We expect to find a positive coefficient, but this variable is insignificant. *Capital controls* is a dummy

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[7]Evidence in Berger et al. (2003) contradicts this expectation. They find that the foreign offices of multinationals are more likely to use a host-nation bank, rather than a home-nation bank, for the financial services they require.

that is set at 1 if countries impose controls on cross-border financial credits. This variable is insignificant as well, possibly because we are dealing with a relatively homogenous sample of OECD countries. Hence, there is relatively little cross-sectional variation in this variable.

We include two measures of the quality of the host country's supervisory system. Barth, Caprio, and Levine (2001) have compiled a comprehensive data set on banking supervision around the globe. From this database, we follow Buch and DeLong (2004) and construct two indices that capture the power of the banking supervision authorities to intervene in banks (*supervision*) and the transparency of the supervisory system (*transparency*). Both indicators assume higher values if the quality of the supervisory system improves. Results indicate that German banks appreciate greater transparency of the host-country banking system, while the effect of the power of banking supervisors is insignificant.

4.2.3   Country-Level Explanatory Variables

Besides the structure of the host country's financial system, general characteristics of the host country are likely to affect financial institutions' FDI. These characteristics of the host country can be grouped into proxies for market size; geographical, cultural, and economic distance; and the degree of (macroeconomic) stability.[8]

Gross domestic product (*GDP*) (in logs) is included to control for market size. Additionally, we use the ratio of bilateral trade (*trade*) between Germany and a given host country relative to host-country GDP as a proxy for the intensity of trade relations. This variable is a measure of the trade-related demand for banking services, and we expect a positive coefficient. Since we are using bank-level data as the dependent variable, potential endogeneity of bilateral trade is not an issue.

Both proxies for the size of the foreign market have a positive sign. One interpretation is that banks go abroad to realize economies of scale. A significant impact of trade on the internationalization of

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[8]We do not include a dummy for the presence of a common border or a common language dummy, because countries sharing a common border with Germany, or which are German speaking, tend to be captured through the EU dummy and the distance variable.

banks has often been interpreted in terms of banks following their customers abroad, although the direction of causality has remained largely unexplored. Although we cannot directly link banks to their individual customers, we note that the positive impact of trade would be consistent with such a story.

The geographical *distance* between Berlin and the capital of the host country (in kilometers) is expected to reduce banks' FDI. Greater distances lead to higher communication and information costs, because they curtail face-to-face communication and networking. Moreover, greater distances reflect differences in culture, language, and institutions. Results confirm this expectation: distance is negative and significant.

We use *inflation* and a measure for political *risk* to control for the stability of the host country. The impact of inflation on FDI is not clear cut a priori. On the one hand, inflation could have a negative impact, since it implies increased macroeconomic instability. On the other hand, higher inflation might also have a positive impact on the nominal dependent variable we are using. In our data, the positive effect dominates. As a proxy for political risk, we include risk as a composite index of country risk, taken from various issues of *Euromoney*. We transform this variable so that it has a higher score when country risk is high. However, we find an insignificant coefficient.

Finally, we add a dummy variable *EU* that is set to 1 for countries that are members of the European Union. Contrary to expectations that the Single Market Program might have promoted cross-border entry, we find an insignificant sign. The reason could be that the Single Market Program has also eased the provision of services to foreign countries through cross-border lending, thereby reducing incentives to engage in FDI.

4.2.4   Small Banks versus Large Banks

Results in table 1 show that differences between large and small banks regarding the determinants of FDI are relatively minor. There are a few variables for which we obtain different results. The positive impact of the degree of banks' internationalization is driven by the large banks in the sample. For the small banks, internationalization is insignificant.

Likewise, the positive impact of GDP stems only from the larger banks. This is consistent with the hypothesis that smaller banks seek their market opportunities in (small) niche markets. These niche markets are not attractive to larger banks, because they do not provide sufficient opportunity to realize economies of scale. Also, we find the expected positive coefficient on the variable capturing the power of banking supervisors for the large banks only.

But there are also a few variables that are significant in the subsample of small banks only. The negative impact of distance is driven by the small banks. This would be consistent with an interpretation of distance as a proxy for the fixed costs of entry that are more difficult to cover for small banks. Likewise, capital controls discourage FDI by small banks but not by large banks. The negative EU effect for the small banks would be consistent with the hypothesis that the Single Market Program has eased cross-border lending more than it has lowered barriers for FDI.

In terms of explanatory power, we achieve the best fit for the full sample (pseudo R^2 of 0.19). The R^2 falls to 0.17 and 0.14 for the large and the small banks, respectively. Hence, some of the explanatory power that we obtain in the full sample is driven by the heterogeneity across banks of different size.

4.3   Do Banks Cluster?

We next investigate whether clustering is important in German banks' international investment decisions. We test whether banks are particularly attracted to host countries where other German banks are already active. To do so, we use the aggregated FDI of other German banks (*FDI of others*) as an additional explanatory variable (see Head and Mayer 2004 or Chang, Chaudhuri, and Jayaratne 1997 for a similar strategy). Investment of the bank under study is excluded from this number. To avoid problems of multicollinearity, we use the residual of a regression of aggregated FDI on the remaining explanatory variables.

Aggregated FDI would capture clustering effects if the presence of other German banks created positive spillover. It is, however, also conceivable that the presence of other banks captures omitted variables that attract *all* banks to a certain market. We additionally include a full set of country fixed effects to address this possibility.

4.3.1   Proxies for Clustering Effects

To proxy for the activities of other German banks in foreign markets, we distinguish between the impact of the number of foreign banks abroad (N) and the average amount of FDI in a particular market ($\overline{FDI}$). Hence, we split up the investment of other banks in market j in period t into two components:

$$FDI_{jt} = \sum_{\substack{k=1 \\ k \neq i}}^{N} FDI_{kjt} = \overline{FDI}_{jt} \cdot N_{jt}. \qquad (3)$$

By splitting up the investment of other banks, we acknowledge that the impact of foreign entry on the profitability of domestic banks depends on the number of banks entering rather than on their market share, i.e., the amount that they have invested. Evidence in Claessens, Demirgüc-Kunt, and Huizinga (2001) on the impact of foreign entry on the profitability of the incumbents suggests that the number of competitors matters. Here, we look at a related issue, namely, the impact of the activity of other German banks on new entrants.

4.3.2   Aggregated FDI

Before splitting up the investment of other banks into its components, we use the sum of FDI of others (FDI_{jt}) as an additional regressor. Results are given in columns 1 and 2 of table 2.

Column 1 of table 2 presents the results without including country fixed effects, while column 2 has the results with a full set of country fixed effects. Column 1 shows a positive and significant effect of the FDI of others, but this effect disappears if we include country dummies. Hence, the positive effect reflects omitted variables that capture the general attractiveness of a country. Including country fixed effects even has a significant impact on the sign of the FDI of others: this variable switches from being significantly positive to being significantly negative. Our results thus suggest that the competition effect dominates.

One set of variables that is robust against the inclusion of country fixed effects is the set of bank-specific variables. These remain significant and retain their signs as well as an almost identical magnitude.

Table 2. Regression Results Including Other Banks' FDI

	All Banks	All Banks	All Banks	All Banks
Country Fixed Effects	NO	YES	NO	YES
Time Fixed Effects	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES
FDI of Others (Residual)	2.92*** (0.52)	−3.71*** (0.84)		
Number of Others (Residual)			0.01 (0.02)	−0.06*** (0.02)
Mean FDI of Others (Residual)			0.04 (0.03)	0.07 (0.05)
Internationalization	0.26*** (0.02)	0.25*** (0.02)	0.26*** (0.02)	0.26*** (0.02)
Assets	8.60*** (0.31)	8.31*** (0.30)	8.51*** (0.31)	8.42*** (0.30)
Profitability	1.56*** (0.13)	1.49*** (0.13)	1.53*** (0.13)	1.52*** (0.13)
Distance	−3.57*** (1.11)	−21.41*** (5.36)	−3.19*** (1.15)	−16.93*** (5.19)
Inflation	0.77*** (0.27)	0.22 (0.41)	0.90*** (0.29)	−0.06 (0.42)
GDP	3.37*** (0.85)	−16.65* (9.43)	3.35*** (0.84)	−3.41 (9.54)

Table 2 (continued). Regression Results Including Other Banks' FDI

	All Banks	All Banks	All Banks	All Banks	All Banks
Country Fixed Effects	NO	YES	YES	NO	YES
Time Fixed Effects	YES	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES	YES
Trade	0.51***	−1.32***	−0.80*	0.52***	−0.80*
	(0.10)	(0.44)	(0.42)	(0.10)	(0.42)
Risk	−0.17	−0.13	0.04	−0.06	0.04
	(0.13)	(0.25)	(0.26)	(0.13)	(0.26)
Freedom	−1.53	4.75**	3.52*	−1.10	3.52*
	(0.95)	(2.05)	(2.03)	(0.99)	(2.03)
Supervision	0.06	−11.73***	−9.48**	0.20	−9.48**
	(0.42)	(4.12)	(4.08)	(0.42)	(4.08)
Transparency	6.21***	9.58	−4.40	6.19***	−4.40
	(0.85)	(11.22)	(11.82)	(0.85)	(11.82)
Capital Controls	−1.66	0.42	2.00	−2.05	2.00
	(1.74)	(2.96)	(3.02)	(1.75)	(3.02)
EU	−4.29	−35.47***	−23.71***	−1.77	−23.71***
	(2.90)	(9.58)	(8.91)	(2.98)	(8.91)
Number of Non-German Banks	−0.03	0.08	−0.15	0.48	−0.15
	(0.31)	(2.01)	(2.01)	(0.32)	(2.01)
Banking System Assets/GDP	0.01	−0.01	0.01	0.00	0.01
	(0.00)	(0.02)	(0.02)	(0.00)	(0.02)

(continued)

Table 2 (continued). Regression Results Including Other Banks' FDI

	All Banks	All Banks	All Banks	All Banks
Country Fixed Effects	NO	YES	NO	YES
Time Fixed Effects	YES	YES	YES	YES
Dummies for Bank Types	YES	YES	YES	YES
Return on Average Equity	0.00 (0.02)	0.05* (0.03)	−0.01 (0.02)	0.01 (0.03)
Concentration	−0.40*** (0.05)	0.01 (0.39)	−0.36*** (0.05)	−0.19 (0.40)
Value Added	−0.38 (0.41)	−0.55 (0.83)	−1.08*** (0.41)	−0.91 (0.85)
Employment Share	3.11* (1.65)	−8.24 (5.08)	6.75*** (1.61)	−11.52** (5.67)
Constant	−300.96*** (34.00)	406.27 (277.78)	−313.21*** (33.89)	52.20 (275.37)
Number of Observations (N * T)	12,540	12,540	12,540	12,540
Adjusted R^2	0.20	0.21	0.19	0.21

Note: See also table 1. "FDI of Others" is the residual of a regression of the FDI of other German banks in a given market on the remaining explanatory variables. "Number of Others" is the residual of a regression of the number of other German banks' affiliates in a given market on the remaining explanatory variables. "Mean FDI of Others" is the corresponding mean amount of investment per banks. Investment of the bank under study has been excluded from these aggregates. Only OECD countries are included. Tobit coefficients are shown instead of marginal effects. Standard errors are shown in parentheses. *, **, and *** are significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

This is not very surprising, given that the country fixed effects are unrelated to bank-specific factors.

Of the variables capturing country characteristics, only one variable is unaffected by the inclusion of country fixed effects: distance remains negative and significant. GDP, trade, and supervision, in contrast, tend to become negative. The indicator of economic freedom, by contrast, now has the expected positive sign. The reason for these changes in signs and significance is that the country-level variables are correlated with the country fixed effects.

4.3.3 Splitting Up Aggregated FDI

Including the aggregated FDI of other banks has the disadvantage of not enabling a distinction to be made between the effects of the number of competitors and those of the average size of their foreign affiliates. To give an example, there might be a country where only a few German banks are active but where these banks have made large foreign investments. Aggregated FDI in this country might be similar to that in a country where many banks operate but where the average volume of investment is small.

Moreover, the number of banks present in a foreign market—rather than the volume of their activities—might affect the competitive structure if banks serve as points of contact. Even if the local banks do not lend themselves, they might still arrange loans through their headquarters at home.

We split up aggregated investment abroad into the number of other German banks' affiliates (*number of others*) and the mean amount of FDI of those banks abroad (*mean FDI of others*), as described in equation (3).[9] Results are given in columns 3 and 4 of table 2. Both components of aggregated FDI are insignificant.[10] For the small banks, however, the average volume of investment of others

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[9]Including the number of other banks in addition to the volume of investment also allows us to test the extent to which possible clustering effects are only valuation effects caused by exchange rate changes. Since we find similar results for the volume and the number of FDI, the co-movement of activities abroad is not due to exchange rate valuation effects.

[10]In panel probit regressions (not reported) and in regressions not including mean investment of others, the number of other banks is positive and significant if no country fixed effects are included.

is positive and significant.[11] The remaining results are practically unchanged compared to the baseline regression.

As before, however, the inclusion of a full set of country dummies changes the impact of the activities of other banks. The impact of the number of other banks' affiliates now becomes significantly negative. This effect is driven by the small banks. For the large banks, the effect of the number of other banks remains insignificant. For the small banks, the effect of other banks' mean investment is positive and significant, and this effect is not influenced by the country fixed effects.

Generally, these results are consistent with the hypothesis that the activities of other banks do not capture clustering effects but rather competition effects. The more active German banks are in a foreign market (measured either in terms of their investments or their number), the less attractive this market is to further entrants from Germany. The positive coefficients found in regressions that do not include country fixed effects reflect omitted country effects. At the same time, the positive effect of mean investments of other banks that we find for the small banks suggests that, if anything, clustering effects are more important to small banks than to large banks.

This would be consistent with the model by Barron and Valev (2000) that small banks are more wealth constrained and thus more likely to follow rather than to lead.

4.3.4   Robustness Tests

To check the robustness of our results, we apply a three-step approach. We split our banks into those with a high and a low share of noninterest income, we use a panel probit model and lagged variables to better exploit the time-series dimension of our data, and we include the activities of other nonbanks.

In a first step, we split the banks according to their noninterest income as a percentage of total income from operational business.

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[11]This, and the following results of the comparison of large and small banks, is not reported but is available upon request. The results also come from a probit model since the corresponding tobit model did not converge for the small banks.

The purpose of this exercise is to check whether banks that are predominantly commercial banks behave differently from those that are predominantly investment banks. Since German banks are universal banks, no legal classification into commercial and investment banks is available to us. Therefore, banks that receive more than half of their revenue from noninterest income are classified as investment banks, and the others are referred to as commercial banks. Overall, commercial banks according to this definition dominate the sample, and they also dominate the baseline regression results (not reported). There are some interesting differences between the two groups of banks, though. Distance, GDP, and trade are insignificant for the investment banks. Also, regulatory factors such as the degree of transparency do not matter for these banks. Finally, FDI by commercial banks—but not investment banks' FDI—reacts positively to FDI by other German banks, but, as in the full sample, these effects become negative if we include country fixed effects.

In a second step, we run our model as a panel probit model, and we also include lagged terms to capture the time dimension of our data. The main results are unaffected. Also, we largely confirm our earlier finding that other banks' activities have a positive impact when no country fixed effects are included. This positive impact becomes insignificant or even negative, though, if we include country fixed effects.

In a third step, we use the number of nonbanks' affiliates abroad as an additional explanatory variable. The variable has a positive and significant impact on the activities of German banks, which would support the hypothesis that banks are more active in those markets where their customers are. However, after including country fixed effects that control for unobserved country characteristics, this variable becomes insignificant.

5. Summary

In this paper, we have studied why German banks' FDI is concentrated in particular countries. It could be because some countries are inherently attractive or because there are positive clustering effects between banks' activities. Our empirical analysis tries to disentangle these effects by including variables that capture features of the

host-country financial and banking systems, proxies for clustering effects, and country fixed effects.

To analyze the determinants of German banks' FDI and to test whether clustering effects matter, we have used detailed bank-level data on the foreign direct investment patterns of German banks. Our study has three main findings.

First, banks are more highly invested in markets where other German banks are active as well. However, this is not due to agglomeration or clustering effects. If country fixed effects are included, other banks' activities have a negative impact on the foreign investment of German banks. These results would be consistent with a competition effect rather than a clustering effect.

Second, if anything, clustering is more important for small banks than for large banks. After including country fixed effects, activities of other banks have an insignificant impact on small banks' investment but a negative impact on large banks' investment. One reason could be that it is more difficult for small banks than large banks to obtain information on foreign markets and that they interpret the behavior of others as a signal regarding the profitability of investment.

Third, we confirm earlier literature with regard to the bank-level and the macroeconomic determinants of foreign banking activities. Larger, more-international, and more-profitable banks have numerous, and large, foreign affiliates. Larger countries and those with close trade links to Germany also attract more FDI from German banks. The impact of regulations and of variables capturing characteristics of the local banking market, though, has been more mixed. A higher degree of concentration and a higher share of value added in financial services, for instance, discourage entry. By contrast, a larger number of incumbent banks and a high share of employment in financial services encourage entry. These overall determinants of FDI are similar for small and large German banks alike.

Appendix. Descriptive Statistics and Regression Results

Table 3. Descriptive Statistics (2003)

A. Summary Statistics	Variable	Observations	Mean	Standard Deviation
All Banks	FDI (€ million)	3,080	29.0	709.0
	Profitability (%)	3,080	6.0	3.0
	Internationalization (%)	3,080	17.7	20.1
	Distance (km)	3,080	3,370.3	4,679.1
	Inflation (%)	3,080	3.2	4.2
	Freedom	3,080	3.1	0.8
	Supervision	2,790	3.7	1.6
	Transparency	2,790	2.0	0.8
	GDP (€ billion)	3,080	8,610.0	18,600.0
	Risk	3,080	15.8	13.8
	(Bilateral) Trade/GDP (%)	3,080	12.4	11.8
	Concentration (%)	3,080	76.0	19.1
	Value Added (%) [in 2002]	2,640	4.6	4.1
	Employment Share (%) [in 2002]	2,640	2.1	1.5
	Banking System Assets/GDP (%)	3,080	253.9	352.7
	Return on Average Equity	3,080	12.7	10.5

(*continued*)

Table 3 (continued). Descriptive Statistics (2003)

A. Summary Statistics (continued)

Variable		Observations	Mean	Standard Deviation
Small banks	FDI (€ million)	2,324	0.8	8.6
	Profitability (%)	2,324	6.3	3.3
	Internationalization (%)	2,324	15.5	20.8
Large Banks	FDI (€ million)	756	116.0	1,430.0
	Profitability (%)	756	5.2	1.3
	Internationalization (%)	756	24.5	16.0

B. Internationalization of Small and Large Banks

	Small	Large	All
Number of Banks	83.0	27.0	110.0
FDI			
Amount (€ billion)	1.8	87.5	89.3
Affiliates (number)	99.0	700.0	799.0
Amount per Affiliate (€ million)	18.2	125.0	111.8
FDI/Total Assets (%)	0.35	2.79	2.44
FDI/Yields from Operational Business (%)	6.28	53.19	46.21

Note: We define small banks as those with total assets below €31.4 billion and large banks as those with assets exceeding that value. For the period under study, these cut-off points roughly correspond to the 75% quantile of banks reporting FDI. The number of observations is given as the number of banks times the number of countries times the number of years in the sample.

Table 4. Data Definitions

Variable	Definition	Source
	Bank-Level Variables	
FDI	Sum of primary and secondary direct investment in equity capital minus profits/losses for the current financial year (in €). For banks acting as direct investors, loans and trade credits owed by an affiliate (i.e., loan capital for nonbank investors) are typically not counted as FDI. We therefore only use FDI in equity capital. The original data include profit and losses for the current financial year, as the data are taken from the balance sheet before the allocation of net income. The "original" FDI data thus include profits to be distributed and thus part of the profits to be repatriated. Since we do not want to count these profits as FDI, profits or losses for the current financial year are deducted. Therefore, reinvested earnings appear in next year's revenue reserves or in the profits carried forward.	Deutsche Bundesbank MiDi Data (Micro Database Direct Investment)
Internationalization	Sum of cross-border claims and liabilities over total claims and liabilities (both in €).	Deutsche Bundesbank (Monthly Banking Statistics)
Profitability	Yields from operational business (interest income plus current income from shares/securities plus provisions) over total assets (all in €).	
Assets	Total assets (in €).	
Savings Bank	Dummy: 1 for savings banks; otherwise 0.	
Cooperative Bank	Dummy: 1 for cooperative banks; otherwise 0.	

Table 4 (continued). Data Definitions

Variable	Definition	Source
	Market Size	
(Bilateral) Trade	Sum of bilateral trade (exports plus imports) (in €) over GDP (in USD converted to €).	Deutsche Bundesbank, OECD
GDP	Gross domestic product (in USD converted to €).	OECD
	Geographical and Cultural Distance	
Distance	Great circle distance between Berlin and other capital cities (in km).	U.S. Dept. of Agriculture, http://www.wcrl.ars.usda.gov/cec/java/capitals.htm
	Characteristics of Host-Country Financial Market	
All Non-German Banks	Total number of banks in the host country minus affiliates of German banks (in logs). Data are available for the years 1996–2003.	OECD (2005)
Share of Banks	Assets of the banking system (only banks with assets of more than €1 billion are included) relative to host-country GDP (in %). Data are available for the years 1998–2003.	Bankscope, OECD
Return on Average Equity	Only banks with assets of more than €1 billion are included. Data are available for the years 1998–2004.	Bankscope
Concentration	Assets of the five largest banks relative to total assets of the banking system (only banks with assets of more than €1 billion are included) (in %). Data are available for the years 1998–2004.	Bankscope

(continued)

Table 4 (continued). Data Definitions

Variable	Definition	Source
	Characteristics of Host-Country Financial Market (continued)	
Traded Stocks	Value of traded stocks relative to GDP (in %).	World Bank (2005)
Value Added	Share of value added in the financial services sector (ISIC Rev. 3 Sector 65: "Financial intermediation, except insurance and pension funding") relative to total value added (in %). Data are available for the years 1979–2002.	Groningen Growth and Development Centre, 60-Industry Database, February 2005, http://www.ggdc.net
Employment Share	Share of employment in the financial services sector (ISIC Rev. 3 Sector 65: "Financial intermediation, except insurance and pension funding") relative to total employment (in %). Data are available for the years 1979–2002.	
	Stability and Regulations	
Inflation	GDP deflator.	OECD
Risk	Composite index of country risk. The index is composed as follows: 25% political risk, 25% economic performance, 10% debt indicators, 10% debt in default/rescheduled, 10% credit ratings, 5% access to bank finance, 5% access to short-term finance, 5% access to capital markets, 5% discount on forfeiting. The original variable takes values from 100 (low risk) to 0 (high risk). The risk index used here has a lower score when country risk is small, i.e., we transformed the original data using x' = 100 − x.	*Euromoney* (various issues).
Freedom	Index of Economic Freedom in Banking. The index used here runs from 1 to 5, and a lower value indicates a more regulated system, i.e., we have transformed the original index values using x' = 5 − x.	Heritage Foundation (2005)

Table 4 (continued). Data Definitions

Variable	Definition	Source
	Stability and Regulations (continued)	
Capital Controls	0–1 dummy variable for the existence of controls for cross-border financial credits.	IMF (various issues)
EU	Dummy: 1 for EU member states; otherwise 0.	—
Supervision	Index of toughness of banking supervisors, which has been computed as the sum of 1–0 dummies capturing the following aspects: (i) Are supervisors legally liable for their actions? (ii) Can the supervisory agency supersede bank shareholder rights and declare a bank insolvent? (iii) Can the supervisory agency order directors/management to form provisions to cover actual/potential losses? (iv) Can the supervisory agency suspend dividends? (v) Can the supervisory agency suspend bonuses? (vi) Can the supervisory agency suspend management fees? The index runs from 0 to 6, and a higher value indicates greater supervisory power.	Barth, Caprio, and Levine (2001), own calculations
Transparency	Index of disclosure requirements in the banking industry, which has been computed as the sum of 1–0 dummies capturing the following aspects: (i) Are consolidated accounts covering bank and any nonbank financial subsidiaries required? (ii) Are off-balance-sheet items disclosed to the public? (iii) Must banks disclose risk management procedures to the public? (iv) Do regulations require credit ratings for commercial banks? The index runs from 0 to 4, and a higher value indicates greater transparency.	Barth, Caprio, and Levine (2001), own calculations

Note: All data denominated in foreign currencies (e.g., the data retrieved from the World Bank's *World Development Indicators* CD-ROM) are converted into euros. For the 1997–98 period, foreign currencies are converted into Deutsche marks and then into euros, using the fixed conversion rate for the Deutsche mark, which is DM 1.95583/€1. For year-end data, year-end exchange rates are used, whereas other data such as the GDP numbers are converted using the average exchange rates of the year in question.

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