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Foreign Bank Entry into Emerging Economies: An Empirical Assessment of the Determinants and Risks Predicated on German FDI Data

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Abstract

The paper investigates the factors crucial in the locational decisions of multinational German banks in selected emerging markets of central and eastern Europe, Latin America and Asia between 1994 and 2001. Emphasis is placed on testing variables of macroeconomic and financial sector risk along with measures of bank-client integration and host country market characteristics. Results indicate that FDI by non-banks exerted a strong pull effect on banking FDI flows, as did highly developed financial markets and a low country risk. No particularly meaningful effects are found in the sample for per capita GDP or trade linkages. A strong case can be made for a variable taken from the "early warning indicators" literature which measures the backing of short-term banking deposits by international currency reserves. In almost all regressions, this financial crisis variable turns out be highly negatively correlated with FDI flows. Disaggregation of the sample by region illustrates that the factors which are at work differ between the continents. Comparing pre- and post-Asian-crisis time periods, it is found that both variables of country riskiness gain significance in the later sub-sample, with the result being especially pronounced for the measure of financial vulnerability.

Key words: foreign direct investment, banks, emerging markets, macroeconomic risk

JEL Classification: F21, G21

Non-Technical Summary

In the literature on foreign direct investment (FDI) of the financial sector most studies find a strong relationship between FDI and bilateral trade linkages as well as the decision of non-banks to enter emerging markets, a phenomenon that is commonly called the “follow the client” motive. Other factors that have been shown to exert a positive influence on direct investment are host country income, the level of development of the financial sector abroad and its openness to foreign bank entry as well as the profit margin to be had there. A number of studies also stress that foreign multinational banks are deterred by a high degree of country or political risk.

A limitation of the previous work in this field is that most studies are only concerned with banking FDI between developed countries and thus do not consider the distinctive framework concerning various risk factors which is prevalent in emerging markets. Another drawback is that many studies use relatively dated time series which inhibits analysis of the changed financial market conditions in the aftermath of the Asian crisis. This paper aims to close this gap by focussing on FDI flows into emerging markets exclusively and using data from the mid-1990s onward. It analyzes the factors crucial in the locational decisions of multinational German banks in selected emerging markets of central and eastern Europe, Latin America and Asia. Emphasis is placed on testing variables of macroeconomic and financial sector risk along with measures of bank-client integration and host country market characteristics. As an innovation in this strand of FDI research, a variable taken from the literature on “early warning indicators” which measures the backing of short-term banking deposits by international currency reserves is put to econometric testing.

The estimation outcome makes a strong case for the devastating impact of looming banking crises. In almost all regressions, this crisis variable shows a highly significantly negative correlation with normalized FDI flows (dependent variable: absolute FDI divided by host country GDP). Other exogenous variables tested to have a strong pull effect are, as expected, agglomeration effects in terms of non-banking FDI of German firms and financial market development measured by stock market capitalization relative to GDP. By contrast, per-capita income, country risk and openness of the financial sector abroad play a lesser role. Profit considerations cannot be shown to have an influence at all. The significance of the variable of trade linkages is not robust.

Disaggregation of the sample by region illustrates that the factors which are at work differ between the continents. While for the small sample of European countries economic growth is the distinguishing positive factor along with the absence of banking crises, German banks in Latin America were drawn into locations that are considered financial centers, and Asian host countries were chosen according to strong inflows of non-financial German FDI. Comparing

pre- and post-Asian-crisis time periods, it is found that both variables of country riskiness gain significance in the later sub-sample, with the result being especially pronounced for the measure of financial vulnerability. This finding indicates that German banks learned from the Asian debacle, adjusting their holdings when the viability of the foreign financial system was increasingly deemed at risk or proportionally shunning risky banking environments altogether.

The main conclusion of the paper is that in addition to traditional macroeconomic variables measures of country, and, more specifically, financial sector risk, influencing the variability of expected earnings, should also be taken into account when assessing the determinants of foreign bank entry.

Nichttechnische Zusammenfassung

In der Literatur zu ausländischen Direktinvestitionen („foreign direct investment“ – „FDI“) des Finanzsektors finden die meisten Studien eine enge Beziehung zwischen FDI und bilateraler Handelsverflechtung sowie der Entscheidung von Nichtbanken zum Markteintritt in Schwellenländern – ein Phänomen, das üblicherweise als „follow the client“-Motiv bezeichnet wird. Andere Faktoren, für die ein positiver Einfluss auf Direktinvestitionen nachgewiesen worden ist, umfassen das Volkseinkommen des Empfängerlandes, den Entwicklungsgrad des dortigen Finanzsektors und seine Offenheit gegenüber dem Zutritt ausländischer Banken sowie die dort zu erzielende Gewinnmarge. Eine Reihe von Studien betont zudem, dass multinationale Banken durch hohes Länder- bzw. politisches Risiko abgeschreckt werden.

Ein Manko der bisherigen Arbeiten auf diesem Gebiet liegt darin, dass die meisten Untersuchungen sich nur mit Direktinvestitionen zwischen Industrieländern befassen und somit nicht die unterschiedlichen Rahmenbedingungen hinsichtlich diverser Risikofaktoren berücksichtigen, die in Schwellenländern vorherrschen. Ein anderer Nachteil ist, dass viele Studien vergleichsweise veraltete Daten nutzen, was die Analyse der veränderten Finanzmarktbedingungen im Gefolge der Asienkrise verhindert. Das vorliegende Diskussionspapier versucht diese Lücke zu schließen, indem es sich auf Zuflüsse von Direktinvestitionen in Schwellenländer beschränkt und dafür Daten seit Mitte der neunziger Jahre verwendet. Die Untersuchung analysiert die Faktoren, die für die Standortentscheidungen deutscher Banken in ausgewählten Schwellenländern in Mittel- und Osteuropa, Lateinamerika und Asien entscheidend waren. Das Schwergewicht liegt dabei auf der Überprüfung von Länder- und Finanzsektorrisiken in Verbindung mit anderen Charakteristika der Gastländer und dem Grad der Verflechtungen zwischen Banken und ihren dort ansässigen Firmenkunden. Als Innovation in diesem Zweig der FDI-Forschung wird eine der Literatur zu Frühwarnindikatoren entliehene Variable, die die Unterlegung von kurzfristigen Bankverbindlichkeiten durch Währungsreserven misst, in die ökonometrische Überprüfung einbezogen.

Die Schätzergebnisse bestätigen nachdrücklich die verheerende Wirkung von schwelenden Bankenkrisen. In fast allen Regressionen zeigt die Bankenkrisenvariable eine hochsignifikant negative Korrelation mit der abhängigen Variablen „Direktinvestitionsstrom in Relation zum Bruttoinlandsprodukt des Gastlandes“. Andere exogene Variable, die eine starke Anziehungswirkung auf FDI entfalten, sind, wie erwartet, Agglomerationseffekte im Sinne deutscher Nichtbanken-FDI und das als Verhältnis von Aktienmarktkapitalisierung zu Bruttoinlandsprodukt gemessene Niveau der Finanzmarktentwicklung. Hingegen spielen das Pro-Kopf-Einkommen, das allgemeine Länderrisiko und der Offenheitsgrad des ausländischen Finanzsektors eine geringere Rolle. Dass Ertragserwägungen überhaupt einen Einfluss haben,

ist nicht nachzuweisen. Die Signifikanz der die Handelsverflechtung abbildenden Variablen ist letztlich nicht robust.

Die Disaggregation der Stichprobe nach Regionen veranschaulicht, dass die Einflussfaktoren zwischen den Kontinenten differieren. Während für die kleine Stichprobe der europäischen Länder neben dem Ausbleiben von Bankenkrisen das Wirtschaftswachstum der entscheidende Faktor ist, zog es deutsche Banken in Lateinamerika in Länder mit Finanzzentren, und die Gastländer Asiens wurden entsprechend des Zustroms an Direktinvestitionskapital deutscher Nichtbanken ausgewählt. Ein Vergleich der Zeitabschnitte vor und nach der Asienkrise zeigt, dass beide Länderrisikovariablen in der Nachkrisenstichprobe an Signifikanz gewonnen haben. Dies gilt im besonderen Maße für die Sensibilität gegenüber Bankenkrisen. Dieses Ergebnis deutet darauf hin, dass die deutschen Banken aus der Asienkrise gelernt haben und ihre Positionen anpassten, wenn die Funktionsfähigkeit des ausländischen Finanzsystems zunehmend als gefährdet erschien, oder riskante Bankenmärkte ganz und gar mieden.

Die zentrale Schlussfolgerung dieser Untersuchung ist, dass zusätzlich zu traditionellen makroökonomischen Variablen auch Messgrößen des Länderrisikos und speziell des Finanzsektorrisikos, die die Variabilität der erwarteten Erträge beeinflussen, bei der Einschätzung der die Bankenansiedlung im Ausland beeinflussenden Bestimmungsgründe in Betracht gezogen werden sollten.

Contents

Foreign Bank Entry into Emerging Economies: An Empirical Assessment of the Determinants and Risks Predicated on German FDI Data

1 Introduction

Over the past decade, a large number of countries, especially those in emerging markets, opted to open their banking sectors to foreign equity participation. Since the onset of this type of financial liberalization, foreign direct investment of banks domiciled in industrialized countries has grown strongly, attracting the attention of researchers. Studies on the locational choices of multinational banks have gradually proliferated in the empirical literature. There is now an established body of evidence on commonly agreed determinants of banking FDI. These investigations highlight the role of market integration, causing banks to establish foreign subsidiaries when their customers go international (via trade or direct investment), as well as of locational factors abroad such as financial sector development or the lack of competition tantamount to large banking margins.

Several studies, most prominently perhaps the one by Focarelli and Pozzolo (2001), have used microeconometric methods to explore which banks expand abroad and have found that the size of banks, their efficiency, and restrictions on banking at home are generally decisive factors.[1] In forthcoming papers, Buch and Lipponer (2004a, 2004b) furnish micro-level, i.e. bank-specific evidence that bank size, profitability and the degree of internationalization are unquestionably positively correlated with the decision to enter foreign banking markets. Even so, most studies analyze FDI by banks between developed economies and thus do not consider the distinctive framework concerning various risk factors which is prevalent in emerging markets. Another common limitation is that many studies use relatively dated time series which inhibits analysis of the changed financial market conditions in the aftermath of the Asian crisis.

This paper aims at closing this gap in the empirical literature by investigating the factors crucial to the locational decisions of multinational German banks in selected emerging markets between 1994 and 2001. Specifically, emphasis is placed on testing variables of macroeconomic and financial sector risk. The latter is measured by a crisis variable taken from the literature on "early warning indicators", which, as it turns out, strongly impacts FDI by banks. As a dependent variable, quasi-flows derived from differences in adjusted FDI stocks are used. Aggregate German banking FDI flows to the 20 countries in the sample quintupled during the sample period. This verdict also holds for global FDI flows into

[1] See Clarke et al. (2001), pp. 10-13, for a survey of the empirical literature.

emerging banking markets. As Galindo et al. (2002) illustrate, foreign control of local banks in Latin America more than quadrupled throughout the sample period, with the most extreme case being Mexico whose foreign control rate went up from almost zero in 1994 to nearly 80% in 2001. By the end of the sample period, eastern European banking markets were also under majority control by foreign institutions (see Table 6, Appendix). In Asia, even though FDI inflows were among the largest world-wide, foreign control of local banks was virtually non-existent at the time, which suggests that governments in emerging Asia were keen on opening up to foreign investment capital while retaining control over domestic banks by allowing minority stakes only.

The paper is structured as follows: The next section discusses the theoretical framework for selecting explanatory variables which reflects the risk-return tradeoff an individual bank faces when maximizing its utility within a two-country portfolio choice model. Section three provides a review of the literature on FDI in banking. The quantitative approach is laid out in section four along with stylized facts on the time-varying distribution of FDI stock of German banks across the sample countries. Next, in section five, the set of variables previously derived in the theoretical part is subjected to econometric testing, first for the whole sample and then broken down by region and time period. The study closes with a brief appraisal of the empirical results.

2 Models of Foreign Banking Activity

Within the literature on FDI of financial services companies, models of banking investments are clearly dominant. While it is possible, in principle, to extend such models to the direct investments of insurance firms, it has to be kept in mind that certain determinants, such as the interest rate spread between loans and deposits, only apply to banking institutions. Most studies take an ad-hoc approach to estimating determinants of FDI. However, even the few structural models of banking FDI – see, for example, Sabi (1988), Buch (1999 & 2000) – are relatively straightforward, recurring on the optimization of shares of portfolio investments. Combining the aforementioned approaches and tolerably simplifying them, banks' utility is dependent on expected returns (R^e) and the variability of returns (σ_R^2), such that:[2]

$$(1) \quad U_B = U(R^e, \sigma_R^2), \quad where \frac{\partial U}{\partial R^e} > 0 \quad and \quad \frac{\partial U}{\partial \sigma_R^2} < 0 .$$

In a two-country setting, expected (net) returns are calculated as the sum of interest earned on domestic and foreign loans net of interest costs on domestic and foreign deposits, whereas foreign positions are also subject to changes in the exchange rates:

[2] See Buch (2000), pp. 5-7.

(2) $E[R^e] = r_L L + (r_L^* + \Delta e)L^* + r_F R - r_D D - (r_D^* - \Delta e)D^*$,

with r_L (r_L^*) and r_D (r_D^*) being the expected interest rates on domestic (foreign) loans L (L^*) and corresponding deposits D (D^*), respectively, Δe the expected change in the bilateral nominal exchange rate and r_F the interest rate to be earned on a risk-free asset R. Variable administrative costs and the bank's initial wealth are dispensed with in this context.

The variance of expected returns for portfolio shares x_i is defined as:[3]

$$(3) \quad \sigma_R^2 = \sum_{m=1}^{4} x_m^2 \sigma_m^2 + 2 \sum_{m=1}^{4} \sum_{\substack{n=1 \\ m \neq n}}^{4} x_m x_n \sigma_m \sigma_n \rho_{mn} \quad where \quad x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} L \\ D \\ L^* \\ D^* \end{pmatrix} and \sum x_i \overset{!}{=} 1.$$

with σ and ρ, as usual, denoting the standard deviation of and the correlation coefficient between portfolio shares, respectively.

Maximizing the bank's utility subject to the restriction that total loans must not exceed available deposits, while noting that the volatility of returns from abroad also hinges on exchange rate fluctuations, the bank's optimal portfolio is determined as follows:[4]

$$(4) \quad \frac{\partial U_i}{\partial x_i} = \frac{\partial U_i}{\partial E(R^e)} * \frac{\partial E(R^e)}{\partial x_i} + \frac{\partial U_i}{\partial \sigma^2(R^e)} * \frac{\partial \sigma^2(R^e)}{\partial x_i} = 0.$$

Solving for x_i, the optimal portfolio shares turn out to be a function of expected excess returns on loans and deposits (e.g. excess return on loans = $r_L - r_F$), both at home and abroad, and on the degree of risk aversion of the individual bank.

This model, however, neglects the specific framework in which foreign direct investment is carried out. It fails to account for costs incurred by entering (or potentially exiting) the market, which, as Galindo et al. (2002) show for Latin America, vary substantially across jurisdictions and do influence foreign banking activity.[5] Nor does the analysis involve the real option value of postponing FDI in favor of continuing to lend to the foreign market. As to the latter factor, a stylized partial equilibrium model exploring the inter-linkages between policy uncertainty, real option value and the timing of FDI at the firm level was recently put forth by Chen and Funke (2003). As a caveat, the authors point out that their microeconomic model cannot be mechanically translated to aggregate investment, as it does not capture the strategic

[3] See Buch (1999), p. 15.

[4] Ibid, p. 17.

[5] The authors report that in the empirical analysis differences in the legal setup of host countries reduce bilateral (foreign) participation in the banking system abroad by at least 13%, see Galindo et al. (2002), pp. 13-15.

interaction among firms in the sense of early movers prompting similar investment by competitors which would otherwise have chosen to wait it out.[6] Blandón (1998) aims at assessing the importance of timing for direct investment. In a study on FDI in Spain, he shows that it is the banks with the strongest comparative advantages (size, international experience) that enter a new banking market first, lending support to the theory of ownership-specific advantages as an explanation for firms' expanding abroad (see section 3.2.1 below).

Returning to the portfolio choice approach, a distinct drawback concerning the empirical testing of the above model is, typically, the scarce availability of information on the expected rate of returns. This holds true even more for emerging markets, where economic conditions tend to vary greatly. Therefore, appropriate proxies for expected returns need to be derived. In general, it is possible to think of a variety of variables influencing the rate of return. Some are more direct than others, such as the prevailing interest rate spread or real interest rates as well as the degree of competition in the banking market determining whether monopoly rents may be reaped by prospective entrants. Among the variables which have a relatively indirect influence on banks' profitability abroad are those relating to specific beneficial characteristics of a certain location or to the ability of a given bank to capitalize on distinct ownership advantages.

Thus, a linear relationship between expected return and an array of proxy variables for such factors may be hypothesized:[7]

$$(5) \quad R^{e}_{i,t} = \alpha_{i,t} + \sum_{j=1}^{J} \beta \mathbf{I}_{j,i,t} + \sum_{k=1}^{K} \gamma \mathbf{P}_{k,i,t} + \varepsilon_{i,t} \ ,$$

with **I** and **P** denoting vectors of proxy variables for the degree of banks' internalization of comparative advantages and their profitability (in country *i* and year *t*), respectively. The vector **I** can be thought of as representing the ability to provide specific services *j* to home country clients that local banks abroad could not (see section 3.2.1), while **P** is deemed to depict characteristics (i.e. opportunities, challenges) of local banking markets *k*.

However, the above model addresses the issue of risk only indirectly, hiding it in the assumed variability of the proxy variables. The degree of risk is an important determinant of whether to enter an emerging market at all and if so, which foreign location to choose. In expanding to developing countries banks expose themselves to risks not present in their domestic markets.[8] If a certain bank relies heavily on income from unstable foreign locations, both borrowers, owing to possible non-renewal of loans, and creditors worried about the safety of deposits may reconsider their relationship with the bank.

[6] See Chen and Funke (2003), p. 14.

[7] See Sabi (1988), p. 435.

[8] See Williams (1997), pp. 85-86.

Be that as it may, it is the question of whether country risk or financial vulnerability matters for German banks that is at the heart of the present study. To isolate country-specific factors that have a more or less immediate influence on variability of banks' foreign earnings, a set of risk variables is explicitly included in the estimations.

Thus, the fundamental regression equation for FDI flows of the banking sector has the following form:

$$(6) \quad FDI_{i,t} = \alpha_{i,t} + \sum_{j=1}^{J} \beta_j \mathbf{FOLLOW}_{j,i,t} + \sum_{k=1}^{K} \gamma_k \mathbf{MARKET}_{k,i,t} + \sum_{l=1}^{L} \delta_l \mathbf{RISK}_{l,i,t} + \varepsilon_{i,t} \ ,$$

with

FOLLOW comprising a vector of up to *J* variables that are aimed at capturing home country banks' linkages to the rest of the economy's international operations as a proxy for the degree of internalization of comparative advantages:

- *FDINONBK* (lagged FDI outflows of the non-financial sectors relative to GDP),
- *TRADE* (lagged total trade with a given host country relative to its GDP),

MARKET containing up to *K* measures of banking market attractiveness in the host country:

- *GDPCAP* (real GDP per capita),
- *FINCTR* (ratio of stock market capitalization to GDP as proxy for financial centers),
- *REALINT, MARGIN* (real interest rate, i.e. lending rate minus inflation; and banking margin, i.e. lending minus deposit rates adjusted for exchange rate changes, respectively; both variables serve as proxies for potential profitability and the degree of competition),
- *BANKFREE, OPENNESS* (freedom from restrictions on banking activity, and on both openness to banking and investment flows, respectively), and the

RISK vector pertaining to as much as *L* variables of macroeconomic and institutional uncertainties facing foreign investors that are depicted by

- *CRISK* (country risk) and, as a sub-component, *PRISK* (political risk),
- *M2/RES* (ratio of M2 to gross international reserves as proxy for incipient banking crises),
- *RERVOL* (volatility of the real exchange rate).

The descriptions and sources of the variables employed in this study are detailed in the appendix (Table 7).

3 Review of the Literature and Hypothesized Variables

3.1 Endogenous Variable

Of the 17 empirical studies on foreign banking activity reviewed here, less than half actually consider outright foreign direct investment by banks (Sagari (1992), Buch and Lapp (1998), Yamori (1998), Buch (2000), Moshirian (2001)[9]) or investigate the incidence of foreign bank entry at the firm level by employing correlation analysis or probit estimation (Cardone-Riportella et al. (2000), Focarelli and Pozzolo (2001)). The remaining studies use as a dependent variable total assets of banks' foreign subsidiaries (Nigh et al. (1986), Sabi (1988), Goldberg and Johnson (1990), Miller and Parkhe (1998), Moshirian and Van der Laan (1998), Galindo et al. (2002)), the number of offices abroad (Goldberg and Johnson (1990), Brealey and Kaplanis (1996), Miller and Parkhe (1998), Papi and Revoltella (2000, variable: number of "FDI initiatives"), foreign banks' share in the host market (Claessens et al. (1998)) or subsidiaries' total lending (Seth et al. (1998)). In a sense, the use of total banking assets is the most comprehensive measure of foreign banking activity, and FDI represents – from a purely accounting perspective – merely a subset of total capital. Still, each concept depicts reasonably well the degree of cross-border funds supplied by parent companies which are predominately located in industrial countries.

The endogenous variable used in this study is the year-on-year difference in FDI stocks (direct and indirect holdings) of the German banking sector[10] adjusted[11] for deviating reporting dates, actual participation rates for indirect participating interests as well as repatriated profits, relative to host-country GDP. This normalized variable has the merit of automatically deflating the time series and accounting for exchange rate effects while at the same time largely eliminating unwarranted non-stationarity in the data. It would have been desirable to relate the FDI flow to the size of the banking sector in the host country but, as it turns out, the national accounts of several countries in the sample include the real estate industry or personal services in the financial sector without detailing the sub-components. While this limitation could, in principle, be tolerated, the fact that the Russian statistics, as provided by the IMF, include unrelated activities, *inter alia* subsoil resources and exploration, in financial services prohibits using the size of the financial sector as a normalization variable.

[9] The study by Moshirian (2001) uses merely balance-of-payments data when defining German FDI. This is methodically questionable as doing so fails to account for indirect participating interests (i.e. those via a holding company, possibly located in a country other than the host country to be examined). Then again, other studies do not bother to explain the derivation of FDI stocks or flows at all.

[10] The definition used here includes asset management corporations, leasing companies, mutual funds and holding companies making direct investments.

[11] For a detailed description of the definition of FDI and of the various adjustment procedures, see the author's recent paper (Wezel (2003), section 2.1). In the present study, no correction for balance-sheet depreciation was carried out because the share of fixed assets in banks' balance-sheets is traditionally low in comparison to the manufacturing sector.

3.2 Exogenous Variables

3.2.1 "Follow the Client" Motive

As banking is an information-intensive industry, foreign banks can differentiate themselves from their counterparts in the host country by offering complex and specialized services to their home country corporate customers. The ability to custom-tailor these services – financing, information brokerage and transaction banking – is frequently rooted in a longstanding relationship with the client. Over the years, banks gain proprietary information about their clients' particular financial needs, the knowledge of which is – at least initially – unavailable to host country institutions. The flow of information enables the bank to assess loan renewals at low marginal cost because of earlier assessment work. This lower marginal cost translates into a competitive advantage over incumbent local banks. As informational asymmetries mean that the value of this type of information is difficult to price by potential buyers (i.e. other banks), market failure arises: The internal information cannot be traded on markets and therefore needs to be exploited by the institutions possessing it. In the literature (Grubel (1977)), this rationale has been termed "defensive expansion". To prevent multinational corporations from soliciting these local or other foreign competitors, banks are impelled to *follow the client* by opening an office (branch, subsidiary) abroad themselves in order to defend their unique bank-client relationship.[12]

Also, foreign banks tend to provide easier access to hard currency or international credit and are frequently perceived as more secure than local banks. This exploitation of ownership-specific advantages[13] in terms of differentiated products, advanced technology or superior human skills constitutes a distinct intangible asset.[14] Once again, these factors are not readily tradable and are more difficult to emulate than relatively standardized, less information-intensive products, thereby endowing foreign banks with a longer term competitive edge over competitors.[15] Note that foreign bank entry occurs despite the possibility to serve the client from the headquarters or via correspondent banks because by having a presence abroad, the

[12] See Williams (1997), p. 86, and, on the "competitive edge"-argument, also Blandón (1998), p. 8.

[13] There is a controversy in the literature (see overview by Williams (1997), pp. 82-84) between proponents of *Dunning's* (1977) *eclectic theory*, which stresses the necessity for firms to have monopolistic advantages (concerning ownership, location, internalization) in order to imperil local incumbents' position, and adherents of the *Coasian view*, which explains the existence of firms by pointing to transaction costs causing firms to prefer ownership of assets rather than incurring costs of contracting in the market. The former theory is firmly grounded on ownership characteristics (generation of assets) which are subsequently internalized (asset use), while the latter emphasizes cost advantages (or rather, the trade-off between in total costs and total benefits) of internalizing operations. Put differently, the difference in opinion is rooted in the question of whether market failure is caused by incomplete markets or excessive transaction costs. In reality, the distinctions between both paradigms may be smaller than hypothesized by both camps, especially when markets for information-intensive assets are underdeveloped to begin with as is likely to be the case with emerging markets.

[14] See Sagari (1992), p. 98, and, similarly, Blandón (1998), p. 7.

[15] See Williams (1997), p. 81.

bank can react faster and more efficiently to whatever needs the client may have in a given situation abroad.

In the literature, virtually every study incorporates as explanatory variables outward FDI of the non-financial sector and/or the degree of trade linkages between the home and host economies.

(a) FDI of the Non-Financial Sector

All but two of the studies reviewed account for FDI outflows of the non-financial sector (in some cases, manufacturing FDI or total outward FDI), either in flows or stocks, depending on the characteristics of the endogenous variable. Most studies indeed find a strongly positive relationship between non-financial FDI and the corresponding stakes of the banking sector. Notably, the studies by Buch and Lapp (1998), Buch (2000), Moshirian (2001) and Brealey and Kaplanis (1996) stand out because they put data on German outflows to the test. While the first three papers find a positive link, the last-named study reports an insignificant coefficient for (total) outward German FDI to both industrialized and developing countries. As a caveat, it should be mentioned that Brealey and Kaplanis use as a dependent variable simply the number of foreign bank offices, and that the regression is a cross-section for 1992 and can therefore only be considered a snapshot view. Fittingly, Miller and Parkhe (1998) offer panel evidence on the link between foreign banking assets/offices and total U.S. FDI in *developing countries only*: while for total banking assets the coefficient is insignificant, the results for foreign branches and subsidiaries turn out to be highly positively significant.

Most prominently perhaps, the study by Seth et al. (1998) is exclusively devoted to investigating the relationship between lending of foreign banks in the U.S. and the financing patterns of fellow non-financial firms operating there. It is hypothesized that if there is to be a "follow-the-client" behavior, the foreign subsidiaries should mainly be serving their home-country clients' financing needs and not engage in lending to other, presumably American, customers. The authors are able to refute the hypothesis for banking subsidiaries from all G7-countries save German institutions. Showing that bank borrowing by US affiliates of German multinationals exceeded total lending by German banks' subsidiaries in all sample years (1981-1992), the authors are led to conclude that this is "the only group of banks for which we can say it is possible that they exclusively followed home-country customers".[16] Conflicting evidence is presented by Moshirian and Van der Laan (1998): U.S., U.K. and German FDI of the non-banking sector is each shown to be negatively correlated to *foreign assets of banks from the respective country*. However, this finding does not entirely contradict the other results as it may well be that the assets of *foreign subsidiaries* (or other more-than-

[16] Seth et al. (1998), p. 14. This effect, of course, is shown to apply to a highly developed banking sector and may not be present in emerging markets.

10% interests), being merely a subset of total (consolidated) assets, move in line with non-financial FDI. Actually, Moshirian, in a later study (2001), now finds a positive sign for German non-banking FDI when relating it to *total FDI in banking* as a dependent variable. Consequently, a positive sign of the non-financial FDI variable, *FDINONBK*, is expected for the present study. The variable is lagged by one period to account for banks' reaction time in following the clients abroad and also to forestall simultaneity bias.

(b) Trade Linkages

Analogous to the relationship between banking and non-banking FDI, trade links are deemed to propel foreign bank entry.[17] It has been argued that without the physical presence of banks shepherding trade operations of domestic exporters abroad, most trade transactions would appear to become rather difficult or not viable at all.[18]

Empirical evidence generally supports the theoretical notion that strong trade links will foster banking FDI in the destination country. This holds true for banks from Germany (studies by Buch (2000) as well as Moshirian), the U.S. (Goldberg and Johnson, Moshirian), the U.K. (Moshirian), Japan (Yamori), Spain and Finland (Cardone-Riportella et al.), and for all of the OECD countries (Focarelli and Pozzolo) investing abroad. FDI inflows to transition countries are shown by Papi and Revoltella (2000) to be driven by strong trade links as well. Conversely, Miller and Parkhe (1998) find an insignificant or even negative sign for U.S. bilateral trade with developing countries when relating it to banks' total assets or number of offices, respectively. In light of the overall evidence, a positive coefficient is hypothesized for *TRADE*, the variable measuring total bilateral German trade (also lagged) with the sample countries.

3.2.2 Market Characteristics

(a) Host Country Income

Ideally, the size of the host country's banking market, measured by sectoral GDP or loan volume, should feed into the investing bank's utility function because a larger market offers the potential for exploiting economies of scale and thus for decreasing marginal costs of production.[19] Since, in the present study, FDI flows have already been adjusted for market

[17] Interestingly enough, an alternative measure for capturing trade relations is geographical distance, as trade tends to be strongest with neighboring countries. In the study of Papi and Revoltella (2000), distance is found to be insignificant for FDI inflows to transition countries, either because of little between-group variation within the sample or because total trade is simultaneously accounted for in their regressions. As an alternative measure Blandón (1998) suggests cultural proximity, notably a dummy variable for countries of FDI origin that belong to the "same cultural group" as the host country, Spain. Blandon's regression shows similarity in culture to foster FDI inflows into the Spanish banking sector.

[18] See Sagari (1992), p. 96, footnote 4.

[19] See Sabi (1988), p. 437.

size by relating them to host country GDP, adding an exogenous size variable would make little sense, even less so considering the fact that, as mentioned above, the definition of the financial services sector is far from consistent across countries. In order to still account for the host countries' purchasing power and thus demand for banking services, *real GDP per capita* is included in the regressions. This measure aims at capturing between-group effects in terms of diverging national income levels as well as within-group growth effects by having those levels vary throughout the sample period.

Most studies reviewed here incorporate a certain type of income variable, be it real absolute GDP (Brealey and Kaplanis, Moshirian and Van der Laan) or GDP per capita (Buch and Lapp, Buch (2000), Claessens et al., Papi and Revoltella, Sagari, Yamori) and largely find a strongly positive relation to FDI or foreign banking assets. The only exceptions to this finding are the studies by Nigh et al. (variable: manufacturing production), and Sagari, which report insignificant regression outcomes, and by Goldberg and Johnson, who, remarkably, find negative coefficients for per capita income when measuring the determinants of US banking activity abroad (assets/number of foreign branches, from the early 1970s to the mid-1980s). Given the empirical evidence, in this study a positive sign for the income variable *GDPCAP* (in logs) is expected.

(b) International Financial Centers

The aspect of market size may still be captured by trying to determine whether a given banking market sector fulfills certain characteristics of a typical international financial center that would almost automatically attract foreign banks. The issue as to what exactly constitutes a financial center is tackled by authors in quite ways. Methods range from not detailing the methodology at all (Cardone-Riportella et al.) or simply, yet correctly, stating that certain localities (Hong Kong, Singapore and the like) *are* such centers (Buch and Lapp) to using either an adequate proxy variable (Focarelli and Pozzolo: ratio of stock market capitalization to GDP) or econometric modeling (Brealey and Kaplanis: regressing the "abnormal" number of banks on measures of capital market activity; their results for financial centers are also used by Buch (2000)).[20]

Not surprisingly in light of the diverging approaches, the empirical evidence on financial centers is mixed. Cardone-Riportella et al. (2000) report a strongly positive coefficient for Spanish banks expanding abroad, whereas they fail to find such an effect in the corresponding case of Finnish banks. Focarelli and Pozzolo (2001) argue that the negative signs they report

[20] Brealey and Kaplanis (1998, pp. 590-594) go about determining financial centers as follows: Upon gaining residuals from a previous regression of banks' foreign presence on exports to the host country and its GDP, the authors regress these residuals on two measures of capital market activity (syndicated loans, value of eurobonds) and find that these measures alone are able to explain between 37% and 49% of the variation in the "abnormal" number of banks domiciled in foreign countries.

for the market capitalization variable are due to an apparent saturation of financial markets, making it unattractive to expand abroad. Arguably the most relevant are the results presented by Buch and Lapp (1998), and Buch (2000), since the authors analyze data on German banking FDI: Their findings from a pooled time-series regression for FDI outflows to developed countries during 1985-1995 and a similar cross-section regression for 1997, respectively, suggest a strong pull effect exercised by financial centers in the sample.

In the present study, the ratio of market capitalization of listed companies relative to GDP of the host economy, *FINCTR*, is used to capture the incidence of financial centers. This discrete variable was preferred to the dummy variable approach as it exhibits considerable variation over time and thus is more appropriate in a panel setting.

(c) Banking Margin / Competition

Returning to the theoretical analysis in section 2, various measures for banking market attractiveness or the level of competition have been suggested in the literature. Among these is an elaborate approach by Moshirian and Van der Laan (1998) to measuring the interest-rate differential of lending rates between markets at home and abroad. Problematically, their calculation is based on both expected inflation and exchange rates, and consequently requires econometric estimation of forward rates as proxies for these future rates. The authors find that a negative differential (i.e. higher rates abroad than at home) is positively correlated with foreign assets of, inter alia, German banks. In a later study, Moshirian (2001) uses a cost of capital differential of German banks vis-à-vis host countries, represented by the "required" after-tax interest rate spread (lending minus deposit rates, adjusted for corporate tax rates). His empirical findings suggest that a lower cost of capital structure at home than abroad contributes to German banking FDI. In a similar vein, Blandón (1998) regards the interest margin not only as a measure of market attractiveness but first and foremost as an indicator of the degree of banking competitiveness (the variable in question is insignificant, however).

Other studies simply focus on the signaling effect of high interest margins in terms of profit opportunities. Papi and Revoltella (2000), in a study of banking FDI inflows to transition countries, report a positive coefficient for the spread on bank interest rates. Yamori (1998) as well as Claessens et al. (1998) consider the definition of the real-interest-rate variable used in the present study, *REALINT*, namely lending rates adjusted for inflation rates abroad. The intuition behind this choice is that, in the absence of capital controls, banks freely decide whether to fund the operations from home or abroad. They can be expected to choose the minimum of interbank rates at home (e.g. LIBOR) and foreign deposit (interbank) rates (adjusted for *expected* inflation or, if solely calculating in home currency, *expected* exchange rate changes). The outcome of this choice is very difficult to track consistently. It seems therefore justified to concentrate on the deflated lending rates abroad as a measure of both

profit opportunities and (lack of) competition in the foreign banking sectors. Nevertheless, to check for validity, an alternative profitability variable, *MARGIN*, is computed:

$$(7)\quad MARGIN_{i,t} = \left(\frac{\left(1 + l_{i,t}\right) - \left(1 + d_{i,t}\right)}{\left(1 + \Delta NER_{i,t}\right)} \right)$$

where l and d denote average lending and deposit rates (per cent), respectively, and ΔNER is the change in the year-end exchange rate (with $\Delta NER>0$ representing a depreciation of the host country's currency against the Deutsche Mark). The assumption underlying the additional adjustment for exchange rate movements is that the banking spread may not fully incorporate excessive inflation (as seems to have been the case with Brazil in the late 1990s). To obtain the rate that is relevant to a German bank, the host country's banking spread needs to be adjusted for the loss in value due to depreciation of its currency.

(d) Openness of the Foreign Banking Market

Host country banking markets are often oligopolistic in nature, and perfect competition is the exception to the rule. These oligopolies are commonly the outcome of barriers to entry which a foreign multinational bank may be deterred by or, conversely, seek to exploit. In fact, this market characteristic may be called a double-edged sword because the benefit of operating in a competition-restricted environment can only be reaped after clearing specific hurdles imposed by the government to protect the domestic banking system. Even if a foreign bank is granted entry, it may still suffer from cumbersome regulations or uneven government treatment in which case it will operate at a disadvantage compared with local banks.[21] One may assume that the deterring effect of banking restrictions applying to foreign institutions outweigh the conceivable opportunities presenting themselves upon entry into such over-regulated markets.

Most studies on banking FDI rely on dummy variables in measuring the extent of government interference with market provision of financial services. Surveying the literature, approaches range from simple 0/1 dummies (Nigh et al. (1986), Miller and Parkhe (1998)) or somewhat more elaborate scales (Goldberg and Johnson (1990), Papi and Revoltella (2000), Galindo et al. (2002)) to indices composed of several individual criteria (Sabi (1988)) or even a regulatory matrix with a total of 15 sub-classifications (Sagari (1992)) of which those principal components were tested that might theoretically be relevant to U.S. FDI in banking. Galindo et al. (2002), testing for the impact of various administrative impediments on foreign banks, demonstrate that the assets of their subsidiaries are negatively related to higher regulatory burdens in the host countries and to greater differences in banking regulations between the two countries. Sagari (1992) puts two components to the test: one is aimed at

[21] See Williams (1997), p. 91.

measuring discrimination against foreign banking affiliates, and the other one combines measures of barriers to entry and of operating constraints once inside a country.[22] The overriding result of these empirical studies is that a high degree of such openness is conducive to FDI flows in banking. The only study not to find a significantly positive relationship is the one by Sabi (1988).

Following Sagari's approach, this study uses two measures of banking freedom, both taken from the Heritage Foundation's Index of Economic Freedom that has been published since 1994.[23] The index's factor #6 ("banking and finance") serves as the chief measure of banking freedom, named *BANKFREE*. It consists of five individual factors: government ownership of banks, restrictions on the ability of foreign banks to open branches and subsidiaries, government influence over the allocation of credit, government regulations and freedom to offer all types of financial services. The original data have been transformed so that the high score of 4 applies to countries where government involvement in the financial sector is negligible, very few restrictions on foreign banks exist and banks may engage in all types of financial services (overall: restrictions are "very low"). The most negative score applying to the sample countries is 1, denoting heavy government involvement and corresponding restrictions. In order to account more explicitly for barriers to entry as they apply to FDI flows, an alternative, more comprehensive openness variable, *OPENNESS*, was formed. It consists of *BANKFREE* and, in addition, incorporates Heritage's factor #5 "capital flows and foreign investment",[24] a composite measure of the government's general attitude to foreign investment. For simplicity and admittedly arbitrarily, equal weights were imposed. Both variables are expected to exhibit a positive coefficient.

3.2.3 Risk Factors

Ultimately, the risk of banks' international operations may be defined as the variability of earnings or, more specifically, the variance of the rate of return on assets or on equity. However, it would be a daunting task to try to compute an average rate of return in the aggregate. Hence, there is a need to devise reasonable proxies for macroeconomic and institutional uncertainty affecting the stability of banking profits. Such an attempt was made by Sabi (1988) who, in the absence of profitability data, used as a proxy for variability of returns the (lagged) deviation of national income from its longer-term trend. The author fails to find a significant effect of his variable, which at any rate is a relatively crude measure of

[22] See Sagari (1992), pp. 109-110.

[23] The index is published in last quarter of each year, but in the title appears the following year (the "2003 index of economic freedom" was published in November 2002).

[24] Index factor #5 comprises the following criteria: foreign investment code, restrictions on foreign ownership of business, restrictions on the industries and companies open to foreign investors, restrictions and performance requirements on foreign companies, foreign ownership of land, equal treatment under the law for both foreign and domestic companies, restrictions on repatriation of earnings, availability of local financing for foreign companies; see Heritage Foundation (2002), chapter 5.

risk facing foreign investors. More elaborate proxies have in fact been devised in the literature, as the following sections show.

(a) Country/Political Risk

The issue of country risk and, in particular, political risk is a distinguishing feature of developing countries. Although many of the emerging markets exhibit a remarkably high degree of macroeconomic stability, there is still a higher likelihood of unexpected economic downturns than in advanced economies. Oftentimes, this has to do with political instability or institutional deficiencies, for instance in the domestic banking system (see below). The majority of empirical studies neglect country risk indicators as explanatory variables because the samples are usually made up exclusively, or at least predominately, of industrialized economies. Among the few studies to use country risk measures are Papi and Revoltella (2000) who find a positive effect for institutional stability of transition countries (as measured by stability indicator of Institutional Investor) and Yamori (1998) who uses Euromoney's country risk index and likewise reports a significantly positive relationship between high scores (low country risk) and Japanese banking FDI in 44 countries (of which at least 25 are emerging markets).[25]

As this present study is concerned with emerging markets only, the inclusion of a country (political) risk variable appears to be warranted. Earlier research on German FDI in developing/emerging economies (see Jost and Nunnenkamp (2002) and Wezel (2003)) has shown that the *Euromoney* country risk index selected for the present study performs well in partially explaining the German case. The index has the following composition: 25% political risk, 25% economic performance (GNP per capita etc.), 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 index's strong emphasis on debt and access to finance is striking, making a separate debt variable as in some of the studies (Sabi; Moshirian and Van der Laar) unnecessary. The variables are named *CRISK* and *PRISK* for country risk and its sub-component political risk, respectively.[26] Because of very high correlation, only one of the variables will be tested at a given time. A positive sign is expected in each case.

[25] Remarkably, the country risk variable loses significance when other risk factors such as real interest rates and changes in exchange rates and GNP are accounted for in the same equation; see Yamori (1998), pp. 116-117.

[26] Annual risk scores are derived by summing index scores published by Euromoney in September and March of the following year and then averaging the sum. As a result, economic or political developments that have unfolded after the September surveys are also taken into account, albeit with only half the weight of the average score.

(b) Likelihood of Banking Crises

The inclusion of country risk to cover macroeconomic variability may not suffice if other types of risk can be shown to influence sectoral FDI flows as well. Indeed, banks may be deterred by factors specific to their field of business. As an innovation to the banking FDI literature, this study tests a banking fragility variable (M2 to currency reserves) that has been proven reliable in the literature concerned with "early warning indicators".[27] To be sure, there are other indicators of looming banking crises such as output growth, inflation, real interest rates, all of which have been widely tested to predict such crises accurately. However, in the context of this study, many of these factors are already controlled for by GDP per capita, the banking margin or country risk. With respect to a more banking-specific factor, Kaminsky and Reinhardt (1999) find the ratio of domestic credit to GDP to be a strong predictor of banking crises, whereas Glick and Hutchinson (1999) report insignificant results for this variable. Apart from being causally related to and thus likely correlated with GDP (growth),[28] strong credit growth might also signal market attractiveness and therefore be regarded as a good thing. Moreover, it is likely to be correlated with GDP. Consequently, it cannot be singled out as detrimental at all times and may not serve as a unambiguous indicator to foreign investors.

One factor not yet accounted for is real overvaluation of the currency. Only few empirical studies account for this effect. Most importantly, Moshirian (2001) finds German banking FDI to react significantly negatively to real appreciation of host countries' currencies,[29] whereas Goldberg and Johnson (1990) and Yamori (1998) report insignificant regression outcomes. Note that this study does not attempt to meticulously measure harmful overvaluation directly but instead resorts to an immediate *symptom* of overvaluation, rapid growth of banking deposits due to high real interest rates coinciding with loss of currency reserves. Therefore, an alternative measure of banking sector fragility is used: short-term financial liabilities of the banking system (M2) as a share of gross international reserves of the host country, aptly named *M2/RES*. It is a good crisis predictor – be it a currency or a banking crisis or both – because numerator and denominator tend to move in opposite directions when the crisis nears, causing the ratio to display marked deviations from normal in such a case. Following financial liberalization there are typically strong capital inflows that trigger a lending boom. In the absence of tight banking regulation and supervision, this market exuberance may not be easily dampened, with real monetary aggregates being inelastic to negative macroeconomic developments.[30] This could be the result of an active

[27] For a good overview of the literature see OECD (2002), pp. 49-52.

[28] See Demirgüç-Kunt and Detragiache (1998), p. 89.

[29] As measured by the IMF's Multilateral Exchange Rate Model (MERM) index; see Moshirian (2001), p. 326 (footnote 8).

[30] See Calvo and Mendoza (1996), p. 172.

credit expansion policy by the government to offset deposit withdrawal, as was the case in the Mexican "tequila" crisis.[31] The loss of currency reserves, on the other hand, is typically associated with the government's (often futile) attempt to defend an exchange rate regime that has gradually become unsustainable. Not only does this "leaning against the wind" precipitate a balance-of-payments crisis, it is also likely to jeopardize the viability of the banking system as the foreign currency backing of its short-term (often foreign-currency-indexed) liabilities decreases and the currency is rendered vulnerable to negative and persistent money demand shocks.[32] Demirgüç-Kunt and Detragiache (1998, p. 93) argue that the ratio mainly applies to countries with an exchange rate peg. Nonetheless, intermediate regimes should be considered, too, because they likewise imply market interventions causing reserves losses. In fact, the majority of sample countries featured a non-floating exchange rate regime during much of the sample period in order to retain some discretion in managing the currency's external value.

In the empirical literature, the case for *M2/RES* as a dependable banking crisis predictor may be termed as strong. Kaminsky and Reinhardt (1999), while noting that banking crises are typically triggered by negative developments in the real sector, find the above ratio to be the strongest predictor of banking crises among financial sector variables (75% of crises "called"), second only to the real interest rate whose significance is likewise a product of overvaluation. In fact, it also accurately called balance-of-payments crises (81% of cases) as it did in instances of "twin" crises. The authors show that the ratio begins to exceed normal levels in tranquil times significantly (by 40-80 %) about six to nine months before the onset of either crisis (or both). Demirgüç-Kunt and Detragiache (1998) test the ratio of M2 to currency reserves as the only consistently significant measure among four financial variables in a panel of 66 countries between 1980 and 1994. Glick and Hutchison (1999) arrive at a similar conclusion, showing in a probit regression involving currency crisis indicators that the ratio is significant at the 1% level specifically for emerging markets.[33] Lastly, Eichengreen and Rose (1998) report high predictive qualities for real sector variables (world interest rates and economic growth, and overvalued exchange rates are strongest). Defying any value for typical banking crisis variables such as growth of domestic credit, the authors yet contend that among the variables of domestic financial fragility the ratio of M2 to reserves comes closest to being significant (it actually is at the 20% level).

[31] See Calvo (1996), p. 210. Contrary to the notion of most money demand equations, the Mexican government succeeded in raising real M2 *directly* via credit expansion: higher transfers to the poor in advance of an election stabilized the money demand as the poor are subject to "cash-in-advance" effects. This segment of the population also tends to consume more out of wealth (perceived or actual), thereby propelling economic activity and in turn demand for money. Because of the higher activity, firms are then led to keep higher deposits at banks. The above effects joined in halting the autonomous fall in M2 (ibid., p. 212).

[32] See Glick and Hutchison (1999), p. 10, and Calvo and Mendoza (1996), p. 171.

[33] Incomprehensibly, the authors do not include this measure in their regression for banking crises, instead using only real sector variables such as inflation and output growth.

(c) Exchange Rate Volatility

In addition, it would be interesting to know whether the *volatility* of the exchange rate, not just overvaluation, matters for banking FDI. For the real economy there is an indication that high exchange rate volatility may cause firms to establish production sites abroad. This may not be assumed to be stringent for banks.[34] Generally speaking, a high degree of exchange rate volatility renders forecasting of expected returns subject to greater uncertainty and may lead investors to require a higher rate of return in compensation for taking on higher risk. In sum, there is reason to be agnostic about the sign of a volatility measure.

Within the studies of the banking FDI literature reviewed here, only the one by Buch (2000) on German FDI in banking (cross sectional regression for 1997) uses an explicit volatility measure, constructed as the average percentage change of the D-mark exchange rate over five years.[35] The author reports a negative sign which is significant at the 10% level. The present study uses a similar measure, *RERVOL*, which has been tested meaningful for German FDI in Asia (Wezel (2003)). The variable denotes the variance of the indexed real bilateral exchange rate (RER) over past years, i.e. regardless of the direction of the individual change,[36] and is aimed at measuring the excess volatility of the RER over and above the exchange rate movements that could reasonably be expected when considering inflation differentials.

4 Methodology

4.1 Sample Properties

As a selection criterion for the sample countries the study adopts the BIS (Bank for International Settlements) set of 24 systematically important emerging markets – Europe: Czech Republic, Hungary, Poland, Russian Federation, Turkey; Latin America: Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela; Asia: China, Hong Kong SAR, India, Indonesia, Republic of Korea, Malaysia, the Philippines, Saudi-Arabia, Singapore, Thailand;

[34] It has been demonstrated by Sung and Lapan (2000) that by erecting more than one production facility, i.e. opening another plant abroad, and postponing the decision as to where to produce, a multinational *manufacturing* firm acquires a real option whose value increases with greater exchange rate fluctuations. Therefore, it is conjectured that more volatile exchange rates induce the relative value of opening the foreign plant to rise. This notion may not hold for *banking*. Locational decisions can be reversed relatively easily because there are no production facilities abroad that would translate into sizable sunk costs.

[35] The author does not detail whether the volatility of a bilateral or Germany's effective exchange rate is taken.

[36] The volatility variable is defined as follows:

$$RERVOL_{i,t} = \sqrt{0.5\sum_{k=1}^{2}\log\left(\frac{RER_{i,t-k} - RER_{i,t-k+1}}{RER_{i,t-k+1}}\right)^2}$$

where $RER_{i,t}$ is the real exchange rate between Germany and the i[th] country in a given year.

Africa: South Africa. Of these, three Latin American countries (Colombia, Peru, Venezuela) that did not receive FDI by German banks were omitted as was Taiwan owing to a general lack of data from official sources. This brings down the number of sample countries to 20.

To ensure a balanced panel of countries, the sample period was chosen to run from 1994 to 2001 (the most recent data are for 2001 and still preliminary), taking account of the fact that some of the transition countries received their first banking FDI from Germany only in that starting year.[37] The timeliness of the data is a distinguishing feature of this study since all other studies reviewed here use older data series (up until the mid-1990s).

Figure 1: Top Ten Emerging Market Destinations of German Banking FDI (% of total stocks)

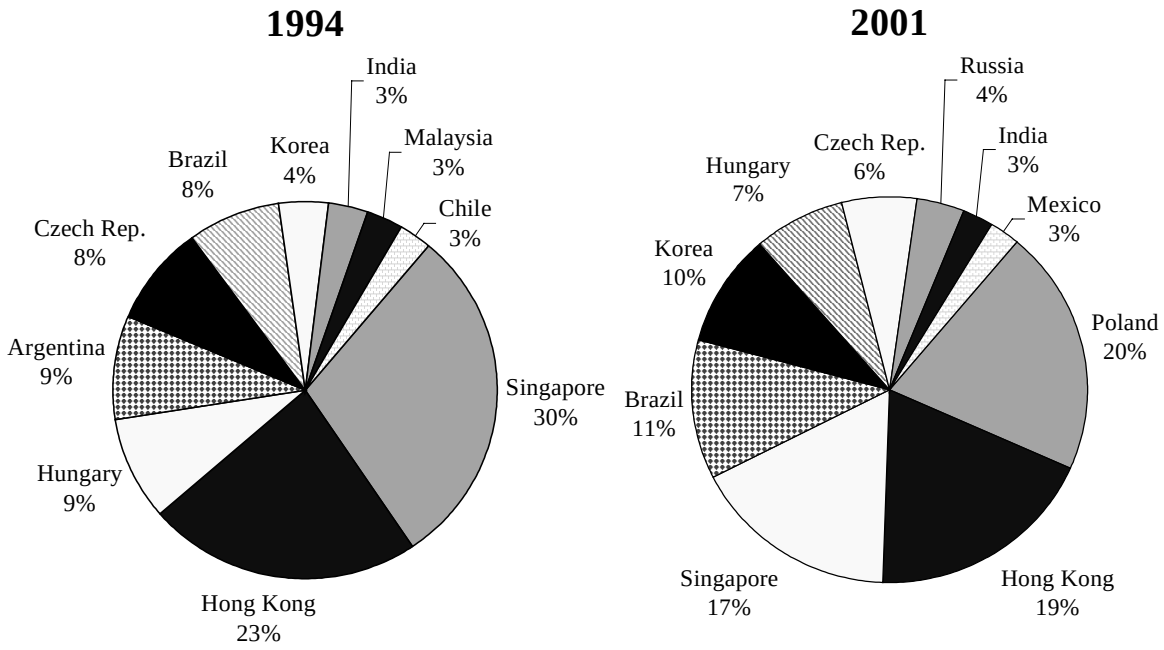

Figure 1 illustrates the development of the largest shares of FDI stocks held by German banking institutions over the sample period. The most astounding change is that Poland, once basically starting from scratch, has now captured the top position from Singapore which has fallen to third place. Remarkably, Argentina has dropped out of the top ten by end-2001 – this, incidentally, is before the "tango" crisis evolved in early 2002. This constitutes anecdotal evidence that German banks shunned Argentina in comparison with to other locations even before its financial system collapsed. It is also striking that despite the blow Korea took during the Asian crisis, the country managed to raise its share in German banking FDI from 4% to 10%.

[37] Papi and Revoltella (2000, pp. 445-446) classify German banks as generally having been laggards in entering into the emerging financial markets of the transition countries despite the fact that a few banks were among the frontrunners. As a reason for this late entry the authors cite difficulties arising from German reunification.

4.2 Estimation Technique

Initially, the familiar panel estimation techniques were applied to the entire sample, i.e. fixed and random effects regressions. However, all specification tests on the existence of individual effects demonstrate that there are indeed none. Both an F-test on fixed effects (testing the null hypothesis that the constant terms are equal) and a Breusch-Pagan Lagrange multiplier test for the random effects model (BP-Test)[38] could not be rejected at the 5% level (Prob>F or Prob>χ^2 were each greater than 0.05 at all times with the exception of regression (17)).

As a consequence, pooled ordinary least squares (OLS) estimation was chosen as the appropriate estimation technique for the sample,[39] with the regression residuals being automatically corrected for possible heteroskedasticity and serial correlation within the groups.[40] This allows correction for very general forms of heteroskedasticity and autocorrelation whereas a feasible generalized least squares (FGLS) estimation procedure would require a more restrictive parametrization of the covariance matrices.[41] Notwithstanding these methodological issues, alternative regressions to the ones contained in Table 1, now using the FGLS procedure, produce broadly similar results (exceptions: the dummy is more significant while *FDINONBK* is less so) as the results in Table 8 in the Appendix reveal. The necessity of including time dummies was denied as none of the dummies was significant at conventional levels. Regression results display "standardized" beta coefficients.[42] As a double-log linear model was not feasible owing to the occurrence of negative FDI flows, this standardization allows for comparing the "weights" with which the individual variables enter the equation.

5 Discussion of Results

The following sections present the estimation outcome consisting of different model specifications in order to perform a sensitivity analysis. More specifically, the variables included in each of the three sets derived in section 2 (**FOLLOW, MARKET, RISK)** are tested one at a time to isolate the individual variable's effect on the regression outcome. Afterwards, the sample is split up by region and then by time (pre-/post-crisis) to control for individual spatial and temporal effects. Note that for some variables (*GDPCAP*, *FINCTR*, *M2/RES*) the logs were taken to bring their originally skewed distributions closer to normality.

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[38] For details on both test specifications see Greene (2003), pp. 289 and 299.

[39] As there are no individual effects, the subscript i of α is dropped so that the regression equation becomes:

(6') $FDI_{i,t} = \alpha_t + \sum_{j=1}^{J} \beta_j \mathbf{FOLLOW}_{j,i,t} + \sum_{k=1}^{K} \gamma_k \mathbf{MARKET}_{k,i,t} + \sum_{l=1}^{L} \delta_l \mathbf{RISK}_{l,i,t} + \varepsilon_{i,t}$

[40] In STATA, the command for those corrections is "cluster(...)", to be used with conventional OLS estimation.

[41] Specifically, a time-constant covariance matrix is assumed for FGLS estimation, and the serial correlation may be represented by a first-order autocorrelated process.

[42] Coefficients are corrected as follows: $\beta_j^* = \beta_j (s_{xj}/s_y)$ with s_{xj} being the standard deviation of the j^{th} exogenous variable and s_y the standard deviation of the endogenous variable; see Pindyck and Rubinfeld (1981), pp. 90-91.

5.1 Full Sample Analysis

The results of the baseline regression (1) in Table 1, encompassing two variables from each set, are somewhat unsatisfactory since half of the variables turn out to be insignificant. Market integration effects pertaining to FDI flows of the non-financial sector clearly dominate the scenario, considering the weight of the adjusted coefficient and its t-value.

Table 1: Follow-the-Leader Effects (all countries)

Pooled OLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations = 160

	(1)	**(2)**	**(3)**	**(4)**
(FOLLOW)				
FDINONBK	0.315 (9.18)***	0.291 (7.70)***	0.308 (6.95)***	0.218 (3.06)***
TRADE	0.001 (0.01)	-0.265 (-2.12)**	-0.210 (-1.52)	
(MARKET)				
GDPCAP	0.130 (2.63)**	0.084 (1.88)*		
FINCTR	0.052 (0.69)	0.182 (2.18)**	0.268 (2.43)**	0.232 (2.41)**
(RISK)				
CRISK	0.039 (0.66)	0.120 (1.80)*		
M2/RES	-0.189 (-3.38)***	-0.150 (-3.45)***	-0.174 (-3.65)***	-0.186 (-3.14)***
DUMMY_CEC		0.405 (2.23)**	0.371 (1.73)*	0.246 (2.02)*
R-Squared	0.184	0.209	0.206	0.194
F-Test (Prob>F)	0.33	0.81	0.58	0.84
BP-Test (Prob>χ^2)	0.24	0.07	0.32	0.28

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

The picture changes considerably if the diverging motives entertained by German banks entering European transition countries (here: Czech Republic, Hungary, Poland, Russia) are accounted for. When including a transition country dummy, *DUMMY_CEC*, which, as (2) shows, is relevant, all variables turn significant (at least at the 10% level) with the expected signs except for the lagged trade variable that exhibits a counterintuitive negative sign.[43] However, the trade variable is far from being robust against varying specifications as can be

[43] Note that the regressions below do not represent genuine gravity models as a variable of geographic distance is not included. Using distance instead of the CEC dummy yields broadly similar results due to high correlation.

taken from regression (3) where per capita GDP and country risk, both previously only slightly significant, are left out. Interestingly, inclusion of trade linkages does not add any meaningful information when already accounting for non-financial FDI or the dissimilarity of transition countries: in both cases, the trade variable's strong significance (t-value: 3.01, when *FDINONBK* and *DUMMY_CEC* are omitted) completely vanishes. By dropping *TRADE* as well the parsimonious regression (4) is reached, which illustrates that exactly one variable of each set is highly significant for German banking FDI in emerging markets: "Follow the client" effects are best depicted by non-banking FDI, within market characteristics the variable for financial centers measured by size-adjusted stock market capitalization stands out, and of the risk variables the backing of short-term deposits by international reserves matters most. In turn, this specification represents the baseline model for the following analyses.[44] In Table 2, variables from the **MARKET** cluster are added one at a time to the new baseline case (4).

Table 2: Market Characteristics (all countries)

Pooled OLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations equation (5) & (6) = 160; (7) = 140; (8) = 132

	(5)	**(6)**	**(7)**	**(8)**
FDINONBK	0.228 (3.00)***	0.218 (2.79)**	0.207 (3.67)***	0.191 (3.65)***
FINCTR	0.264 (2.41)**	0.263 (2.38)*	0.223 (2.40)**	0.198 (2.60)**
M2/RES	-0.201 (-3.05)***	-0.217 (-3.18)**	-0.182 (-2.86)***	-0.173 (-2.75)**
DUMMY_CEC	0.241 (1.95)*	0.252 (2.00)*	0.238 (1.86)*	0.220 (1.85)*
REALINT	0.021 (0.53)			
MARGIN		-0.023 (-0.56)		
BANKFREE			0.033 (0.57)	
OPENNESS				0.106 (1.98)*
R-Squared	0.189	0.188	0.195	0.203
Test FE (Prob>F)	0.77	0.76	0.84	0.91
Test RE (Prob>χ^2)	0.37	0.36	0.25	0.16

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

[44] Regarding the relatively low value of R_2, it has to borne in mind that it is composed of "within"- and "between"-group variation. Using a tentative random effects regression, the within-R_2, i.e. the variation across time explained by the model, was constantly rather low (around 0.10), while the between-R^2 hovered at 0.80.

The insignificant coefficients for either interest rate spread variable (*REALINT, MARGIN)* should not come as a surprise. Conceivably, they are the result of variable misspecification because of failure to incorporate unknown market expectations that could differ greatly from the actual rates. More revealing are the results for the measures of host country openness to banking (or both banking and FDI). While the specific banking openness variable, *BANKFREE*, is insignificant, the combined variable, *OPENNESS*, proves to be significant at the 10%-level. Driving this result is the strong significance (at the 1% level) of the freedom-to-FDI component. The results can be interpreted as stipulating that, for German multinationals, banking regulations mattered less than did the absence of general restrictions on capital flows.

Analysis of the third variable cluster comprising risk factors in Table 3 reveals that despite the joint estimation of *M2/RES* and *CRISK* both variables are relevant in (9).

Table 3: Risk Factors (all countries)

Pooled OLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations: 160

	(9)	**(10)**	**(11)**	**(12)**
FDINONBK	0.187 (3.67)***	0.165 (3.61)***	0.187 (4.20)***	0.212 (3.23)***
FINCTR	0.187 (2.19)**	0.170 (2.15)**	0.180 (2.34)**	0.213 (2.26)**
M2/RES	-0.169 (-2.82)**		-0.173 (-2.76)**	-0.191 (-3.16)***
DUMMY_CEC	0.263 (2.58)**	0.292 (3.07)***	0.256 (2.64)**	0.241 (2.19)**
CRISK	0.117 (2.03)*	0.150 (2.40)**		
PRISK			0.113 (1.60)	
RERVOL				-0.050 (-1.05)
R-Squared	0.204	0.176	0.203	0.196
Test FE (Prob>F)	0.90	0.94	0.87	0.85
Test RE (Prob>χ^2)	0.09	0.07	0.09	0.20

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

The two risk variables seem to depict different aspects of host country instability, given that the bi-variate correlation is surprisingly low (-0.119). Even if *M2/RES* is lagged by one period reflecting the possibility that the country risk rating reacts belatedly to changes in the deposits-reserves ratio, the correlation rises only moderately to -0.292. Nevertheless, *CRISK* gains significance (now reaching the 5% level) when *M2/RES* is dropped in (10).

By contrast, political risk appears to play a less meaningful role as the standard error of its coefficient fails to reach conventional significance levels. The same holds true for volatility of the real exchange rate (*RERVOL*), which is clearly insignificant. The bottom line of the analysis of risk factors is that the early warning indicator *M2/RES* is able to explain the pattern of German banking FDI better than a professional country-risk rating, this being true at least for the sample's country composition and time frame.

5.2 Spatial Disaggregation

Having established robust estimators of German FDI activity in banking for the set of emerging markets as a whole, the question as to possible dissimilarities within the three regions arises. Note that, by omitting Turkey, the European sample is restricted to the transition countries in order not to mingle banking sectors at very different levels of development. This, of course, comes at the cost of losing eight observations. Both the European and the Latin American sample thus comprise merely 32 observations. This fact should be borne in mind when interpreting the regression results presented below. The estimation outcome in Table 4 offers a number of valuable insights. Each region exhibits its very own determinants for German banking FDI.

Table 4: Determinants by Region (Baseline)

Pooled OLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations: Europe = 32, Latin America = 32, Asia = 80

	(13) EUROPE	**(14) LAT. AM.**	**(15) ASIA**	**(16) ASIA**
FDINONBK	0.086 (1.12)	-0.064 (-0.42)	0.566 (2.93)**	0.539 (2.90)**
GDPCAP	1.116 (2.59)*	0.043 (0.51)	0.056 (1.20)	0.074 (1.56)
FINCTR	0.006 (0.06)	0.151 (5.92)***	0.293 (2.04)*	
M2/RES	-0.637 (-4.20)**	-0.050 (-0.81)	-0.116 (-2.01)*	-0.108 (-1.76)
OPENNESS				0.154 (4.96)***
R-Squared	0.467	0.077	0.127	0.111
Test FE (Prob>F)	0.22	0.86	0.78	0.96
Test RE (Prob>χ^2)	0.82	0.20	0.11	0.06

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

It is economic growth that matters to banks entering the *European transition countries*. In regression (13) the respective variable, *GDPCAP*, carries by far the greatest weight in the

regression and jumps in significance (to a t-value of 5.05) if the highly correlated non-financial FDI variable is dropped. Furthermore, the crisis variable *M2/RES* turns out to be significant at the 5% level and, above all, contributes to the relatively high R-squared by explaining a large fraction of the variation across time. This is most likely the outcome of the variable's signaling the Czech and Russian banking crises of 1997 and 1998, respectively. "Follow the client" effects do not seem to play a role in the transition countries, thus confirming the hypothesis that this effect mainly applies to more advanced economies (see below). The insignificant result for *FINCTR* is quite logical because stock markets were virtually non-existent in the early stages of the transition process. German banks seem to have gone abroad *despite* the lack of well-established financial markets, seeking to be firmly established when business would take off in the process.

The results for the *Latin American sample* in (14) are by and large immaterial (R-squared below 0.10), probably due to small sample size and/or model misspecification in that case. Neither integration effects nor consequences of country risks can be attested. Notwithstanding methodological issues, the latter finding is a bit surprising, considering the multiplicity of financial crises in Latin American emerging markets during the sample period. If anything, German banks were attracted by highly developed financial markets as the strong results for *FINCTR* show. However, the variable is not robust to changes in specification. This is the case if, for example, *M2/RES* is dropped in favor of the country risk variable that is insignificant itself.

In the *Asian banking markets* (15), "follow the client" effects play a dominant role as *FDINONBK* is equipped with the largest weight and the highest significance. As alluded to above, this integration effect appears to be a characteristic of more advanced economies where multinationals from the home country are already flocking in large numbers. The marginally significant result for *FINCTR* is caused by two countervailing effects. If a dummy variable is set for the dominant international financial centers of Singapore and Hong Kong, *FINCTR* turns insignificant (t-value: 1.52) while the dummy itself is significant at the 5% level. Hence, as could be expected, banks are also subject to agglomeration effects. The clustering of international banks in those two locations is incidentally the product of these countries' very liberal attitude to foreign bank entry and capital flows in general. The comprehensive banking/FDI openness variable is not different from zero when added to the equation containing the Singapore/Hong Kong dummy. However, if the dummy is left out, *OPENNESS* gains significance, narrowly missing the 10% level (t-value: 1.76). The notion that open borders to FDI flows are instrumental in becoming a financial center is further substantiated if *FINCTR* is replaced by the openness variable. As regression (16) illustrates, *OPENNESS* becomes significant at the 1% level in that case. The measures of banking margins and exchange rate volatility are both insignificant for Asia as they are for the other two regions.

5.3 Temporal Disaggregation

After dissecting the sample by region, the other dimension of the panel, namely time, merits attention. The sample was divided into two equally-spaced sub-samples. The first one comprises the years 1994-97, which can be considered the "pre-crisis" period since the impact of the Asian crisis was felt only in late 1997. Accordingly, the other sub-sample is made up of the "post-crisis" years 1998-2001. This qualification is warranted because it is possible to presume the devastating impact of ignoring early warning indicators already publicly known in early 1998. The following table lists the outcome of re-running regression (2), omitting the insignificant trade variable, separately for both sub-samples.

Table 5: Determinants by Time Period (all countries)

Pooled OLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations: 80 each

	(17) Years 1994-1997 (Rand. Eff.)	**(18) Years 1998-2001 (Pooled OLS)**
FDINONBK	0.238 (1.99)**	-0.011 (-0.07)
GDPCAP	-0.040 (-0.34)	0.074 (1.07)
FINCTR	0.075 (0.61)	0.268 (1.89)*
CRISK	0.123 (0.75)	0.329 (1.68)
M2/RES	-0.094 (-0.25)	-0.221 (-3.10)***
DUMMY_CEC	0.322 (2.07)**	0.271 (1.51)
R-Squared	0.255	0.313
Test FE (Prob>F)	0.99	0.32
Test RE (Prob>χ^2)	0.004	0.50
Hausman-Test (Prob>χ^2)	0.48	---

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

The regression for the pre-crisis sample in (17) was not estimated by pooled OLS because the Breusch-Pagan test of no random effects was rejected at the 5% level. Taking into account the high value of the F-test (0.99), it is unsurprising that a Hausman-test failed to reject the hypothesis that the difference in coefficients between the fixed and the random effects model is not systematic. Accordingly, random effects estimation is appropriate in this case.

The main difference between the two periods is that, *before the Asian crisis*, variables of country riskiness did not significantly influence the rationale of German banks. Their FDI in emerging markets was largely driven by market integration aspects as the coefficient for the non-financial FDI illustrates. Also, the dummy variable for the European transition countries is also significant at the 5% level, denoting the exceptional role of these economies during their opening-up to capital flows.

By contrast, both variables lose their significance when the *post-crisis* sample is considered. Now, risk aspects rule the picture with the early warning variable, *M2/RES*, reaching very strong significance (at the 1% level) and the additional country risk variable missing the 10% level only narrowly. This is clear indication that German banks learned from the Asian debacle, adjusting their holdings more quickly if the soundness of the financial system deteriorates or proportionally disregarding high risk banking environments altogether. In the later years, there is also a greater tendency towards targeting financial centers as locations for banking activity abroad. Lastly, per capita income cannot be shown to exert a meaningful influence on those locational decisions.

6 Conclusion

This paper has investigated whether the significance of determinants commonly found in the literature on foreign direct investment in the banking sector holds for German banks entering emerging markets via foreign direct investment. Traditional variables depicting market integration effects represented by FDI of non-banks and as well as financial market development in terms of stock market capitalization did exert the hypothesized influence on German banking FDI flows. However, in contrast to the evidence presented elsewhere, this study fails to find a statistically robust impact of bilateral trade linkages on banks' locational choices. Also, per capita income (or growth effects if considering annual differences) did not matter except in a sub-sample comprising European transition countries.

The strongest case regarding FDI flows can be made for the necessity of including indicators of financial vulnerability. A typical crisis variable measuring the backing of short-term banking deposits by international reserves which was adopted from the literature on "early warning indicators" displayed very high levels of significance throughout the empirical analysis. In other words, when a host country's reserves faded as a result of defending an unsustainable exchange rate regime, German banks tended to reconsider their direct investment position, shifting funds out of high-risk countries into more stable environments. Interestingly, the traditional measure of country risk (*Euromoney* index) is also moderately significant if regressed simultaneously with the crisis variable, indicating that the two measures depict different aspects of instability. Other non-traditional factors such as the destination market's openness to foreign bank entry, also coupled with a liberal attitude to

capital inflows in general, or the volatility of the real bilateral exchange rate did not turn out to be meaningful in the German case. The same goes for measures of interest rate margin. Openness to capital flows did matter for banking FDI going into Asia, though, since the combined openness variable was moderately significant.

The dissimilarity of the four European transition countries was explicitly incorporated by including a dummy variable in the full sample regressions. This dummy was moderately significant throughout, pointing to distinct pull factors such as geographic proximity. Furthermore, regressions were run for each regional sub-sample. Since financial markets were clearly underdeveloped in central and eastern Europe at the start of the sample period, the financial center variable, logically, turned out to be irrelevant, while economic growth was the focal point of German banking expansion in that region. Regarding "follow the client" effects depicted by the influence of non-financial FDI flows, it is noteworthy that this factor did not matter greatly in the CEC countries while it was the main driving force in the Asian case. This supports the hypothesis that market integration effects matter more for developed banking markets.

Finally, when splitting the sample into two four-year periods, roughly before and after the Asian crisis, learning effects among German investors become evident. While in the outer years both risk variables, country risk and currency-reserve backing of deposits, were virtually meaningless, they gained significance considerably in the more recent sub-sample, with the financial vulnerability variable even reaching the 1% level. This finding suggests that the experience of the emerging market shake-up in late 1997 has drastically changed the risk perception of German banks active in emerging markets. Further empirical evidence on the importance of risk elements in the decision-making process of multinational banks is clearly warranted to affirm this conjecture.

Appendix

Table 6: Foreign Bank Ownership in Selected Emerging Markets in 2001

Host Country	Total Assets (US$ bill.)	Number of Foreign Banks	Foreign control in %
Europe			
Czech Republic	50.3	21	93.0
Hungary	28.2	29	68.8
Poland	85.4	39	63.6
Turkey	156.0	45	6.7
Latin America			
Argentina	166.0	97	54.5
Brazil	397.0	138	30.6
Chile	77.1	28	43.7
Mexico	156.0	38	76.5
Asia			
China	1090.0	37	0.2
Korea (South)	496.0	27	8.7
India	273.0	75	0.8
Indonesia	87.4	67	4.9
Malaysia	180.0	51	16.8
Thailand	155.0	23	6.4

Note: Foreign control refers to cases where foreigners own more than 50 % of total equity.
Source: Inter-American Development Bank (2002), p. 108. Numbers shown are estimates based on data from Fitch IBCA's Bankscope database.

Table 7: Descriptions and Sources of Exogenous Variables

FDINONBK	FDI outflows of the non-financial sector relative to host country GDP (both in current DM)	Deutsche Bundesbank (FDI), World Bank (GDP)
TRADE	Total trade (sum of exports and imports) with the host country relative to its GDP (in current DM)	Deutsche Bundesbank (Trade), World Bank (GDP)
GDPCAP	GDP per capita is gross domestic product divided by midyear population (in constant U.S. dollars)	World Bank (World Development Indicators)
FINCTR	Market capitalization is the share price times the number of shares outstanding in relation to GDP. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year.	Standard & Poor's (Emerging Stock Markets Factbook and supplemental S&P data), variable is taken from World Development Indicators
REALINT; MARGIN	*REALINT* denotes the real interest rate, i.e. the lending interest rate (charged by banks on loans to prime customers) adjusted for inflation as measured by the consumer price index. *MARGIN* is the difference between lending minus deposit rates in the host country, adjusted for changes in the bilateral nominal exchange rate**.**	International Monetary Fund (International Financial Statistics)
BANKFREE; OPENNESS	*BANKFREE* is the Index of Economic Freedom's factor #6 ("banking and finance"). *OPEN* is the equally-weighted sum of factors #6 and #5 ("capital flows and foreign investment")	Heritage Foundation (annual Index of Economic Freedom)
CRISK; PRISK	*CRISK* is country risk composed of factors of economic (75 %) and political risk (25%). *PRISK* is political risk alone.	Euromoney, various issues
M2/RES	*M2* is money and quasi money (sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government). *RES* denotes gross international reserves (holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities.	International Monetary Fund (International Financial Statistics)
RERVOL	RERVOL measures the variance of the indexed real bilateral exchange rate (RER) over the past two years	International Monetary Fund (International Financial Statistics), own calculations

Table 8: Alternative Estimation Using an FGLS Procedure

FGLS estimation, heteroskedasticity-consistent standard errors corrected for serial correlation
Dependent variable: *FDIGDP*; number of observations = 160

	(19)	**(20)**	**(21)**	**(22)**
FDINONBK	0.132 (1.84)*	0.133 (2.07)**	0.137 (2.05)**	0.115 (2.04)**
TRADE	0.099 (1.18)	-0.041 (-0.50)	-0.054 (-0.64)	
GDPCAP	0.032 (0.90)	0.024 (0.82)		
FINCTR	0.044 (1.18)	0.074 (1.92)*	0.095 (2.28)**	0.083 (2.17)**
CRISK	0.011 (0.03)	0.038 (1.05)		
M2/RES	-0.070 (-2.58)***	-0.062 (-2.30)**	-0.064 (-2.49)**	-0.066 (-2.66)***
DUMMY_CEC		0.269 (3.31)***	0.288 (3.34)***	0.225 (3.49)***
Pseudo R-Squared	0.097	0.207	0.194	0.170
Diff. LogLikelihood	2.66	1.40	1.23	1.00
Serial Correlation?	yes	no	no	no

Note: t-values in parentheses; ***=significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

Pseudo R-Squared has to be used instead of standard R-Squared in FGLS estimation. This measure of goodness-of-fit is derived from the likelihood ratio statistic (LR) which is asymptotically equivalent to the Wald test statistic (W). The Wald (or F-) statistic is related to Pseudo R-Squared as follows:

$$F \approx \frac{n}{K-1} * \frac{R^2}{1-R^2} \text{ and } (K-1) * F \approx W \approx LR. \quad \text{Therefore, } PseudoR^2 \approx \frac{W}{n+W}.$$

Diff. LogLikelihood denotes difference of the likelihood ratios observed in FGLS regressions with and without correcting for serial correlation. The likelihood ratio statistic is defined as

$$\lambda = -2(\log L_r - \log L_u) = T(\log\left|\hat{\mathbf{W}}_r\right| - \log\left|\hat{\mathbf{W}}_u\right|),$$

where $\mathbf{W}_r$ and $\mathbf{W}_u$ are the residual sums of squares and cross-product matrices using the constrained and unconstrained estimators, respectively. The likelihood ratio statistic is asymptotically χ^2-distributed with degrees of freedom equal to the number of imposed restrictions. If the ratio for a common AR(1) coefficient is $\chi^2(1) > 3.84$, serial correlation in the residuals is present and needs to be corrected for. This was the case only in regression (19) as $(2 * 2.66) > 3.84$. In the other regressions, the threshold was not crossed and no correction performed.

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