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Spillovers through banking centers: a panel data analysis of bank flows

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Abstract

This paper presents evidence that spillovers through bank lending contributed to the transmission of currency crises during the recent episodes of financial instability in emerging markets. The innovation of the paper is that it looks beyond aggregated measures of contagion into the structure of bank flows, disaggregating by banking centers. The main findings are that spillovers caused by banks' exposures to a crisis country help predict flows in third countries after the Mexican and Asian crises, but not after the Russian crisis. In the latter, there is evidence of a generalized outflow from emerging markets. The importance of spillovers through banking centers suggests that countries might reduce contagion risk by diversifying the sources of their financing and by carefully monitoring borrowing from creditors exposed to potential crisis countries.

JEL classification: F30; F32; F34

Keywords: International Banking; Financial contagion; Currency crisis

1. Introduction

International banks are a major source of financing for emerging economies and also one of the most volatile ones. During the Asian crisis, for example, banks were the single largest group of creditors before the crisis and bank lending was the most variable component of capital flows during the crisis. In 1996, net flows from banks into 29 emerging markets accounted for USD 120 billion, or about a third of total

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private inflows. In 1997 banks had reduced their share to about 9% of private inflows and by 1998 net inflows had turned into net outflows of about USD 30 billion. By contrast, other private flows were much less volatile (Table 1).[1] This paper examines the behavior of flows from banking centers during episodes of financial instability and how a crisis in one country affects bank lending to other countries.[2]

Observers have pointed to a number of reasons why banking centers may add to financial contagion. These can be classified into two types: a "common lender" effect and a "wake-up call" effect. A "common lender" effect exists if a bank creditor withdraws from a country in which it holds a position after experiencing an unexpected loss in another country. The reason for the withdrawal in the face of losses can be the need to restore capital adequacy ratios, meet margin calls, or the dictates of banks' "Value-at Risk" models or similar models.[3] By contrast, "wake-up calls" refer to a sudden shift in perceptions for an entire asset class following an initial crisis due to reinterpretation of information and revisions of expected returns in this asset class, or due to a generalized increase in risk-aversion. This kind of response also leads to outflows from emerging markets. However, all countries are vulnerable irrespective of whether they share a common bank creditor with the primary crisis country. In this view banks react to a crisis with a *generalized* reduction of credit to other emerging markets. Such behavior leads to "pure contagion", using the terminology of Masson (1999), or contagion that is not caused by mechanistic spillovers.

From a policy standpoint it is important to understand which kind of financial contagion is more relevant. Large spillovers through common bank lenders imply that emerging markets can be vulnerable through this channel and that they should carefully monitor the composition of their creditors. Countries might reduce con-

Table 1
Net private capital flows to 29 emerging market economies[a]

	1994	1995	1996	1997	1998
in billions of USD					
Banks	43.4	99.5	120.4	30.9	–29.1
Other creditors	30.0	23.4	78.8	88.7	49.4
Direct investment	67.2	81.4	93.3	116.2	120.4
Portfolio equity	29.4	24.4	35.7	25.7	2.4
Total private flows	170.0	228.7	328.2	261.5	143.1

[a] Source: IIF (1999).

[1] Also, Van Wincoop and Yi Kei-Mu (2000) show that almost all outflows from Asia originated as banking flows of which the majority went first to offshore centers and then to European banks.

[2] Claessens et al. (2001) offer an overview of the general literature on financial contagion.

[3] Schinasi and Smith (2001), for example, show how portfolio management rules such as "Value at Risk" tend to produce contagion when the investor is leveraged in the face of events which reduce capital.

tagion risk by diversifying the sources of their financing and by avoiding borrowing too much from any one creditor, in particular when creditors are highly exposed to potential crisis countries. The policy implications are different, if, on the other hand, bank responses can be characterized as generalized wake-up calls. In this case, countries' only protection against contagion may be to lengthen the maturity structure of their debt and to rely more on foreign direct investment rather than debt financing. This latter conclusion has already been drawn in policy discussions. However, the role of the *composition* of lenders has so far not been stressed in the policy discourse, possibly because there was little empirical evidence regarding the relative importance of this effect.

This paper attempts to explain the pattern of international bank lending during three recent crises episodes, the Mexican, the Asian, and the Russian crisis, in order to determine the role of spillovers through common bank lenders. According to the common bank creditor hypothesis, the spread of a currency crisis is caused by banks' response to potential or actual losses in an individual crisis country, the ground zero country. Exposure to a crisis country leads to bank flows and ultimately exchange market pressure and balance of payments crises in other countries, hence the common lender effect creates a pattern of spillovers across countries. The testable hypothesis therefore is whether bank flows to other countries can be explained by exposures in the crisis country (using exposures as a proxy for potential losses).[4]

To test this hypothesis we propose to look at bank flows *disaggregated* by creditor and emerging market country. In a panel data set of 11 creditor countries and 30 emerging market debtor countries we examine the link between flows and exposure to the "ground-zero country", controlling for other determinants of bank flows. In particular, we include trade links to control for any reduced supply of credit reflecting banks' worries about the crisis spreading through a deterioration in competitiveness. We calculate exposures on the eve of the Mexican, Thai, and Russian currency crises, and flows in the subsequent 6–12 month period based on the BIS semi-annual consolidated banking statistics.

The emphasis on disaggregated flows is new to the literature. While the existence of a common bank lender channel in emerging market crises has been examined by a number of authors (Kaminsky and Reinhart, 2000a), Caramazza et al. (2000), Van Rijckeghem and Weder (2001), and Hernandez and Valdes (2000)), this has been done in an aggregated and indirect way, examining the effect of a proxy for competition for funds with an initial crisis country on exchange market pressure or other measures of contagion, without looking at actual bank behavior.[5] That is, the dependent variable has been exchange market pressure in any given country, rather than

[4] Note that in this paper we do not investigate whether the common bank lender effect contributes to the spreading of currency crises (see e.g. Van Rijckeghem and Weder (2001) and references given below for the literature). However, a finding that bank flows can be explained by bank exposures to countries with currency crises suggests that crises could spread through a common bank lending effect.

[5] An exception to this aggregated approach is Peek and Rosengren (1997), who establish, using individual bank data covering the period 1988–1995, the existence of a link between adverse shocks to Japanese bank capital (linked to declines in the Japanese stock market) and bank lending by their US branches.

the vector of bank flows to any given country. The evidence to date is suggestive of the existence of a common lender effect in the Asian crisis, as well as in the 1982 debt crisis.[6]

At the outset it should be said that the role of banks goes beyond what can be captured with our data for a number of reasons. First, a shift in the supply curve of bank credit could manifest itself as a change in yields with unchanged flows, if demand is inelastic. Thus, in theory, if prices rather than quantities adjust, we could find an insignificant effect on flows, even in the presence of a common lender effect. In practice, flows also adjusted, as shown in Fig. 1. The figure shows spreads on syndicated loans at issuance, as well as total issuance and the maturity of loans. The most striking finding in the figure is that issuance is sharply reduced during the Asian crisis (starting from the fourth quarter of 1997).[7] A second issue is that banks can have indirect exposures to crisis countries through their lending to hedge funds and other commercial entities as well as positions in mutual funds they own, and similarly that available data on exposures do not capture off-balance sheet positions. Under those circumstances the link between exposure and flows in the data may appear weaker than it really is.

The paper is organized as follows. Section 2 describes the regional flows of international bank lending and makes the case that bank losses during the three crisis episodes were sizable, and so could potentially give rise to the responses to losses described above. Section 3 presents the empirical strategy, section 4 the basic results and section 5 the results of extensive sensitivity testing. Section 6 concludes.

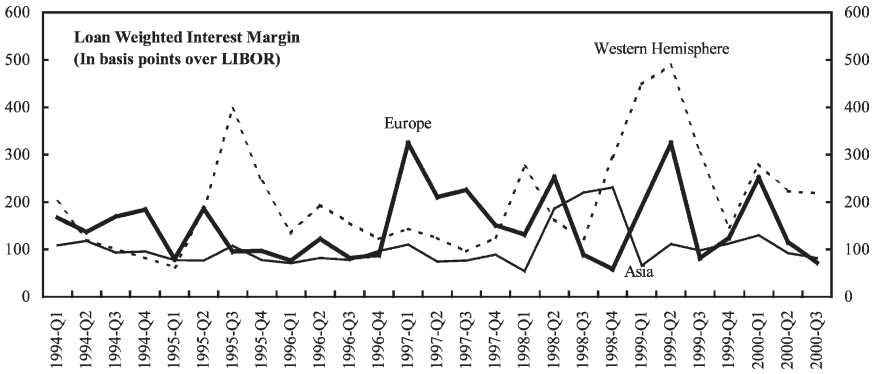
2. Lending flows and bank losses

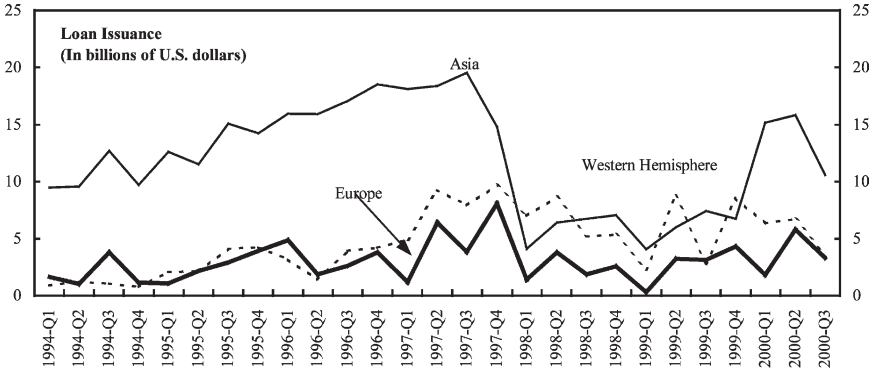
We begin by looking at the distribution of international bank lending by region and by major banking center for the period covering the Asian and the Russian crises. Table 2 shows the distribution of banks' international claims, consolidated by nationality, from end-1994 to end-1998.

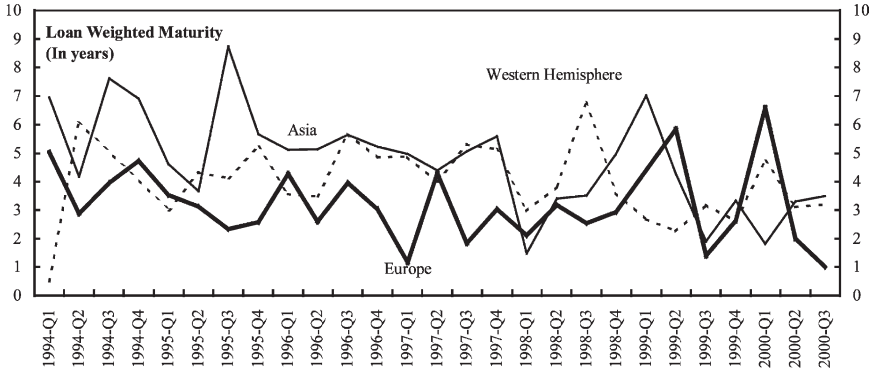
The table illustrates the dominating position of European banks in international lending. European banks are clearly the largest creditors in all regions. It follows

[6] Forbes (2000) finds that at the global level, stock prices of firms with higher short-term debt relative to equity are not disproportionately affected in most regression specifications. She interprets this as evidence against the existence of a global "credit crunch". This finding is not inconsistent with the existence of a common lender effect, as the common lender effect operates only in countries where creditors with high exposure to crisis countries operate and where positions are relatively risky, and not at the global level.

[7] Note that reduced issuance could reflect reduced *demand* as growth prospects declined; however, the fact that interest rate spreads also jumped in the second quarter of 1998, points to at least some role for supply. Flat spreads in the initial stages of the Asian crisis could reflect elastic demand, as when issuance is postponed when the climate for issuance deteriorates. Eichengreen and Mody (1999) come to a similar conclusion for the bond market where they find that issuance is postponed when US interest rates climb. Furthermore, spreads are likely to be biased downwards during crises, because only the better credits tend to come to market.







Source: Capital Data.

Fig. 1. Syndicated loans to emerging markets.

that the behavior of European banks may be key in the understanding of spillovers through banking centers. Also, banks tend to lend in "their" region. The majority of North American banks' loans tends to go to Latin America and of Japanese banks' loans to Asia. European lending is more balanced. Table 2 also illustrates the shifts in portfolios of European, North American and Japanese banks during the Asian and the Russian Crisis. Japanese banks consistently withdrew from Asia reducing their claims from USD 124 billion in mid 1997 to USD 86 billion by end 1998 [8]. North American banks mainly shifted their lending among emerging markets during the Asian crisis (from Asia to Latin America and Europe) while they reduced their positions in all three regions during the Russian crisis. European banks initially, that is, after the Thai crisis, continued to build up their lending to all three regions (including Asia) [9] and only during the first half of 1998 reduced their holdings in Asia, while increasing them in Latin America and Eastern Europe. Finally, as was the case with US banks, European banks reduced their holdings in all three regions during the Russian crisis.

While providing an overview of financial flows, it is clear that this data is too aggregated to answer the question of whether banks tended to pull out where they were most exposed to losses. Appendix Table 1 shows a disaggregated breakdown by country. The data gives exposure to the ground-zero crisis countries as well as changes in claims by any one of 11 creditor countries vis-à-vis any one of 31 emerging markets, for the Mexican, Asian, and Russian crises. The table shows how on average flows were smallest for US banks in the Mexican crisis, for the Japanese in the Asian crisis, and for the Belgian banks in the Russian crisis. It happens that these creditor countries were also highly exposed to Mexico, Thailand, and Indonesia (which was in crisis alongside Russia), respectively, consistent with the common lender hypothesis. We turn to a more systematic data analysis to test the common lender hypothesis in section 4. In the remainder of this section, we examine whether bank exposures and losses during the recent crisis episodes were sufficiently large (as confirmed by changes in credit ratings) that banks might have wanted to rebalance their portfolios in response to losses in an initial crisis country.

By a number of accounts international banks incurred significant losses in the Asian and Russian crises. This was true to a much lesser extent in the Mexican crisis of end-1994. In the four Asian crisis countries (Korea, Indonesia, Malaysia, and Thailand), exposures ranged from 20 to 30% of capital for banks from the United States, France, Germany and the United Kingdom, and 70% of capital in Japan. Exposures to Thailand, the first crisis country, ranged from 3 to 5% of capital for the European banks to 29% of capital in Japan. The aggregate non-performing loan

[8] Note that the change in international claims as recorded in BIS data is not equal to the actual in- and outflows since it incorporates changes in valuation and exchange rates. We discuss this point below and also attempt to adjust for it in the empirical estimates.

[9] The inflow to Asia is expressed in USD and hence underestimates the flow in Deutsche Mark and other European currencies, given the slight appreciation of the USD vis-à-vis the DM over the period.

Table 2
Distribution of consolidated international bank claims[a]

	European banks	North American banks	Japanese banks	Other Banking centers	Total
	(billion US dollars)				
Asia					
end-1994	91.3	22.6	93.3	34.0	241.2
mid-1995	108.6	25.5	108.0	38.4	280.4
mid-1997	171.4	39.4	123.8	55.8	390.5
end-1997	177.3	37.1	114.8	49.6	378.8
mid-1998	155.6	29.1	98.4	36.1	319.6
end-1998	149.5	25.9	85.8	36.6	297.9
Latin America					
end-1994	100.9	65.7	13.6	25.4	205.7
mid-1995	100.9	63.6	14.5	24.9	203.8
mid-1997	147.8	69.6	14.6	20.2	252.3
end-1997	173.0	73.4	14.6	20.3	281.3
mid-1998	181.2	76.1	14.7	21.4	293.7
end-1998	180.0	73.9	14.4	20.2	288.5
Africa					
end-1994	39.2	2.9	2.6	6.1	50.8
mid-1995	40.4	3.6	3.1	5.4	52.5
mid-1997	36.8	6.2	3.4	6.1	52.5
end-1997	45.1	5.7	2.8	4.4	58.0
mid-1998	45.2	5.7	2.3	4.0	57.2
end-1998	45.2	4.6	1.9	4.7	56.4
Eastern Europe					
end-1994	68.6	2.6	5.7	5.4	82.4
mid-1995	77.0	3.0	5.8	5.9	91.8
mid-1997	92.4	11.8	4.0	8.5	116.5
end-1997	98.6	11.0	4.2	9.5	123.3
mid-1998	107.7	13.0	4.2	9.1	134.0
end-1998	103.4	6.8	3.9	7.5	121.6
Developed Countries					
end-1994	75.2	9.5	29.0	18.1	131.8
mid-1995	87.1	11.0	29.5	22.3	149.9
mid-1997	103.4	17.8	24.2	37.9	183.3
end-1997	117.1	16.4	23.7	38.3	195.5
mid-1998	138.0	19.8	19.4	35.5	212.7
end-1998	148.9	20.5	17.6	41.0	228.0

[a] Source: BIS, The BIS Consolidated International Banking Statistics, Tables 1 and 2, various issues.

rate for the four crisis countries was expected to be about 25–30%.[10]. In Russia, exposures were smaller, but expected losses greater—about 90 cents on the dollar. For European banks, the exposure of nine selected banks was estimated at $8 billion in Russia, compared to $48 billion in the four Asian crisis countries. Provisions as of October 1998 were $2.3 billion in Russia and $7.1 billion in the four Asian crisis countries respectively. Based on market views of ultimate losses of 90% of exposure in Russia and 30% in Asia, this means losses were expected to be about half as large in Russia as in the four Asian crisis countries. German (both commercial and Landesbanken), Swiss, Austrian, French, and US banks had the largest exposures.[11] Rating actions confirm that notwithstanding their large capital, major commercial and investment banks active in emerging markets were affected in the Asian and Russian crises. [12]

Kho et al. (2000) provide further evidence that US banks were affected by currency crises by investigating the impact on bank stock prices of emerging market crises. They distinguish between banks with exposure to a crisis country and other banks based on the exposure reported in their annual reports and find that banks with exposures to a crisis country were affected adversely by currency events while other banks were mostly unaffected.

Note that a common bank lender effect could be present even if banks do not immediately suffer losses in the primary crisis country since loss of capital (a "capital event") is only one reason why banks may choose to rebalance portfolios, another reason being a "volatility event" (involving an increase in the variance of an asset's future return rather than actual losses). As noted above, asset managers who operate under loss constraint rules (such as VaR) will under certain circumstances sell an asset whose return is positively correlated with their assets in a primary crisis country hit by a volatility event, thereby contributing to contagion across emerging markets. Thus, exposure to an initial crisis country could still give rise to a common bank lender effect even when not manifesting itself in actual losses.

Overall, the above review of information on exposures, losses, and rating actions suggests that the Asian and Russian crisis episodes were "capital events", giving one reason to believe that bank flows would have been affected in these episodes. No equivalent loss of capital appears to have been present in the Mexican crisis, but if this crisis is interpreted as a volatility event, an effect on bank flows might also be expected. We turn to an empirical investigation of whether this was in fact the case next.

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[10] Capital refers to aggregate tier 1 capital for the ten largest banks, except for Germany where the concept used is shareholders' equity. The source of data is "Mature Banking System Exposures to Asia," MF memorandum (March 6, 1998), based on Moody's (1998).

[11] "European Banks Weather the Russian Storm", Standard and Poor's Credit Analysis Service (October 7, 1998) and US Banking Quarterly Review, Third Quarter 1998.

[12] See Van Rijckeghem and Weder (2000) for a detailed account of the reasons for the downgrades and for more information about the total capital of banks involved in emerging markets.

3. Empirical strategy and data

Our aim is to explain the pattern of outflows (and inflows) of bank lending during a crisis period. Since we are interested in financial contagion, we omit the first crisis country (Mexico, Thailand, Russia) and only study the reaction of bank flows in the other countries.[13]

We estimate the following reduced form equation for each crisis episode:

$$(\Delta\text{Exposure}_{ci})/\text{Exposure}_c = \alpha + \beta(\text{Exposure}_{c0}/\text{Exposure}_c) + \gamma(\text{Exposure}_{ci}/\text{Exposure}_c) + \varphi\,\text{Macro} - \text{Controls}_i + \delta\,\text{Trade}_i + \varepsilon. \quad (1)$$

where 0 stands for the ground-zero country,[14] c stands for the common creditor (11 banking centers) and i indexes the receiving country, $\Delta\text{Exposure}_{ci}$ is the flow of bank lending during the post-crisis period.[15] Exposure_{ci} represents bank flows from a creditor country c to an emerging market i, Exposure_c is the total exposure of a bank creditor c to developing countries as a whole (including Eastern Europe), and Exposure_{c0} is exposure of a bank creditor c to the ground-zero country.[16]

For example (Exposure_{c0},/Exposure_c) could refer to German banks' lending to Thailand as a share of total lending of German banks to developing countries. This is used as a proxy for the exposure to loss that German banks face in the event of a crisis in Thailand. A significant β, the coefficient on $\text{Exposure}_{c0}/\text{Exposure}_c$, is evidence in favor of a common lender effect. A significant γ points to the presence of generalized inflows or outflows proportional to initial exposure, as one would expect to find when there is a general shift in investor's attitudes towards investing in emerging markets.

Macro-controls_i are a set of macroeconomic variables that have been identified in the crisis literature[17] and should in principle determine bank flows to the extent that banks use these criteria in their lending decision (current account/GDP, budget balance/ GDP, M2/Reserves, growth of credit to the private sector, and real exchange

[13] While feedback effects from second crisis countries onto the first are likely to exist, total flows out of a ground-zero country are likely to be larger than flows out of other countries, ceteris paribus. Indeed, when including the first crisis country in our sample the results on the common lender variable become stronger. However, since these outflows are to a large extent caused by the first currency crisis itself, rather than by feedback from other countries, one cannot place too much confidence in these results. Thus we report the results without the first crisis country.

[14] Mexico, Thailand, and Russia.

[15] Because the BIS data is semi-annual, we can only roughly approximate the post-crisis periods. We used January–July 1995, for Mexico; July 1997–July 1998, for the Asian crisis, July–December 1998 for the Russian crisis.

[16] Bank exposures refer to the positions of banks on the eve of the respective crisis episodes (December 1994 for Mexico, June 1997 for Thailand, and June 1998 for Russia).

[17] See e.g. Kaminsky et al. (1998); Sachs et al. (1996); Radelet and Sachs (1998), and Berg and Pattillo (1999).

rate appreciation[18]).[19] Trade linkages are captured in two ways—as direct trade (calculated as the percent of total exports destined for the ground-zero country) and as trade competition in third markets.[20]

We subject this specification to extensive sensitivity tests detailed in section 5.

3.1. Data

We use the BIS′ semi-annual consolidated data covering banking systems in 11 industrialized countries (the "reporting area").[21] For flows we use the six month change in claims subsequent to these dates, with the exception of the Asian crisis where we use the change in claims for the entire subsequent year (i.e. June 1997–June, 1998). The data is organized in an unbalanced panel of 11 creditor countries[22] and 30 emerging market debtor countries.[23] Note, that the panel dimension is by creditor banks and not by time. Separate regressions are run for the Mexican, Asian, and Russian crises.

A number of features of the data should be noted, some of which call for sensitivity

[18] Defined as in Glick and Rose (1999) as the average of the real effective exchange rate in the 12 months before the crisis divided by the average in the previous three years.

[19] We use annual data (end-of-year data for stocks). All macroeconomic variables are computed from IFS and are compiled for the period previous to the beginning of each episode of currency instability to avoid contamination of the annual data by the crisis (i.e. we use 1994 data for Mexico, 1996 data for Thailand, and 19997 data for Russia). Using data prior to the realization of a currency crisis is necessary since the crisis will usually completely alter the macroeconomic picture.

[20] Direct trade is calculated for 1994, 1996 and 1997 from "Direction of Trade Statistics" IMF, Washington and trade competition in third markets is the trade share index of Glick and Rose (1999). We use direct trade competition in the Mexican and Russian crises and indirect trade competition in the Asian crisis. This choice is based on a previous selection process in which direct and indirect trade effects were tested (see Van Rijckeghem and Weder (2001)).

[21] The data include lending through banking offices located outside the reporting area, but of the same nationality as countries in the reporting area (BIS, 1995, p. 82). Claims on affiliates of banks with head offices outside of the host country, are in principle included under the country of the parent bank (BIS, 1995, p. 93). The data (in principle) cover all on-balance sheet claims on countries outside the reporting area, including deposits and balances placed with banks, loans and advances to banks and non-banks, holdings of securities, and participations. The data (in principle) *include local claims of affiliates in outside-area countries in non-local currency*, as well as net asset positions in local currency. (p. 83). There are only a few exceptions to these rules (pp. 83–84). Investment banks are generally covered, the UK being the exception.

[22] While the BIS coverage comprises claims of 17 countries, data-coverage is insufficient for five of these (Denmark, Finland, Ireland, Norway, and Sweden). Luxemburg was also dropped as a creditor country beause of inconsistency of the timing of the data with the rest of the sample. This leaves us with Austria, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, the UK, and the US. Note that the data do not cover Switzerland.

[23] The countries are Argentina, Brazil, Chile, China, Colombia, Czech Republic, Ecuador, Egypt, Hungary, India, Indonesia, Israel, Jordan, Kenya, Korea, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Peru, Phillippines, Poland, Russia, South Africa, Sri Lanka, Taiwan Province of China, Thailand, Turkey, Venezuela and Zimbabwe. Of this set of 31 countries, the ground-zero country is excluded in the regressions, leaving 30 countries. As mentioned above, we exclude the first crisis country, as outflows from these countries were likely larger than for other countries, holding everything else constant.

tests (which we carry out). First, the data refers to consolidated claims, not claims by residence. Thus, on-lending through subsidiaries located in, say, offshores is captured as exposure of the original bank creditor, as it should (e.g. Japanese lending to China through a Hong Kong subsidiary is counted as Japanese lending).[24]

A second point to note is that our dependent variable—the change in claims—is only indirectly linked to the incidence of currency crises. Banks can change their exposure without a one for one balance of payments flow. The acquisitions of Argentine banks by Spanish banks in 1997–98 are a case in point. These led to a large increase in claims as foreign exchange denominated assets of Argentine banks swelled claims, but only a limited balance of payments inflow (corresponding to the payment for the equity stake in the banks). Similarly, if capital is repatriated from a subsidiary in an emerging market without a corresponding change in foreign currency lending this would not show up in the data to its industrial country home.

Third, changes in bank claims incorporate valuation changes (exchange rate changes, marking to market of securities, and write-downs of non-performing loans) and may differ somewhat from the true lending flows. When the price of securities falls, for example, claims fall, even when there is no true outflow. Similarly, with a depreciation in a debtor country which borrows abroad in its own currency, inflows measured in dollars will appear smaller than physical inflows. We make two different types of adjustments and check whether these make a difference to the results. We first look at the effect of local factors—local exchange rates, interest rates, and non-performing loans. Bank claims are usually expressed in foreign exchange rather than local currency (so that devaluations in borrowing countries have no effect) and write-downs tend to be limited to the securities portfolio (which in general has to be market to market), with non-performing loans slower to be acknowledged, so that local factors do not create a large wedge between the two concepts—the change in claims and true flows. We attempt to adjust the data for this bias using the exchange market pressure index and check whether this makes a difference to the results.

Fourth, market participants have been sceptical of the usefulness of the BIS data, pointing out that it captures only on-balance sheet positions, whereas banks typically hedge their positions with off-balance sheet positions. Maintaining such hedges is nevertheless expensive, and hence tends to be done more when a crisis is widely anticipated, as was the case in Brazil. For the Mexican, Asian, and Russian crises, which were generally not anticipated, the data is more likely to closely capture overall positions.[25] An additional caveat is that indirect exposures are not covered by the data. To the extent that commercial and investment banks maintain sizeable exposures to other commercial entities which invest heavily in ground-zero countries, this means that the data misses indirect exposures of banks to ground-zero countries. In practice, this appears to have been important only during the Russian crisis, on

[24] Such lending through offshore branches is quantitatively important (Fornari and Levy, 2000 p. 11).

[25] Off-balance sheet data is not available which would permit us to accurately calculate exposures and risks.

account of high exposures of hedge funds to Russia.[26] Finally, exposure data do not capture the effect of any off-setting guarantees. As this is known to be important for the largest common creditor in the Russian crisis—Germany—this country is omitted from the Russian crisis regressions.[27]

4. Regression results

Table 3 presents the results of the base specification on our panel of data on bank flows. As already noted, the availability of data is *by creditor*, which yields the panel dimension. The columns represent separate regressions for the Mexican, Asian, and Russian crises. The flow from a given creditor to a given emerging market (the dependent variable) is scaled by the creditor's total claims on emerging markets. The common lender effect is tested by including creditor country exposure to the ground-zero country (scaled by the creditor's total claims on emerging markets) as an independent variable. The creditor's claims on an emerging market (again scaled by its total claims on emerging markets) is introduced as an independent variable, to test whether inflows and outflows are proportional to exposure (generalized inflows and outflows). As heteroscedasticity is to be expected in panel data, we provide standard errors robust to heteroscedasticity.[28]

The results point to the existence of a common lender effect in the Mexican 1994 and Asian 1997 crises, but not in the Russian crisis. For the Mexican crisis, the results point to a small common lender effect which is significant at the 5% level of significance. For each dollar additional exposure of a banking center to Mexico, flows are lower by 1 cent on average for any given emerging market, holding constant exposure to that given country and macro-controls. At the same time, the data point towards a generalized inflow of funds in the wake of the Mexican crisis, consistent with rising interest in emerging markets in that period. For each dollar of exposure to the country under consideration, flows increase by on average 13–14 cents to that country, and this effect is statistically significant. That is, the "own-country" effect is stronger than the one connected to Mexico. Among macro-controls, only the real effective exchange rate is statistically significant with the anticipated

[26] Eichengreen et al. (1998) note the relatively small exposures of hedge funds in Mexico and Thailand, with hedge funds having closed their long positions in baht instruments and taken on sizable short positions before the onset of the Thai crisis (pp. 16–20).

[27] Many of the German credits received state-supported export agency guarantees. An additional factor working against a contagious response by German banks was that between 50 and 60% of the Russian exposures were provisioned against ahead of the crisis (IMF, 1999, p. 115). The paper by Baig and Goldfajn (2001) concludes that banks were probably not a main channel for contagion to Brazil after the Russian crisis; this conclusion rests on the finding that the main common lender—Germany—maintained a relatively high rollover rate (70%) after the Russian crisis. However, as we just noted, German banks received extensive guarantees, reducing their need to raise capital through compensatory liquidations. Hence the behavior of German banks in Brazil after the Russian crisis does not constitute strong evidence against the common lender hypothesis.

[28] Standard errors were obtained using Newey–West.

Table 3
Base specification. Dependent variable: Changes in BIS bank exposures in emerging market (i) by creditor[a] (c)[b]

	Mexico	Thailand	Russia
I. With macro- and trade-controls			
Constant	0.003	0.02	–0.02∗∗
	1.49	1.38	–2.27
Proportional out/inflows[b,c]	0.14∗∗∗	0.05	–0.06
	4.65	0.41	–1.28
Common Bank Lender	**–0.01∗∗**	**–0.04∗∗∗**	**0.01**
Variable[b,d]	**–2.01**	**–2.93**	**1.53**
M2/Reserves	0.001	$-2.0\ 10^{-5}$	$-2.6\ 10^{-5}$
	2.55	–0.44	–0.33
Current account	–0.02	0.001	–0.05
(percent GDP)	–2.50	0.05	–2.18
Credit to private	–0.01	–0.003	–0.01
Sector (% change)	–1.47	–0.25	–0.98
Real effective exchange rate	–0.27∗∗	–1.09	1.98
appreciation	–2.05	–0.79	2.19
Trade competition[e]	0.002	–0.02∗	0.04
	0.03	–1.76	0.86
Adjusted R-squared	0.30	0.02	0.14
Number of observations	307	277	239

[a] T-Statistics below coefficient, ∗ coefficient is significant at the 10% level and has the expected sign, ∗∗ coefficient is significant at the 5% level and has the expected sign ∗∗∗ coefficient is significant at the 1% level and has the expected sign. Regressions exclude main crisis country. Newey-West heteroscedasticity and serial correlation robust standard errors, except for random effects.

[b] As a percent of creditor c total exposure in emerging markets.

[c] Defined as Exposure of Creditor c to Emerging Market i.

[d] Defined as Exposure of Creditor c to ground zero country.

[e] Trade based on direct trade in Mexico and Russia; based on indirect trade in Thailand.

sign. Trade competition is not significant in this regression, indicating that bank flows were not affected by this variable in the aftermath of the Mexican crisis.[29]

For the Asian crisis, the common lender effect is economically significant as well as statistically significant. For each additional dollar in exposure to Thailand, flows

[29] Note that this finding refers only to the effect of trade competition on bank flows to other countries

per emerging market fall by 4 cents, on average, everything else constant. To illustrate the magnitudes involved, consider the case of Japanese banks. Exposures to Thailand were 25.5% of Japanese banks' total exposure to emerging markets. This meant, according to the regression results, that Japan would have reduced its exposure (holding everything else constant) by about 1% (25.5∗0.04) of its total emerging market exposure, on average, in each of the emerging markets where it invests. Summing over the 30 emerging markets in our regressions, this amounts to 30% of initial exposure to emerging markets, a very sizeable figure.[30] The coefficient on initial exposure to the respective country is insignificantly different from zero, indicating that there is neither a generalized inflow or outflow of funds. Trade competition is marginally statistically significant and of the correct sign.

Turning to the case of the Russian crisis, the results point to a generalized outflow, of some 6–9% of initial exposures. The constant term is negative and statistically significant, which also points to generalized outflows.[31] The common lender effect is not statistically significant. From this it appears possible that contagion from the Russian crisis was generalized, possibly reflecting an increase in perceived risk or in risk aversion. Alternatively, capital flows in the wake of the LTCM crisis may have obscured the common lender effect pertaining to the Russian crisis (see e.g. Kaminsky and Reinhart, 2000b). It is also possible that the lack of significance on the common lender variable is related to the limitations of the data, and we speculate how this might have operated in the conclusion.

It is worth recalling that the data limitations (absence of bank-by-bank data, the fact that some of the reduced supply in international bank credit is reflected in a price increase rather than volume decline, and use of on-balance sheet and direct exposure data only) lead to a downward bias in the coefficient estimates on exposure to the ground-zero country.

5. Sensitivity analysis

We conduct a number of sensitivity tests. First we examine extended specifications in part prompted by the poor fit in our base specification, in particular during the Asian crisis episode (Table 4). Second we attempt to adjust the BIS data for changes in exchange rate and valuation and to recover the true flows (Table 5).

The first set of regressions in Table 4 (panel I) show the results of estimates with

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and does not preclude trade linkages from exerting competitive pressures on other countries (see Glick and Rose (1999).

[30] Summing the regression equation over the 30 countries, one obtains that total flows equal 30 times 0.04∗ exposure to Thailand plus the total generalized inflow plus the effect of macro-variables.

[31] We adopted a relatively narrow definition of generalized outflows by characterizing them as a *proportional* reduction in claims. A significant negative constant points to another pattern of generalized outflows, namely to a lump sum reduction in claims (as a percent of total exposure) in every emerging market.

Table 4
Sensitivity to specification[a]

	Mexico	Thailand	Russia
I. With fixed effects			
Proportional Out/Inflows[b,c]	0.13∗∗∗	0.01	–0.09
	10.44	0.05	–1.40
Common bank lender variable[b,d]	**–0.01∗**	**–0.04∗∗∗**	**0.01**
	–1.97	**–3.63**	**1.55**
Adjusted R-squared	0.45	0.17	0.12
Number of observations	322	323	299
II. With macro- and trade-controls			
Constant	0.002∗	0.01	–0.02∗
	1.64	0.68	–1.76
Proportional Out/Inflows[a,b]	0.22∗∗∗	0.004	–0.08
	6.80	0.04	–1.19
Common bank lender Interacted with initial exposure to recipient country[a,c]	**–0.80∗∗∗**	**–1.19∗∗∗**	**0.48**
	–4.52	**–3.87**	**1.00**
M2/Reserves	5.5 10–5∗	9.4 10–6	–3.4 10–5
	1.81	0.22	–0.38
Current Account	0.01	0.04	–0.04
(percent GDP)	0.52	1.08	–1.17
Credit to Private	0.02	–0.0004	–0.01
Sector (%change)	3.71	–0.02	–0.51
Real effective exchange rate	–0.36∗∗	–0.28	1.95
appreciation	–2.38	–0.25	1.81
Trade Competition[e]	0.02	–0.001	0.04
	0.33	–0.16	0.86
Growth of Exports	–0.0002	0.02∗	–0.002
	–0.13	1.89	–0.53
Inflation	–0.01∗∗∗	0.001	0.0003
	–3.91	0.04	0.02
Dummy for Spanish	–	0.24∗∗∗	–
Acquisitions in Argentina		15.94	

(*continued on next page*)

Table 4 (*continued*)

	Mexico	Thailand	Russia
Adjusted R-squared	0.37	0.52	0.13
Number of observations	289	259	229
III. Adjusting for the share of short term debt (with macro- and trade-controls)			
Proportional Out/Inflows[b,c]	0.20∗∗∗	0.01	–0.07
	5.90	0.10	–1.15
Common Bank Lender—Interacted with Initial Exposure to Emerging Markets and with short term debt[b,d]	**–1.10**∗∗∗	**–2.02**∗∗∗	**0.68**
	–2.93	**–3.45**	**0.79**
Adjusted R-squared	0.33	0.53	0.12
Number of observations	289	259	229
IV. Adding an additional crisis country			
Proportional out/inflows[b,c]	0.25∗∗∗	0.18∗∗	0.04
	8.42	2.36	1.27
Common bank lender exposure to main crisis country interacted with initial exposure to recipient country	**–0.29**	**–0.89**∗∗∗	**–0.19**
	–1.25	**–3.92**	**–0.42**
Common bank lender exposure to additional crisis country interacted with initial exposure to recipient country 3/ (Argentina, Korea, Indonesia)	**–1.95**∗∗∗	**–0.71**∗	**–1.14**∗∗∗
	–2.95	**–1.69**	**–3.32**
Adjusted R-squared	0.46	0.66	0.38
Number of observations	278	248	229
Correlation between two common bank lender exposures	0.83	0.73	0.17

[a] T-Statistics below coefficient, ∗ coefficient is significant at the 10% level and has the expected sign, ∗∗ coefficient is significant at the 5% level and has the expected sign, ∗∗∗ coefficient is significant at the 1% level and has the expected sign. Newey-West heteroscedasticity and serial correlation robust standard errors.

[b] As a percent of creditor c total exposure in emerging markets. Macroeconomic and trade-controls included but not reported.

[c] Defined as: Exposure of creditor c to emerging market i.

[d] Defined as: Exposure of creditor c to ground zero country ∗ Exposure of creditor C to emerging market i.

[e] Trade based on direct trade in Mexico and Russia; based on indirect trade in Thailand.

Table 5
Sensitivity to adjustments of bank exposure data[a]

	Mexico	Thailand	Russia
I. Adjusting dependent variable for the true flow (Pressure in EM i)			
Proportional out/inflows[b,c]	0.21∗∗∗	0.15∗∗∗	–0.09
	6.97	2.60	–0.95
Common bank lender interacted with initial exposure to recipient country[b,d]	**–0.74∗∗∗**	**–1.26∗∗∗**	**0.28**
	–4.14	**–4.80**	**0.49**
Adjusted R-squared	0.36	0.66	0.18
Number of observations	289	237	119
II. Adjusting dependent variable for exposure in home currency of creditor			
Proportional out/inflows[b,c]	0.03	0.002	–0.15∗∗∗
	1.11	0.02	–2.37
Common bank lender interacted with initial exposure to recipient country[b,d]	**–0.12**	**–0.51**	**0.58**
	–0.61	**–1.44**	**1.18**
Adjusted R-squared	0.06	0.51	0.28
Number of observations	289	259	229

[a] T-Statistics below coefficient, ∗ coefficient is significant at the 10% level and has the expected sign, ∗∗ coefficient is significant at the 5% level and has the expected sign ∗∗∗ coefficient is significant at the 1% level and has the expected sign. Newey-West heteroscedasticity and serial correlation robust standard errors. Regressions exclude main and additional crisis country, as applicable. Macroeconomic and trade controls included but not reported.

[b] As a percent of creditor c total exposure in emerging markets.

[c] Defined as: Exposure of creditor c to emerging market i.

[d] Defined as: Exposure of creditor c to ground zero country ∗ Exposure of creditor C to emerging market i.

fixed effects.[32] The results on the common bank lender variable are as above. Because under fixed effects, country-specific variables such as macroeconomic controls (which do not vary across creditors) cannot be included, and given that coefficient estimates are identical indicating no bias, in the remaining regressions we prefer to work with specifications with macroeconomic and trade-controls.

[32] We also tested for random effects. The coefficients on the variables of interest are almost identical.

In the second set of regressions (panel II) we add a number of variables used to explain bank lending in the literature on bank lending outside of crises (see e.g. Dahl and Shrieves, 1999), namely the growth in exports and inflation, as well as—for the Asian crisis—the dummy variable capturing Spanish acquisitions of Argentine banks. Growth in exports is included to control for changes in the demand for international bank lending.[33] The dummy for Spanish flows to Argentina captures the special case of Argentina: Argentina is highly dollarized and therefore, a large fraction of local bank lending happens to be in USD. Since the BIS counts foreign exchange denominated assets of local subsidiaries among consolidated claims there is a large jump in BIS bank exposure to Argentina during the Asian crisis, which cannot be explained by our model.[34] We also interact the common bank lender variable—normalized exposure to the ground-zero country—with initial exposure to the debtor country. We do this to capture the idea that reductions in claims in a country X cannot be affected, no matter how high exposure to the ground-zero country is, unless there are claims in the country X in the first place. As before, the coefficients on the common lender variable is significant and negative in the Mexican and Asian crisis, but not the Russian crisis. Growth in exports is marginally significant with the expected positive sign only in the Asian crisis. In the Asian crisis, the dummy variable for flows from Spain to Argentina is highly significant.

Next, we present results where exposure to the ground-zero country is interacted with short-term exposure, rather than total exposure (Table 4, panel III). Short-term exposure is easier to cut, hence we might expect this to be a more relevant variable than total exposure. The results are nonetheless about the same, with the exception of the size of the coefficient on the common lender variable, which is now about 50% larger than it was earlier. This finding reflects the fact that short-term exposure is less than total exposure; predicted flows would be about the same under both specifications.[35]

Finally, in Table 4 panel IV we add exposure to an additional crisis country (Argentina in the tequila crisis, Korea in the Asian crisis, and Indonesia in the Russian crisis episode).[36] It turns out that in each case exposure to the additional crisis

[33] Given that interest rates on syndicated loans increased (Fig. 1), supply factors probably dominated demand factors; however, this does not mean demand did not also decline, albeit to a lesser degree than supply. See Domac and Ferri (1999); Ghosh and Ghosh (1999), and Ito and Pereira da Silva (1999) for evidence on a credit-crunch during at least part of the Asian crisis period. Furthermore, aggregate demand could have fallen due to changes in macro-fundamentals or expected company profitability, e.g. as the result of a deteriorating competitive position, reducing the demand for bank credit.

[34] The BIS data include cross-border claims in all currencies and local claims of foreign affiliates in non-local currencies.

[35] It was not possible to include both exposure to a ground-zero country and exposure interacted with the share of short-term debt because the variables are highly correlated.

[36] As we do this, we exclude both the ground-zero country and the additional crisis country (Argentina, Korea, and Indonesia, respectively), given that outflows from the additional crisis country were likely larger than for other countries, holding everything else constant. Failure to do so would introduce a non-linearity (e.g. in the Asian crisis regression, exposure to Korea squared would appear) which might cause the Korea data-point to unduly influence the regression results.

country is statistically significant or marginally significant. Thus, exposure to Argentina in the Mexican crisis and exposure to Indonesia in the Russian crisis are statistically and economically highly significant. In the Mexican crisis, exposure to Mexico loses its significance. In the Asian crisis, the economic significance of exposure to Thailand and Korea are about equal. Statistically, exposure to Thailand is highly significant, and exposure to Korea marginally significant. Given high correlation among exposure variable in the Mexican and Asian crises (the correlation coefficients are 0.83, 0.73, and 0.17, respectively in the three crises), it is not clear, however, which exposure—Mexican versus Argentine, and Thai versus Korean—is the driving factor. The finding of the importance of exposure to Indonesia during the Russian crisis is of particular interest, given our inability to detect an effect from exposure to Russian exposure. The explanatory power of these regressions is quite satisfactory, and in the case of the Russian crisis regression represents a substantial increase in explanatory power over the regressions that includes only exposure to Russia.

We also examined a number of variants (results not reported). In a first variant, we replace macroeconomic controls with credit ratings. Bank credit committees pay great attention to their internal ratings of countries as well as to ratings by external credit rating agencies. Such ratings summarize material economic and political risks associated with sovereigns.[37] The effect of ratings varies across crises, with the expected sign in the Mexican crisis, but the opposite sign in the Asian crisis. The results on the common bank lender variable are as above. In a second variant we introduce liquidity as an additional control variable. We use the JP Morgan liquidity measure in the month of the crisis in the ground-zero country. The effect of liquidity could go either way. On the one hand, banks could try to sell those securities with low bid-ask ratio as this would minimize losses from "firesales"; on the other hand, in periods of tight liquidity, banks might prefer to exit markets with low liquidity, in order to remain liquid themselves.[38] As with ratings, the effect of liquidity appears to have been different across crises. In the Mexican crisis greater liquidity meant larger outflows; in the Asian and Russian crises, on the other hand, greater liquidity meant larger inflows. However, these results may be spurious and driven by regional effects.[39] Again, the results on the common bank lender variable are unchanged. Finally, for the Asian crisis, we check whether the results are driven by a regional effect or by Japan. We find evidence in favor of a regional effect: a dummy variable for the Asian countries (Thailand, Philippines, Malaysia, Taiwan, Korea, and China) is significant at the 1% level and points to a reduction equal to on average 1.5% of

[37] Each rating was translated into a numerical value based on the historical probability of default associated with corporate ratings. For example, entities rated investment grade (BBB and higher) are supposed to have very low (1–5%) chances of default over 15 years.

[38] When JP Morgan provides a liquidity rating for more than 1 Brady or Eurobond, we use the highest (most liquid) rating.

[39] Thus, in the Asian crisis, crisis countries were initially very highly rated countries (IMF, 1999 p. 186–92). Similarly, in the Asian crisis, Latin American countries, which have more liquid markets (cfr. Argentine, Brazilian, and Mexican bond markets), tended to witness inflows.

emerging market assets from these countries. The coefficient and statistical significance of the common lender variable are not affected. When Japan is dropped from the sample, the common lender effect loses some significance, but remains significant at the 10% level.

Next, we examine the sensitivity of results to adjustments in the dependent variable (Table 5). As noted above, BIS flow data (expressed in USD) incorporate valuation changes for local-currency denominated loans on account of depreciations in borrowing countries as well as valuation changes in the securities portfolio on account of interest rate changes which do not represent true changes in volumes.

Table 5, panel I shows the results when we make a rough adjustment to the BIS flow data based on the exchange market pressure index to adjust for these valuation changes. Specifically, the adjustment we make is as follows: Let E_0 and E_1 denote original and final exposure. Then unadjusted flows (used in the baseline regressions) are equal to E_1-E_0. Now add back the effect of exchange rate changes and write-downs to final exposure by assuming that this effect is proportional to the product of exchange market pressure (the average, of the percent change in the exchange rate, in (minus) reserves, and in normalized interest rates) and original exposure. Our guesstimate for the fraction of bank portfolios which is market-to-market or expressed in local currency terms is 20%. Then adjusted flows equal $E_1-E_0+0.2*\text{pressure}*E_0$. We chose the 20% guesstimate based on BIS data on the share of debt securities in total claims[40] and a selective examination of the share of local currency denominated bank claims.[41] The pressure index used in this equation is an equally weighted average of percent changes in the exchange rate, reserves, and interest rates. We use the pressure index six months after the Mexican and Russian crises and 12 months after the Thai crisis.[42] We find that the previous results are largely unchanged. We still find a significant common creditor effect in the Mexican and Asian crises and not during the Russian crisis.

In Table 5, panel II we look at the effect of valuation changes on account of cross-exchange rate changes among the major currencies. The BIS data is expressed in dollars, so that cross-exchange rate changes lead to changes in valuation if the currency of issuance is not the USD (e.g. the Yen or DM). Thus, there will appear to be changes in exposures in the absence of flows. The depreciation of the Yen during

[40] BIS data on total claims and loans indicate that in December 1998 the share of loans in total claims was 90% for the BIS category "developing countries", and hence the share of debt securities 10%. This share was about constant across broad geographic areas (Latin America, Middle East, Africa, and Asia). The source is the BIS′ Quarterly Review: International Banking and Financial Developments.

[41] The share of local currency lending in developing country lending is known to be very smal for most countries. For example, data for 116 Swiss banks (Swiss National Bank: Bankenstatistisches Monatsheft, January 1999, Eurodevisenstatistik) indicate that for Latin America, lending in currencies other than the US dollar, Swiss Franc, and DM, was 4% as of mid-1998. Hence the share of local currency lending was at most 4%. Similarly, US bank claims on Latin American countries payable in currencies other than the dollar were only 5% of the total in Latin America and Asia in mid-1998 (US Treasury Bulletin, December, 1998).

[42] To be precise, we use the index six months after the Thai crisis multiplied by the index six months after the Korean crisis.

the Asian crisis, for example, to the extent that lending was in Yen, would have led to a decline in USD claims in the absence of any outflows. There would appear to have been a retrenchment, when in fact there might not have been one. Fortunately, it turns out that most international lending is in USD. Loanware data from Capital Data for 1996 shows that 84% of syndicated lending to non-Japanese entities and involving a Japanese bank in the syndicate was in USD (0.2% in Yen). Similarly, 80% of syndicated lending to non-Western European entities and involving Western European banks was in USD.[43] This means that changes in claims expressed in dollars are a good proxy for flows. We nevertheless also check our results based on adjusted flows, with assets translated into the home currency of the creditor (Yen for the Japanese banks, the DM for the Continental European banks, the Pound for the UK, and the USD for Canada and the US). The common lender effect for the first crisis country is no longer significant in the regression for Mexico. For Asia, the coefficient on ground-zero exposure is significant only at the 15% level. These results are perhaps not surprising, given the dominance of USD-based lending, which implies that changes in unadjusted claims in USD are probably a better proxy for flows and thus a better dependent variable than changes in claims in the currency of the creditor.

Overall, the results of the sensitivity analysis suggest that the findings on the common bank lender effect are quite robust to alternative specifications and to variations in the calculation of banks' exposures.

6. Conclusions

This paper has provided evidence from flow data of bank lending that supports the view that spillovers through common bank lenders were important in transmitting the recent Mexican and Thai financial crises. Regressions based on panel data for 11 creditor countries and 30 emerging markets point to a large and statistically significant common lender effect during the Thai crisis. The effect is somewhat smaller in the Mexican crisis and not statistically significant in the Russian crisis.

The small impact during the Mexican crisis is consistent with the lack of impact which the Mexican crisis appears to have had on developed country bank capital. In the Russian crisis, the withdrawal of funds seems to have been more generalized, pointing to the role of "wake-up calls" concerning emerging markets or a general increase in risk-aversion. Still, the absence of a common lender effect goes contrary to the widely held view of bank behavior. This could possibly be attributed to an overwhelming factor such as the failure of LTCM. It could also reflect the absence of some major players from the data (the BIS data exclude data on Swiss banks,

[43] Conceivably, exchange rate changes are relevant even when loans are expressed in USD, if say, Japanese banks are concerned about how their balance sheet looks in Yen (e.g. because of capital-adequacy concerns), rather than about actual flows (say because of margin calls, capital repatriation for provisioning). The role of the currency in which banks make decisions is an interesting topic for future research.

likely to have played a role during the Russian crisis) or the existence of indirect exposures and guarantees not captured by the data. An alternative explanation would be that banks manipulated their off-balance sheet positions to cut their exposures, an effect which is not captured by the BIS data. Finally, because pressures to withdraw funds can appear in either quantities (flows) or prices (yields), spillovers through common bank lenders may be present even when they are not captured by the flow data. Many of these factors impart a downward bias to the coefficient on the common bank lender effect. In fact, in Van Rijckeghem and Weder (2001), where we do not rely on flow data but use measures of contagion such as the exchange market pressure index, we previously found some evidence in favor of a significant common bank lender effect even in the Russian crisis.

From a policy point of view these findings imply that emerging market economies could reduce their contagion risk by diversifying the sources of their funding and carefully monitoring their vulnerability through shared bank creditors. Notwithstanding the fact that the choice of creditors by private banks is the decision of individual banks, the government can still play a role by providing information on aggregate positions and also by adjusting the composition of its own creditors.

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Appendix A: Exposures and flows to emerging markets

	Creditor Country											
	Austria	Belgium	Canada	France	Germany	Italy	Japan	Nether-lands	Spain	UK	US	Average
I. Mexican crisis												
Total exposure to d.c. (billion $)	14.2	8.7	11.9	68.7	107.9	26.3	120.5	21.3	13.7	69.9	86.8	
Exposure to Mexico (% of total exposure)	2.7	9.1	23.4	8.4	4.2	6.2	3.4	9.5	20.5	14.3	25.5	11.6
Exposure to Argentina (% of total exposure)	2.2	1.1	6.0	3.9	6.1	13.1	1.4	7.2	14.1	4.7	11.4	6.5
Flows during Jan–June 1995 (% of total exposure):												
Argentina	0.0	0.5	1.8	0.7	–0.1	1.7	0.1	0.5	0.6	–0.6	1.0	0.6
Brazil	0.1	1.5	0.0	0.1	0.8	0.3	0.2	1.2	–3.1	0.4	–0.3	0.1
Chile	0.0	1.2	0.4	0.0	–0.1	–0.2	0.1	–0.1	–2.8	–0.2	0.1	–0.1
China	1.4	1.5	0.1	0.7	0.6	0.1	1.9	–0.4	0.3	0.2	0.2	0.6
Colombia	0.1	–0.1	0.0	–0.1	0.1	–0.1	0.0	–	0.1	–0.1	0.1	0.0
Czech Republic	1.5	0.2	–	0.1	0.9	0.3	0.2	0.2	0.0	0.1	0.0	0.4
Ecuador	0.0	0.0	–0.5	0.0	–0.1	–0.2	–0.2	–0.6	0.0	0.0	0.1	–0.1
Egypt	0.0	–0.1	0.0	–0.1	0.0	0.0	0.0	–0.1	–0.1	0.1	0.0	0.0
Hong Kong SAR	2.3	4.8	4.7	0.1	2.1	–2.8	7.1	–0.3	4.3	2.7	–1.0	2.2
Hungary	0.9	–0.2	0.0	–0.3	0.3	0.3	0.0	0.5	0.1	0.0	0.0	0.1
India	0.3	–1.2	0.1	–0.1	0.4	0.1	0.0	–2.3	0.0	–1.1	0.0	–0.3
Indonesia	1.4	2.1	0.7	0.8	0.4	0.0	1.8	2.9	0.0	0.9	–0.2	1.0
Israel	0.2	–0.2	0.1	0.0	0.1	0.2	0.0	0.1	0.0	0.2	0.1	0.1
Jordan	0.1	0.0	–	0.1	0.0	0.0	0.0	–	0.0	0.0	0.0	0.0
Kenya	0.1	0.0	–	0.0	0.0	0.0	0.0	–0.1	0.0	0.0	0.0	0.0
Korea	1.2	6.0	1.0	2.5	1.4	0.3	2.9	1.2	1.1	1.5	1.9	1.9
Malaysia	–0.1	–0.9	–0.6	0.7	0.4	0.0	0.2	0.0	0.1	0.2	–0.3	0.0
Mexico	–0.2	–1.4	–1.3	–0.1	0.0	–0.6	0.3	2.5	–2.5	–2.2	–3.0	–0.8
Morocco	0.0	0.0	0.0	0.2	0.0	–0.1	0.0	0.1	0.5	0.0	–0.1	0.1
Nigeria	0.2	0.0	0.0	0.0	0.0	–0.3	0.0	0.0	0.0	–0.1	0.0	0.0
Pakistan	0.1	0.1	–0.1	0.4	0.2	0.3	0.1	0.6	0.2	0.2	0.0	0.2
Peru	–	–0.1	0.0	0.0	0.1	0.1	0.0	–0.1	5.1	0.0	0.1	0.5
Philippines	–0.1	–0.2	–0.6	0.1	0.0	0.0	0.2	0.4	–0.1	0.1	0.1	0.0
Poland	0.4	0.0	–0.1	–0.1	–0.2	–0.6	–0.1	0.3	0.2	–0.1	0.4	0.0
Russia	5.1	–0.4	0.0	0.3	3.5	2.8	0.1	–0.9	0.0	0.1	0.2	1.0
Singapore	–0.3	21.0	5.3	1.0	6.2	0.3	17.7	6.2	4.8	7.3	0.3	6.3
South Africa	0.8	0.6	1.2	0.2	0.5	0.0	0.3	0.6	0.4	–0.1	0.6	0.5
Sri Lanka	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	0.0	0.0	0.0	0.0
Taiwan Province of China	0.2	3.0	3.2	1.3	1.3	0.1	0.1	1.6	0.2	0.3	0.6	1.1
Thailand	0.4	1.6	0.2	0.7	0.3	0.1	5.1	0.9	0.1	2.0	0.5	1.1
Turkey	0.1	–0.1	–0.1	0.2	0.3	–0.1	0.2	0.3	0.3	0.1	0.2	0.1
Venezuela	0.0	–0.1	–0.5	0.0	–0.2	–0.3	0.0	–0.1	–0.2	–0.2	–1.0	–0.2
Zimbabwe	–	–0.3	0.0	0.0	0.0	0.0	0.0	–0.1	0.0	0.1	–0.1	0.0
Average	0.5	1.2	0.5	0.3	0.6	0.1	1.2	0.5	0.3	0.4	0.0	0.5

II. Asian crisis												
Total exposure to d.c. (billion $)	20.5	16.8	18.4	88.0	148.0	27.9	148.6	35.3	30.5	58.6	113.8	
Exposure to Thailand (% of total exposure)	3.0	6.9	5.5	5.8	5.1	1.5	25.4	4.6	0.4	4.8	3.5	6.1
Exposure to Korea (% of total exposure)	5.9	23.2	7.2	12.3	7.3	4.9	16.0	4.9	1.8	10.4	8.8	9.3
Flows during July 1997–June 1998 (% of total exposure):												
Argentina	0.5	0.5	8.7	1.7	–0.1	2.3	0.1	1.6	24.6	4.2	0.2	4.0
Brazil	–0.4	0.8	–0.5	0.6	2.9	2.4	0.2	5.5	5.5	2.2	0.7	1.8
Chile	0.4	0.6	1.8	0.8	0.6	0.3	–0.1	–0.7	5.1	0.4	0.8	0.9
China	0.5	2.3	–0.3	0.8	0.1	0.4	–0.8	2.9	–0.2	1.5	–0.7	0.6
Colombia	0.1	0.2	0.2	0.2	0.4	0.2	0.1	–0.4	–3.8	0.9	0.3	–0.2
Czech Republic	–0.5	0.0	–	0.2	–0.5	–0.1	–0.2	1.6	0.2	–0.1	0.0	0.1
Ecuador	–	0.0	0.0	0.0	0.1	0.2	0.0	–	0.1	0.0	–0.1	0.0
Egypt	0.0	–0.1	0.2	0.0	0.1	0.1	0.0	0.2	0.0	0.6	0.0	0.1
Hong Kong SAR	0.2	1.8	–8.0	–0.2	–5.5	–6.7	–22.0	6.9	–7.6	4.7	–2.3	–3.5
Hungary	0.8	–0.7	0.1	0.2	0.9	1.9	–0.2	1.8	0.0	0.5	0.2	0.5
India	0.8	–0.3	–0.2	–0.2	0.0	0.4	–0.3	1.2	0.0	0.3	–0.5	0.1
Indonesia	–0.3	–0.4	–1.0	–0.9	0.2	–0.1	–2.8	1.8	0.0	–0.6	–1.2	–0.5
Israel	–0.1	–0.7	–0.2	–0.1	0.2	0.1	0.0	0.6	0.0	0.1	0.1	0.0
Jordan	0.0	0.0	–	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Kenya	–0.1	0.5	–	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Korea	–2.9	–14.2	1.5	–3.3	–1.6	–1.9	–3.2	2.3	–1.1	–0.7	–2.2	–2.5
Malaysia	–0.1	0.9	–0.1	–0.6	–0.4	–0.6	–1.7	–0.6	0.0	–0.7	–1.1	–0.5
Mexico	–0.4	–0.4	–1.3	0.8	0.4	1.7	–0.1	2.7	1.2	1.3	–0.8	0.5
Morocco	0.0	0.1	0.3	1.7	0.1	–0.2	0.0	0.3	0.0	0.0	0.0	0.2
Nigeria	–0.2	0.0	0.2	–0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Pakistan	0.0	0.2	–0.1	0.0	–0.1	0.0	–0.1	0.8	–0.6	0.1	0.0	0.0
Peru	0.0	0.1	0.0	0.0	0.2	1.4	0.0	0.1	3.2	0.8	1.0	0.6
Philippines	–0.2	1.1	–0.7	–0.3	0.1	0.0	0.1	8.0	–0.1	1.2	0.2	0.9
Poland	1.2	0.2	0.1	0.6	0.7	0.6	0.1	1.1	0.1	0.4	0.6	0.5
Russia	1.1	1.3	0.2	2.0	1.0	–0.7	0.1	9.2	–0.5	2.1	0.2	1.5
Singapore	–3.4	–9.4	–5.3	–9.2	–8.1	–14.5	–21.2	–3.1	–6.7	–6.3	–1.3	–8.0
South Africa	0.4	1.0	1.1	1.6	0.0	–0.3	–0.3	1.8	–0.4	–0.7	–0.4	0.3
Sri Lanka	0.0	0.0	0.0	0.0	0.0	–	0.0	0.0	0.0	0.0	0.0	0.0
Taiwan Province of China	0.3	0.9	0.4	–1.1	–0.4	–0.6	–0.3	4.8	0.0	0.6	–0.9	0.3
Thailand	–0.2	–0.9	–2.3	–1.3	–1.5	–0.4	–7.8	0.4	0.1	–1.2	–2.0	–1.6
Turkey	0.8	0.6	0.5	0.8	1.5	1.6	–0.1	1.7	0.7	0.5	1.7	0.9
Venezuela	0.0	–0.1	0.6	0.1	0.1	0.0	0.0	0.6	–1.1	0.4	0.4	0.1
Zimbabwe	–	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	–0.1	0.0	0.0
Average	–0.1	–0.4	–0.1	–0.2	–0.3	–0.4	–1.8	1.7	0.6	0.4	–0.2	–0.1

III. Russian Crisis												
Total exposure to d.c. ($)	20.8	15.8	20.4	97.4	155.3	30.2	122.8	54.3	41.3	67.4	109.3	
Exposure to Russia (% of total exposure)	19.4	2.6	0.3	6.9	20.2	14.3	0.8	7.3	1.4	2.7	7.1	7.6
Exposure to Brazil (% of total exposure)	3.2	4.5	9.3	8.1	8.2	12.0	4.2	13.0	11.3	8.6	15.3	8.9
Exposure to Indonesia (% of total exposure)	6.7	17.7	3.2	4.1	3.8	0.5	15.5	6.3	0.5	5.9	3.0	6.1
Exposure to Korea (% of total exposure)	3.0	9.6	7.9	8.1	5.4	2.8	15.4	4.7	0.5	8.4	6.8	6.6
Flows during Jul–Dec 1998 (% of total exposure):												
Argentina	–0.3	0.3	–0.6	–1.9	1.0	–1.4	0.2	0.0	2.6	0.7	1.0	0.1
Brazil	–1.1	0.1	–2.4	–1.9	–1.0	0.5	–0.8	3.5	1.2	1.1	–3.7	–0.4
Chile	0.0	1.2	–0.6	0.3	0.3	0.2	0.0	0.2	0.0	0.4	–0.7	0.1
China	–0.5	–2.1	–1.0	0.2	–0.3	–0.2	–1.9	–0.2	–0.4	–1.9	–0.2	–0.8
Colombia	–0.1	–0.3	0.3	0.0	0.0	–0.7	0.0	0.4	–0.5	–0.2	0.1	–0.1
Czech Republic	1.7	0.9	–0.6	0.1	0.7	0.3	–0.2	–0.7	–0.1	0.1	–0.1	0.2
Ecuador	0.0	0.0	0.0	0.0	0.0	–0.2	0.0	–	0.0	0.0	0.1	0.0
Egypt	0.0	0.7	0.0	–0.1	0.0	0.1	0.0	0.0	0.0	–0.1	0.0	0.0
Hong Kong SAR	6.1	–31.0	–3.5	–2.9	–1.1	–5.0	0.0	–4.9	–1.5	–6.9	–1.2	–4.7
Hungary	1.6	4.3	0.2	0.1	1.0	0.7	0.0	0.2	0.2	–0.3	–0.2	0.7
India	0.0	–1.2	0.2	0.2	–0.1	–0.5	–0.3	0.4	0.0	0.1	0.1	–0.1
Indonesia	0.6	–12.6	–0.9	–0.1	–0.2	0.0	–2.1	–0.2	–0.1	–0.2	0.3	–1.4
Israel	0.1	0.5	0.0	0.0	0.0	–0.1	0.0	–0.2	0.0	0.3	0.3	0.1
Jordan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	0.0	–0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Korea	–0.3	–5.0	–0.4	–0.5	–0.1	–0.8	–1.6	0.0	–0.2	–0.1	–1.0	–0.9
Malaysia	–0.1	–1.6	1.0	–0.1	–0.3	–0.2	–1.0	0.2	0.2	0.6	–0.3	–0.1
Mexico	–0.3	–0.7	1.3	0.2	0.4	–0.1	0.2	0.8	–0.2	–0.8	1.4	0.2
Morocco	0.0	–0.2	0.0	0.2	0.1	0.3	0.0	–0.1	0.0	0.0	0.0	0.0
Nigeria	–0.1	0.1	0.2	0.0	0.3	–0.5	0.0	0.0	0.0	0.0	–0.1	0.0
Pakistan	0.0	–0.1	0.0	0.1	0.0	0.2	0.0	–0.5	0.0	0.0	–0.1	0.0
Peru	–0.1	–0.1	–0.1	–0.1	–0.1	–0.4	0.0	–0.2	–0.4	0.1	–0.3	–0.1
Philippines	–0.1	–0.8	0.1	–0.1	0.1	0.0	0.0	–2.8	–0.1	0.1	–0.3	–0.4
Poland	2.1	0.6	0.0	–0.1	0.9	0.3	–0.1	0.5	0.1	0.0	–0.1	0.4
Russia	–2.3	–1.0	–0.1	–0.9	–0.3	–1.0	–0.1	–3.4	–0.2	–1.3	–5.1	–1.4
Singapore	2.2	–30.8	1.5	0.2	3.0	–5.6	–3.3	–2.9	–1.9	0.4	–0.6	–3.4
South Africa	–0.5	–1.0	1.3	–1.0	0.1	–0.2	–0.4	0.2	0.0	–0.2	–1.4	–0.3
Sri Lanka	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	–0.1	0.0	0.0
Taiwan Province of China	–0.4	–3.8	–2.8	–1.0	0.1	0.0	–0.3	0.5	0.0	–0.2	–0.3	–0.7
Thailand	–0.6	–3.1	–0.2	–0.4	–0.4	0.7	–3.0	–0.4	0.0	–0.5	–0.4	–0.7
Turkey	0.4	0.2	–0.2	0.0	0.6	–1.1	0.0	0.3	–0.4	1.4	–0.4	0.1
Venezuela	–0.1	0.1	0.0	0.1	0.3	0.3	0.0	0.0	0.3	–0.1	–0.3	0.1
Zimbabwe	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Average	0.2	–2.6	–0.2	–0.3	0.2	–0.4	–0.4	–0.3	0.0	–0.2	–0.4	–0.4

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