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Spillovers Through Banking Centers: A Panel Data Analysis

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Spillovers Through Banking Centers: A Panel Data Analysis

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Abstract

To test the role of bank lending in transmitting currency crisis we examine a panel of BIS data on bank flows to 30 emerging markets disaggregated by 11 banking centers. We find that bank exposures to a crisis country help predict bank flows in third countries after the Mexican and Asian crisis, but not after the Russian crisis. In the latter, there is evidence of a generalized outflow from emerging markets, rather than outflows linked to prior exposure to Russia.

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I. INTRODUCTION

International banks are a major source of financing for emerging economies and also one of the most volatile ones. In Asia, 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 USD120 billion, or about a third of total private inflows. In 1997 banks had reduced their share to about 9 percent of private inflows and by 1998 net inflows had turned into net outflows of about USD30 billion.[2] Understanding banks' responses to crisis appears to be an important link in explaining the international transmission of currency crisis.[3] In the wake of the recent currency crises, observers have pointed to a number of reasons why banking centers may add to financial contagion which can be classified into two types: the first has been referred to as a "common lender" effect and the second as a "wake up call" effect.

A "common lender"effect exists if countries that share the same bank creditor become vulnerable to spillovers through this financial linkage. The idea is that banks' responses to unexpected losses are fairly mechanistic: banks' needs to rebalance their portfolios (due to capital adequacy and/or margin sales and/or their "Value-at Risk" models or similar models) lead to an automatic reduction of bank lending to other countries in which they hold positions. Schinasi and Smith (1999), 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. They also show that alternative rules of portfolio diversification generate the same response patterns. Contagion across assets whose returns are positively correlated can also occur in response to "volatility events", which rather than involving actual losses involve an increase in the variance of an asset's future return, as long as asset managers operate under loss constraint rules (such as VaR) and the risk tolerance of the portfolio manager is sufficiently high.

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 (1998), 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

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[2] By contrast, other private flows were much less volatile. For instance, direct investment inflows increased markedly over the entire crisis period. See Table 1.

[3] Dornbusch, Park, and Claessens (1999) offer an overview of the general literature on financial contagion.

emerging markets are mainly vulnerable through this channel and that they should carefully monitor the composition of their creditors. Countries might reduce contagion risk by diversifying the sources of their financing and by avoiding borrowing from creditors who are important to potential crisis countries. The policy implications are different, if, on the other hand, bank responses can be characterized as generalized wake up calls, that is as changes in flows that are unrelated to their previous exposures and to potential losses. 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 only little empirical evidence regarding the importance of this effect.

This paper attempts to explain the pattern of international bank lending during three recent crisis 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 a first crisis country. The testable hypothesis therefore is whether bank flows can by explained by exposures in a first crisis country (using exposures as a proxy for potential losses).

To test this hypothesis we propose to look at *disaggregated* flows, by creditor and emerging market country. [4] Specifically, we examine the link between flows and exposure to the "ground zero country," controlling for other determinants of bank flows. We calculate exposure 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 (1998), Caramazza, Ricci, and Salgado (1999), and Van Rijckeghem and Weder (1999)), this has been done in an aggregated way, examining the effect of a proxy for competition for funds on exchange market pressure or other measures of contagion. [5] This evidence is suggestive of the existence of a common lender effect in the Asian crisis, as well as the 1982 debt crisis (Kaminsky and Reinhart, 1998). Evidence on the

[4] Ideally we would use bank-by-bank data, but such data is not available. Hence we use BIS data by nationality of lender as a proxy. To the extent that within a country, some banks specialize in one emerging market, and some in others, the data will not capture financial linkages between countries well; this could lead to insignificant results, even when the common lender effect is present.

[5] An exception 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.

existence of a common lender effect based on disaggregated flows would greatly add to the confidence to be placed on these earlier findings.[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, reduced supply of bank credit could manifest itself as higher yields with unchanged flows. 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, it is likely that there will be at least some adjustment in flows. Work by Eichengreen and Mody (1998) suggests that this is the case in the bond market, where issuance is postponed when the climate for issuance deteriorates (in their study, higher US interest rates). If a similar mechanism is in place for bank loans (so that demand for bank loans has some elasticity with respect to interest rates), a reduced supply of bank credit will have at least some impact on flows. A second issue is that banks can have indirect exposures to crisis countries, through hedge funds for example, 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, tending to reduce the significance of the results.

The paper is organized as follows. Section II describes the regional flows of international bank lending. Section III makes the case that bank losses during the three crisis episodes were sizable, and so could potentially give rise to the mechanical responses to losses described above. Section IV presents the empirical strategy and section V the results. Section VI concludes.

II. International Bank Lending Flows

This section takes a first look at the pattern of bank lending flows during crisis periods. We begin by looking at the distribution of international bank lending by regions and by major banking centers for the period covering the Asian and the Russian crises. Table 2 shows the distribution of banks' international claims from mid-1997 to end-1998. Note that changes in these positions 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. However, as explained below, in practice these differences should not be large since only a small part of the bank portfolio should be affected. In the estimates we make an adjustment to flow data to adjust for valuation changes.

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[6] Forbes (1999) provides indirect evidence on the existence of financial spillovers, without focusing on the institutions accountable for the spillovers. She shows that stock prices of liquid stocks were more affected than those of illiquid ones, and interprets this as evidence of "forced portfolio recomposition". On the other hand, stock prices of firms with higher short-term debt relative to equity are not disproportionately affected in most specifications, which Forbes interprets as evidence against international propagation through a "credit crunch".

Figures 1-3 are extracted from Table 2 to provide an impression of the relative importance of different banking centers by region. These figures illustrate the dominating position of European banks in international lending. European banks are clearly the largest creditors in all regions. It follows that the behavior of European banks may be key in the understanding of spillovers through banking centers. The figures also show that 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.

Figures 4-6 are extracted from Table 2 and illustrate the shifts in portfolios of European, North American, and Japanese banks during the Asian and the Russian crises. Japanese banks consistently withdrew from Asia reducing their lending from USD124 billion in mid 1997 to USD86 billion by end 1998. 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)[7] and only during the first half of 1998 did they reduce their holdings in Asia, while increasing them in Latin America and Eastern Europe. Finally, as was the case for US banks, European banks reduced their holdings in all three regions during the Russian crisis.

While providing an interesting 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. We turn to country-by-country data to answer this question in section IV, after first making a case that bank exposures and losses during the recent crisis episodes were sufficiently large that banks might have wanted to rebalance their portfolios in response.

III. Bank Exposures and Losses During Recent Financial Crises

By a number of accounts international banks lost a sizable amount of money in the Asian and Russian crises. (This was true to a lesser extent in the Mexican crisis at end-1994.) In the 4 Asian crisis countries (Korea, Indonesia, Malaysia, and Thailand), exposures ranged from 20-30 percent of capital for banks from the United States, France, Germany and the United Kingdom, and 70 percent of capital in Japan.[8] Exposures to Thailand ranged from

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[7] Note that the inflow to Asia is even somewhat underestimated since valuation changes tended to reduce the value of the final position and hence measured flows compared to actual flows.

[8] 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," IMF memorandum (March 6, 1998), based on Moody's (1998).

3-5 percent of capital for the European banks and 29 percent of capital in Japan. The aggregate non-performing loan rate for the four crisis countries was expected to be about 25-30 percent.

In Russia, exposures were smaller, but expected losses greater—about 90 cents on the dollar. For European banks, the exposure of 9 selected banks was estimated at $8 billion in Russia, compared to $48 billion in the 4 Asian crisis countries. Provisions as of October 1998 were $2.3 billion in Russia and $7.1 billion in the 4 Asian crisis countries respectively. Based on market views of ultimate losses of 90 percent of exposure in Russia and 30 percent 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.[9]

Rating actions confirm that notwithstanding their large capital, major investment banks active in emerging markets were affected in the Asian and Russian crises. By way of illustration, Figures 7-9 show the rating actions (rating changes and watches)[10] Moody's took over the period 1995-1999 for banks with a large presence in emerging markets. Box 1 describes the reasons for the downgrades and negative watches. Table 3 provides information on the total capital of the banks to illustrate the size of the capital of banks involved in emerging markets.

The picture that emerges is the following. During the *Mexican crisis* episode, the downgrades and watches do not appear to have been related to the Mexican crisis. In the *Asian crisis* episode, Moody's put a large number of banks on watch or downgraded them. For the Japanese banks, the majority of banks were put on watch or downgraded, for domestic reasons but often also with a mention of the impact of the Asian crisis (Box 1). Among European and North American banks, Commerzbank, Societe Generale, Credit Lyonnais, Standard Chartered, JP Morgan, and Royal Bank of Canada were put on negative watch during the period July 1997-July 1998 for reasons related to the impact of the Asian crisis (Box 1). Finally, in the *Russian crisis* episode, a number of European and US banks were put on negative watch or downgraded, for reasons related to the Russian crisis (CSFB, Deutsche, JP Morgan, Bankers' Trust, and Republic New York). Downgrades for Japanese banks were not related to developments in Russia or emerging markets.

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

[10] A rating is "on watch" when it is under review for a possible upgrade or downgrade.

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 in the introduction, 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.

IV. Empirical Strategy

Our aim is to explain the pattern of outflows (and inflows) of bank lending during a crises 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. We estimate the following equation for each crisis episode:

$$\Delta \text{Exposure}_{ci} / \text{Exposure}_{c} = \alpha + \beta\,(\text{Exposure}_{c0}/\text{Exposure}_{c}) + \gamma\,(\text{Exposure}_{ci}/\text{Exposure}_{c}) + \varphi\,\text{Macro-Controls}_{i} + \delta\,\text{Trade}_{i} + \varepsilon$$

where 0 stands for the ground zero country,[11] c stands for the common creditor (11 banking centers), and i indexes the receiving country. 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. $\Delta\text{Exposure}_{ci}$ is the flow of bank lending during the crises period.[12]

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[11] Mexico, Thailand, and Russia.

[12] 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 crises, July-December 1998 for the Russian crisis.

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 $Exposure_{c0}/Exposure_{c}$, 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.

$Macro\text{-}controls_{i}$ are a set of macroeconomic variables that have been identified in the crisis literature[13] and should in principle determine bank flows to the extent that banks use these criteria in their lending decision (current account/GDP, budget deficit/ GDP, M2/Reserves, growth of credit to the private sector, and real exchange rate appreciation[14]).[15] Trade linkages are captured in two ways—as direct trade (calculated as the percent of total exports destined for the ground zero country)[16] and as trade competition in third markets (the trade share index of Glick and Rose (1999)).[17]

We also examine a number of variants. In a first variant, we use changes in flows as the dependent variable. In a second variant, we adjust the data to control for the fact that flows could be a statistical artifact, reflecting valuation changes. In a third variant, we include the reserves to short-term debt ratio among the macro-controls.[18] In a fourth variant,

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[13] See e.g. Kaminsky, Lizondo, and Reinhart (1997), Sachs, Tornell, and Velasco (1996), Radelet and Sachs (1998), and Berg and Pattillo (1999a).

[14] Defined as in Glick and Rose (1999) as the average in the 12 months before the crisis divided by the average in the previous 3 years.

[15] 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 1997 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.

[16] Calculated for 1994, 1996, and 1997 from "Direction of Trade Statistics" IMF, Washington.

[17] We also substitute rating agencies' sovereign ratings for macro-controls and trade-linkages under the assumption that ratings are used in the allocation of bank capital. The results are reported in the footnotes in the next section.

[18] Rodrik and Velasco (1999), Bussiere and Mulder (1999), and Berg and Pattillo (1999b) document the role of short-term debt in the recent emerging market crises. In the reserves/short-term debt ratio, reserves refer to reserves in the month of the crisis in the ground zero country, while short-term debt refers to end-year debt in the prior year (i.e. 1994, 1996, and 1997, respectively).

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

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). For flows we use the 6-month flows subsequent to these dates, with the exception of the Thai crisis where we use flows for the entire subsequent year (i.e. June 1997-June 1998). We use the BIS' semi-annual consolidated data covering banking systems in 11 industrialized countries (the "reporting area").[19]

Market participants have been skeptical 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 capture overall positions closely.[20] A second 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 invested 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

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[19] The data are consolidated by nationality, unlike the quarterly BIS data which are by residency. 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 U.K. being the exception.

[20] Off-balance sheet data is not available which would permit us to accurately calculate exposures and risks. First, this data is generally not compiled, except for the US, where the Federal Financial Institutions Examination Board does compile comprehensive information which comprises off-balance sheet data. Second, even when the data is available, true exposures and risks are difficult to calculate. This is because off-balance sheet positions include a myriad of factors, including interbank deposits, commitments, derivatives, and letters of credit. Some (e.g. letters of credit) go in the direction of increasing exposure, some in the direction of reducing exposure (derivatives). However, in the data, derivative positions which reduce risk (hedges) are counted as part of the off-balance sheet position, and hence appear to increase exposure, because of exposure to the counterparty which has to fulfill the contract (see "Mature Banking System Exposures to Asia," IMF memorandum (March, 6, 1998)).

account of high exposures of hedge funds to Russia.[21] Third, exposure data do not capture the effect of any off-setting guarantees. Because 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. [22] Finally, bank claims reflect exchange rate changes and write-downs and marking to market of securities. Hence the BIS data will point to changes in exposures without physical flows having occurred. With a depreciation in a borrowing country, for example, inflows will appear smaller than physical inflows; similarly, outflows will appear larger. Below, we attempt to adjust the data for this bias using an exchange market pressure index. Because of gaps in the availability of the data, the data is organized into an unbalanced panel. It covers the 30 main emerging markets.

V. Regression Results

Table 4 provides the results based on a panel of data on bank flows to each emerging market disaggregated by 11 creditors,[23] for a subset of 30 emerging markets.[24] Note that it is the availability of data *by creditor* which yields the panel dimension, not *time*, as the regressions are run for a *point in time* (i.e. separate regressions are run 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). Two types of regressions are run. In the first, trade competition and macro-controls, which vary across but

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[21] Eichengreen, Mathieson, 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).

[22] Many of the German credits received state-supported export agency guarantees. An additional factor working against a contagious response by German banks was high provisioning by these banks (IMF, 1999, p. 115).

[23] While the BIS coverage comprises claims of 17 countries, data-coverage is insufficient for 5 of these (Denmark, Finland, Ireland, Norway, and Sweden). Luxemburg was also dropped as a creditor country because of inconsistency of the timing with the rest of the sample. This leaves us with Austria, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, the U.K., and the U.S.

[24] 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, Philippines, Poland, Russia, South Africa, Sri Lanka, Taiwan Province of China, Thailand, Turkey, Venezuela, Zimbabwe. Of this set of 31 countries, the ground-zero country is excluded in the regressions, leaving 30 countries.

not within countries, are included. In the second, which corresponds to fixed effects, country-dummies (for recipient countries) replace these control variables.[25]

The results point to the existence of a common lender effect in the Mexican 1994 and Asian 1997 crises, but not the Russian crisis. For the Mexican crisis, the results point to a small common lender effect which is significant at the 5 or 10 percent level of significance, depending on whether fixed effects or macro-controls are used. For each 1 dollar additional exposure 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. 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 that connected to Mexico. Among macro-controls, only private sector credit growth and the current account are statistically significant and bear the anticipated sign. Trade competition is not significant in this regression, but this is not conclusive as to the role of trade competition in contagion, as the regression at hand captures only the effect on bank flows.[26]

For the Asian crisis, the effect is economically significant as well as statistically significant. For each additional dollar in exposure to Thailand, flows 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 percent 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 percent (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 percent of initial exposure to emerging markets, a very sizeable figure.[27] The coefficient on initial exposure to the country under consideration is insignificantly different from zero, indicating that there is neither a generalized inflow or outflow of funds. The real exchange rate and trade competition are statistically significant and of the correct sign.[28]

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[25] Because there is no time-dimension, control variables are perfectly collinear with country-dummies, and hence cannot be included along with country-dummies.

[26] When Standard and Poor's or Moody's ratings are used in lieu of macro- and trade-controls, these are statistically significant, but with the wrong sign.

[27] 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.

[28] When Standard and Poor's or Moody's ratings are used in lieu of macro- and trade-controls, these are statistically significant, with the correct sign. The common lender effect remains statistically significant.

Turning to the case of the Russian crisis, the results point to a generalized outflow, of some 8-9 percent of initial exposures, which is highly significant statistically. The common lender effect is not statistically significant. M2 over reserves, growth in credit to the private sector, and the real exchange rate are statistically significant and of the correct sign.[29] From this it appears possible that contagion from the Russian crisis was generalized, reflecting an increase in perceived risk or in risk aversion. Alternatively, the lack of significance on the common lender variable could be related to the limitations of the data, and we speculate how this might have worked in the conclusion.

As noted above, BIS flow data (expressed in USD) incorporate exchange rate changes and write-downs and hence do not represent true changes in volumes. This is not likely to be important in practice in most cases, because bank claims are usually expressed in foreign exchange rather than local currency (so that devaluations in borrowing countries have no effect) and because write-downs tend to be limited to the securities portfolio which has to be marked to market, with non-performing loans slower to be acknowledged. We make a rough adjustment to the BIS flow data to adjust for these factors, and check whether this makes a difference to the results. Because we do not know the currency denomination of foreign-exchange denominated loans (i.e. USD, Yen, DM, etc.), we cannot adjust for changes in cross-rates. 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 above 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 and original exposure. This effect equals this product when all of the portfolio is marked-to-market (as tends to be the case for securities or when loan loss provisioning is 100 percent) and/or when bank claims are in local currency.

Our guesstimate for the fraction of bank portfolios which is marked-to-market or expressed in local currency terms is 20 percent. Then adjusted flows equal E_1-E_0+0.2*pressure*E_0. This guesstimate is based on BIS data on the share of debt securities in total claims[30] and a selective examination of the share of (a proxy for) local currency denominated bank claims.[31] The pressure index used in this equation is an equally weighted

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[29] When Standard and Poor's or Moody's ratings are used in lieu of macro- and trade-controls, these are statistically insignificant. The common lender effect continues to be insignificant.

[30] BIS data on total claims and loans indicate that in December 1998 the share of loans in total claims was 90 percent for the BIS category "developing countries", and hence the share of debt securities 10 percent. 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.

[31] The share of local currency lending in developing country lending is known to be very small 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 percent as of mid-1998. Hence the share of local currency lending was at most 4 percent. Similarly, US bank claims on Latin American countries payable in currencies other than the

(continued...)

average of percent changes in the exchange rate, reserves, and interest rates. We use the pressure index 6 months after the Mexican and Russian crises and 12 months after the Thai crisis.[32] Table 5, top panel, shows that the results are largely unchanged. We still find a significant common creditor effect in the Mexican and Asian crises and not during the Russian crisis.

We also examine the *change* in flows. This helps us capture contagion which manifests itself as a decline in trend flows, rather than as an outflow. For example, flows declined to Argentina and Mexico in the wake of the Russian crisis, but remained positive.

We use the average flow during *1994* as a benchmark for flows after the Mexican crisis, and during *June 95-June 97* as a benchmark for flows after the Thai and Russian crises. Table 5, bottom panel, shows that the results are similar to those obtained above and point to a strong common lender effect on the change in flows in the Asian crisis, but no such effect in the wake of the Mexican and Russian crises.

In Table 6, top panel, we add reserves to short-term debt as an additional control variable (in addition to macro- and trade-controls). This variable is never significant. In the bottom panel we add JP Morgan's measure of market liquidity as an additional control variable. The effect of liquidity appears to have been different across crises. In the Mexican crisis greater liquidity means larger outflows; in the Asian and Russian crises, on the other hand, greater liquidity means smaller outflows. These results should be regarded as tentative, however, given that the securities portfolio (to which the liquidity measure pertains) is small compared to the loan book.

In closing, it should be noted that the results in general suffer from a lack of explanatory power, with only about 20-30 percent of the variance of bank flows explained at best. This may be due to omitted variables, such as expectations about the future course of policy and of other market participants' actions. The lack of explanatory power should not take away from the conclusions about the role of the common lender effect, however, as long as the correlation with the omitted variables is not too large.

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dollar were only 5 percent of the total in Latin America and Asia in mid-1998 (US Treasury Bulletin, December 1998).

[32] To be precise, we use the index 6 months after the Thai crisis multiplied by the index 6 months after the Korean crisis.

VI. CONCLUSION

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. It could reflect the absence of some major players from the data (the BIS data exclude data on Swiss banks) 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. In fact, in Van Rijckeghem and Weder (1999), 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. [33]

[33] It should be noted that the choice of creditors by private banks is not done collectively—rather it is the decision of individual private banks. Still, the government can play a role by providing information on aggregate positions and also adjust the composition of its own creditors.

Box 1. Reasons for Negative Watches / Downgrades in 1995 and After Mid-1997

European Banks

Credit Suisse First Boston

Downgrades

Dec 1998 - Although it recently reduced its high-risk profile associated with large exposure to emerging markets (such as Russia and Brazil), CSFB's risk-return strategies still provide for an extensive presence in riskier segments of global markets.

Watches / Reviews

Oct 1998 - Increased stress in markets, where CSFB has an active presence.
- Overall risk profile associated with CSFB's prominent positions in emerging Markets, notably Russia and Brazil
- Risks from large presence in commercial mortgage-based activities in the US

Deutsche Bank

Downgrades

May 1999 - DB's effort to strengthen the profitability of its core business in the highly fragmented German banking market remains a significant challenge.

Watches / Reviews

Nov 1998 - Deutsche Bank's announcement of $9 billion acquisition of Bankers Trust. is associated with a variety of challenges:

United Bank of Switzerland

Downgrades

Dec 1998 UBS's aim of consolidating its global positions in a whole range of financial market activities adds an element of uncertainty and volatility to its earnings structure.

Commerzbank

Downgrades

June 1998 - Increasing financial liberalization and regional integration in the European fin. services environment may limit Commerzbank's ability to continue to advance its market position and to sustain earnings growth: it faces rising competition, declining margins and consolidation.

Watches / Reviews

Jan 1998 - Commerzbank's more modest economic capitalization, especially in relation to certain significant concentrations of risk in the domestic and international loan portfolio

- Comparatively high exposures to several troubled East Asian markets.

Bank Austria

Downgrades

Jul 1997 Bank Austria's lower long-term rating reflect Moody's assessment of the new mix of both explicit and implicit support from the City of Vienna. The City's recent public announcements regarding the longer-term outlook for its relationships with AVZ (the holding company foundation for Bank Austria) and with Bank Austria itself create more uncertainty regarding Vienna's implicit support for the bank.

Standard Chartered Bank

Watches / Reviews

Sep 1998 Negative impact of a continuing financial, political and economic and political uncertainty in the Asia-Pacific region.

Jan 1998 Vulnerability of the bank to financial crises in many of the countries where it operates, most notably in South-East Asia.

Credit Lyonnais

Watches / Reviews

Jan 1998 Potential credit risks associated with the exposure of Crédit Lyonnais to troubled East Asian counterpartics, notably in Korea, Indonesia, Thailand and Malaysia. Exposure is very large in relation to the solvency and earnings power of the bank

Dresdner Bank

Downgrades

May 1997
- Uncertainty for Dresdner Bank's future performance, related to increasing challenges in the highly-fragmented German domestic market.
- Narrower margins in Germany (caused by lower lending yields and higher funding costs) along with flattening loan demand (with the post-unification volume effect waning out), and gradual savings disintermediation are limiting to some extent Dresdner Bank's ability to grow its revenues from traditional net interest income sources.
- Dresdner's profitability measures are low by international standards which is is in part the result of a low risk credit portfolio and careful underwriting
- Relatively high cost structure has also negatively affected Dresdner Bank's earning power.

Watches / Reviews

Mar 1999
- The rating review will consider the extent to which Dresdner's recurring earning power - which remains more modest than that of many of its European and global peers -- and its economic-capital resources provide sufficient financial flexibility to cover both the existing risks and its strategic expansion.
- The risk costs of Dresdner Bank have risen recently because of exposures in emerging markets and in the former Eastern German states, thus affecting earnings

Feb 1997
- Dresdner Bank's high cost structure, its more modest core capitalization, and the rising scale of global competition are factors that may no longer be consistent with the highest ratings.
- The changing dynamics for the German banking sector – tighter competition, narrower lending yields, flatter loan demand, and rising funding costs (driven by gradual savings disintermediation) are leading to a decline in Dresdner's traditional revenue sources

Societe Generale

Watches / Reviews

Feb 1999
- Potential negative consequences of the friendly offer to Paribas that Societe Generale announced several days earlier: increased earnings volatility and larger credit exposure to emerging markets.

Jan 1998
- Concerns about the bank's exposure in Asia and the potential negative effect of events in the region on the profitability of the bank.

Bank of Scotland

Watches / Reviews

Sep 1995 - The potential negative effect of the acquisition of Bank of Western Australia (BWA) on core capitalization – geographical distance might have a negative impact on the new entity.

Credit Agricole Indosuez

Downgrades

May 1995 - The downgrade reflects Moody's expectation that pre-provision profitability will continue to be impaired by the bank's relatively high exposure to real estate markets and by competitive pressure in its commercial banking activities.

Watches / Reviews

Feb 1995 - The review was prompted by Cie de Suez's announcement that Banque Indosuez will report a FF 1.1 billion net loss for the year ending December 31, 1994 as a result of a decision to improve its reserve coverage on real estate loans and to adjust the carrying value of real estate assets. Although Banque Indosuez's asset quality problems have been incorporated into Moody's current rating, the unexpected decision to deal aggressively with the problem and the loss reported by its parent, Compagnie de Suez, have prompted the review.

U.S. and Canadian Banks

J.P. Morgan

Downgrades

Dec 1998	- Market improvement of the bank has not led to increased earnings. - J.P. Morgan's earnings are vulnerable to market conditions, esp. in emerging markets.
May 1998	- Risks associated with JPM's emerging market businesses. - Strong competitive pressures that the company faces throughout its broader global franchise. - Moody's quoted recent experience in troubled southeast Asia as an example of the potential earnings volatility and asset risk that the company faces in periods of market stress
Feb 1995	- Changing risk profile as JPM continues its strategic repositioning toward investment Banking. The company's businesses are increasingly sensitive to the behavior of global financial markets.

Watches / Reviews

Oct 1998	- Exposure to emerging and troubled markets. - Uncertainty of LT outlook for several J.P. Morgan core businesses.
Feb 1998	- Exposure to troubled markets in South-East Asia that could have an impact on asset quality and earnings. -Exposure to other emerging markets that might suffer from contagion effects.

Republic New York

Downgrades

Nov 1998	- Emerging markets (namely, Russian) exposure and resulting investment securities losses.

Watches / Reviews

Sep 1998	- Rating action reflects Moody's concern about the bank's exposure to weakening country risks and the impact on profitability. - According to Moody's, RNB, parent of Republic National Bank of New York, expects to take losses on its Russian bond portfolios that will substantially decrease its profits for the third quarter.

Bankers Trust Corp.

Downgrades

Jun 1995 -Downgrade was prompted by continuing concern about the business impact of recent market events, particularly adverse developments in the derivatives business.

Watches / Reviews

Sep 1998 -BT's exposures to emerging markets and the potential for further losses stemming from related credit and market risks.

Salomon Smith Barney

Watches / Reviews

Feb 1995 - The review will focus on the prospects for Salomon's client-driven businesses and management plans for restoring profitability to those operations. The review will also consider the outlook for Salomon's proprietary trading franchise and for the company's non-broker/dealer operations.

Royal Bank of Canada

Watches / Reviews

Jan 1998 - The rating action follows the announcement that Royal Bank of Canada and Bank of Montreal signed a definitive agreement to merge in a transaction that will be accounted for as a pooling of interests.The review for possible downgrade of Royal Bank of Canada focuses on the potentially negative effect of the merger on the ability of the enlarged bank to retain its revenue and client base during the merger process, as well as on its effect on the bank's future business plans in corporate and investment banking activities.

Japanese Banks

Sumitomo Bank

Downgrades

Jan 1999	- Sumitomo Bank has established significant reserves against their exposures to Indonesian borrowers but their reserves regarding other Asian borrowers are modest. Thus, Moody's expects that the bank's results will be constrained by the need for substantial credit expenses in the medium-term.
	- Economic capital has also decreased as the sustained decline in the stock market has dramatically eroded unrealized gains on equity holdings.
May 1998	- Asset quality problems for the most major Japanese banks, incl. Sumitomo, due to weakening domestic economy and to existing problems resulting from the East Asian crisis

Watches / Reviews

Oct 1998	- Increased pressures on the bank's asset quality resulting from deepening recession in Japan as well as further deterioration in distressed East Asian economies.

Sakura Bank

Downgrades

May 1998	- Asset quality problems for the most major Japanese banks, incl. Sumitomo, due to weakening domestic economy and to existing problems resulting from the East Asian crisis

Watches / Reviews

Dec 1997	- Asset quality deterioration, including the impact of Tshoku Ltd (food-oriented trading group), where Sakura had a ¥160 billion exposure.
Jun 1995	- Weak and deteriorating core profitability - Slow pace of the bank's efforts to work out its severe asset quality problems. Also, Sakura has the highest overhead ratio among Japan's top city banks

Industrial Bank of Japan

Downgrades

Jan 1999	- Deterioration of IBJ's asset quality and economic capital. - Sustained increase of costs is to have a negative effect on profitability.
May 1998	- Asset quality problems for the most major Japanese banks, incl. Sumitomo, due to weakening domestic economy and to existing problems resulting from the East Asian crisis
Jul 1997	- The Japanese government's program of deregulating domestic financial markets is expected to diminish the value of IBJ's franchise as a long-term credit bank by fostering greater competition and accelerating the process of disintermediation.

Watches / Reviews

Oct 1998	- Deepening recession in Japan - Further deterioration of distressed Asian economies.
Mar 1998	- Deteriorating domestic credit outlook - Evidence of increasing credit sensitivity and widening credit spreads in the long-term debenture market. - The review is to examine the potential implications of public scrutiny due to publicized scandals on the bank's franchise and IBJ's exposure to borrowers in troubled East Asian economies.

Dai-Ichi Kangyo Bank

Downgrades

Jan 1999	- Deterioration of financial fundamentals to a level that requires a substantial official support.
May 1998	- Asset quality problems for the most major Japanese banks, incl. Sumitomo, due to weakening domestic economy and to existing problems resulting from the East Asian crisis.

Watches / Reviews

Sep 1998	- Deteriorating operating environment that may further affect DKB's asset quality and profit generating power, as a result of intensification of Japan's banking crisis. - The effect of deteriorating financial health of Japanese corporations
Feb 1998	- Asset quality outlook may be affected by the slowdown of the domestic economy and by recent developments in Asian countries.

Daiwa

Downgrades

Feb 1998
- Lingering asset quality problems will continue to pressure its capital base.
- Weak economy in Japan is likely to result in further deterioration of Daiwa's loan portfolio.
- Daiwa remains exposed to significant contingent risks arising from its nonbank affiliates and certain large borrowers.

Watches / Reviews

Oct 1997
- Poor asset quality
- Weak recurrent profitability
- Potential increased competition from ongoing deregulation.

Sep 1995
- The review follows the bank's announcement today of a US$1.1 billion loss (ca. ¥110 billion) in its New York bond trading operation.

Sanwa

Downgrades

Jan 1999
- New problem loans arising from the sharp recession in Japan. The difficult economic environment in Japan is likely to impair the creditworthiness of borrowers that have been able to service their bank debt until the present.

- Sanwa has established significant reserves against its exposures to Indonesian borrowers but reserves regarding other Asian borrowers are modest.

Jan 1998
- Sanwa Bank's asset quality, capitalization and reserve coverage are average or below-average compared to other A1-rated city banks

Watches / Reviews

Oct 1998
- The impact of increased pressures on the banks' asset quality resulting from the deepening recession in Japan as well as further deterioration in distressed East Asian economies.

Bank of Tokyo - Mitsubishi

Downgrades

Jan 1999	- New problem loans arising from the sharp recession in Japan. The difficult economic environment in Japan is likely to impair the creditworthiness of borrowers that have been able to service their bank debt until the present.
	- Bank of Tokyo - Mitsubishi established significant reserves against its exposures to Indonesian borrowers but reserves regarding other Asian borrowers are modest.
May 1998	- Asset quality problems for the most major Japanese banks, incl. Sumitomo, due to weakening domestic economy and to existing problems resulting \ from the East Asian crisis.

Watches / Reviews

Oct 1998	- Deepening recession in Japan. - Further deterioration of distressed Asian economies.
Feb 1998	- Increased pressure due to large exposure to borrowers in South-East Asia. - Deteriorating domestic economy in Japan.

Source: Moody's Research Online.

Table 1. Net Private Capital Flows to 29 Emerging Market Economies

	1994	1995	1996	1997	1998
In billion 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

Source: IIF (1999).

Table 2. Distribution of International Bank Claims

	European Banks	North American Banks	Japanese Banks	Other Banking Centers	European Banks	North American Banks	Japanese Banks	Other Banking Centers	Total
	(Share)				(In billions of US dollars)				
Developing countries									
Asia									
Mid-1997	43,9	10,1	31,7	14,3	171,4	39,4	123,8	55,8	390,5
End-1997	46,8	9,8	30,3	13,1	177,3	37,1	114,8	49,6	378,8
Mid-1998	48,7	9,1	30,8	11,3	155,6	29,1	98,4	36,1	319,6
End-1998	50,2	8,7	28,8	12,3	149,5	25,9	85,8	36,6	297,9
Latin America									
Mid-1997	58,6	27,6	5,8	8	147,8	69,6	14,6	20,2	252,3
End-1997	61,5	26,1	5,2	7,2	173,0	73,4	14,6	20,3	281,3
Mid-1998	61,7	25,9	5	7,3	181,2	76,1	14,7	21,4	293,7
end-1998	62,4	25,6	5	7	180,0	73,9	14,4	20,2	288,5
Middle East									
mid-1997	64	10	5,8	20,2	32,6	5,1	3,0	10,3	50,9
end-1997	62,7	9,2	6,6	21,4	32,2	4,7	3,4	11,0	51,4
mid-1998	63,4	9	5,4	22,2	35,6	5,1	3,0	12,5	56,2
end-1998	63,7	10,2	6,2	19,9	40,2	6,4	3,9	12,6	63,1
Africa									
mid-1997	70	11,9	6,5	11,6	36,8	6,2	3,4	6,1	52,5
end-1997	77,8	9,9	4,8	7,5	45,1	5,7	2,8	4,4	58,0
mid-1998	79	9,9	4	7	45,2	5,7	2,3	4,0	57,2
end-1998	80,2	8,1	3,3	8,3	45,2	4,6	1,9	4,7	56,4
Eastern Europe									
mid-1997	79,3	10,1	3,4	7,3	92,4	11,8	4,0	8,5	116,5
end-1997	80	8,9	3,4	7,7	98,6	11,0	4,2	9,5	123,3
mid-1998	80,4	9,7	3,1	6,8	107,7	13,0	4,2	9,1	134,0
end-1998	85	5,6	3,2	6,2	103,4	6,8	3,9	7,5	121,6
Developed countries									
mid-1997	56,4	9,7	13,2	20,7	103,4	17,8	24,2	37,9	183,3
end-1997	59,9	8,4	12,1	19,6	117,1	16,4	23,7	38,3	195,5
mid-1998	64,9	9,3	9,1	16,7	138,0	19,8	19,4	35,5	212,7
end-1998	65,3	9	7,7	18	148,9	20,5	17,6	41,0	228,0

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

Table 3. Total Assets (in billion USD)

European Banks

United Bank of Switzerland (1988)	685.9
Westdeutsche Landesbank (1997)	603.8
Deutsche (1997)	582.0
Dresdner (1997)	426.3
Societe Generale (1997)	410.7
Commerzbank (1988)	381.4
Barclay Bank (1998)	365.1
National Westminster Bank (1998)	309.4
Credit Suisse First Boston (1988)	293.2
Credit Lyonnais (1997)	244.1
Credit Agricole Indosuez (1998)	139.5
Paribas (1997)	230.1
Abbey National (1998)	177.8
Bank Austria (1997)	142.2
Royal Bank of Scotland (1998)	135.1
Bank of Scotland (1999)	99.5
Landesbank Rheinland Pfalz (1997)	91.2
Standard Chartered Bank (1997)	78.0
U.S. and Canadian Banks	
Bank of America (1999 1/)	614.2
JP Morgan (1988)	298.5
Chase Manhattan (1998)	297.0
Bankers' Trust (1998)	157.5
Bank of Nova Scotia (1998 2/)	151.4
Citicorp (1998)	343.6
Merrill Lynch (1999 3/)	324.7
Royal Bank of Canada (1988 3/)	274.4
Salomon Smith Barney (1998 4/)	238.2
U.S. Bancorp (1999)	76.4
Republic New York (1999)	50.5
Japanese Banks *1/*	
Bank of Tokyo – Mitsubishi 1999	616.4
Sumitomo Bank 1999	456.6
Dai-Ichi Kangyo Bank 1999	455.9
Sanwa 1999	418.4
Sakura Bank 1999	407.1
Industrial Bank of Japan 1999	383.4
Daiwa 1999	128.4

Sources: For European, US, and Canadian banks, Moody's Research Online; for Japanese banks, the figures are based on the banks' consolidated balance sheets provided by BankStat of Thomson Financial Bankwatch, Inc.; for Chase Manhattan Bank the figure is based on the bank's unconsolidated balance sheets provided by BankStat of Thomson Financial Bankwatch, Inc.

1/ 3 months ending March 31.
2/ 10 months ending October 31.
3/ 6 months ending June 25.
4/ 9 months ending September 30.

Table 4. Disaggregated Contagion Indicators
Coefficients and T-Statistics of OLS estimates
Dependent Variable: Flows by Emerging Market (i) by Creditor (c) 1/

	Mexico	Thailand	Russia
With macro- and trade-controls			
Exposure of Creditor c to Emerging Market I 1/	**0.14** **11.50**	0.05 1.60	**-0.08** **-5.01**
Exposure of Creditor c to ground zero country 1/	**-0.01** **-1.89**	**-0.04** **-2.00**	0.006 0.52
Credit to Private Sector (%change)	**-0.001** **-2.85**	-0.0001 -0.09	**-0.002** **-1.65**
M2/Reserves	0.01 2.38	0.0003 0.39	**-0.03** **-2.16**
Real effective exchange rate appreciation	-0.04 -0.422	1.00 2.76	0.30 1.77
Current Account (percent GDP)	**-0.02** **-1.71**	-0.0001 -0.03	0.001 0.29
Trade Competition	0.88 0.22	**-1.52** **-1.85**	9.52 1.22
Adjusted R-squared	0.31	0.01	0.10
Number of observations	307	277	239
With fixed effects			
Exposure of Creditor c to Emerging Market I 1/	**0.13** **9.11**	0.03 0.84	**-0.09** **-4.17**
Exposure of Creditor c to ground zero country 1/	**-0.01** **-2.07**	**-0.04** **-2.36**	0.01 1.10
Adjusted R-squared	0.42	0.17	0.12
Number of observations	318	319	299

Bold entries have the expected sign and are significant at the 10 percent level or better.
1/ As a percent of creditor j total exposure in emerging markets.
2/ Trade based on direct trade in Mexico and Russia; based on shares in Thailand.

Table 5. Disaggregated Contagion Indicators Robustness Tests
Coefficients and T-Statistics of OLS Estimates
Dependent Variable: Adjusted Flows or Change in Flows 1/

	Mexico	Thailand	Russia
Flows adjusted for Pressure Index (see text) with macro- and trade-controls 2/			
Exposure of Creditor c to Emerging Market I 1/	**0.13** **10.10**	**0.18** **5.40**	**-0.87** **-3.35**
Exposure of Creditor c to ground zero country 1/	**-0.01** **-1.65**	**-0.03** **-1.82**	-0.005 -0.24
Adjusted R-squared	0.26	0.10	0.07
Number of observations	300	255	119
Change in Flows with fixed effects 3/			
Exposure of Creditor c to Emerging Market I 1/	**0.08** **3.20**	-0.06 -1.53	**-0.16** **-6.50**
Exposure of Creditor c to ground zero country 1/	-0.004 -0.46	**-0.03** **-2.02**	0.01 1.07
Adjusted R-squared	0.07	0.18	0.24
Number of observations	317	317	291

Bold entries have the expected sign and are significant at the 10 percent level or better.
1/ As a percent of creditor j total exposure in emerging markets.
2/ Macro- and trade-controls are included in the regression but the results are suppressed.
3/ We report only the results based on fixed effects, because of the higher overall explanatory power; results concerning exposures are unchanged in a specification with macro-controls instead of fixed effects.

Table 6. Disaggregated Contagion Indicator
Coefficients and T-Statistics of OLS Estimates
Adding Short-Term Debt and Liquidity as Independent Variables

With macro- and trade-controls and short-term debt 1/			
Exposure of Creditor c to Emerging Market I 2/	**0.13** **9.98**	0.04 1.13	**-0.08** **-4.96**
Exposure of Creditor c to ground zero country 2/	**-0.01** **-1.85**	**-0.04** **-2.02**	0.01 0.54
Reserves/Short-term debt	-0.0002 -1.38	-0.0002 -0.49	-0.0002 -0.85
Adjusted R-squared	0.26	0.01	0.09
Number of observations	289	255	229
With macro- and trade-controls and liquidity 1/			
Exposure of Creditor c to Emerging Market I 2/	**0.14** **11.88**	0.02 0.62	**-0.10** **-5.34**
Exposure of Creditor c to ground zero country 2/	**-0.01** **-2.27**	**-0.04** **-2.10**	0.006 0.48
Liquidity	**-0.0004** **-3.67**	0.001 3.75	0.0004 1.88
Adjusted R-squared	0.33	0.06	0.11
Number of observations	307	277	239

Bold entries have the expected sign and are significant at the 10 percent level or better.
1/ Macro- and trade-controls are included in the regression but the results are suppressed.
2/ As a percent of creditor j total exposure in emerging markets.

Figure 1. International Bank Claims on Asian Countries Outside the Reporting Area

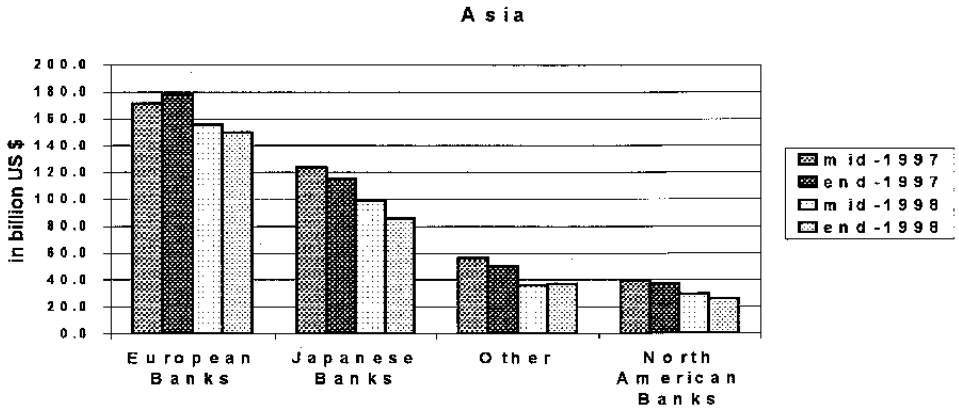


Figure 2. International Bank Claims on Latin American Countries

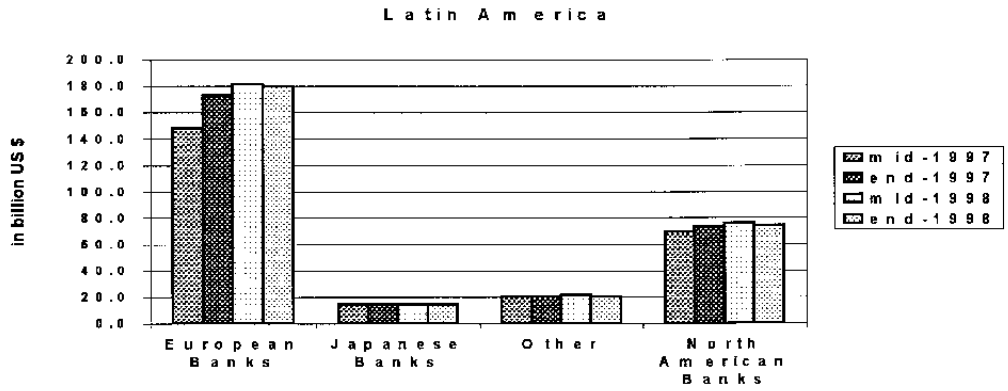
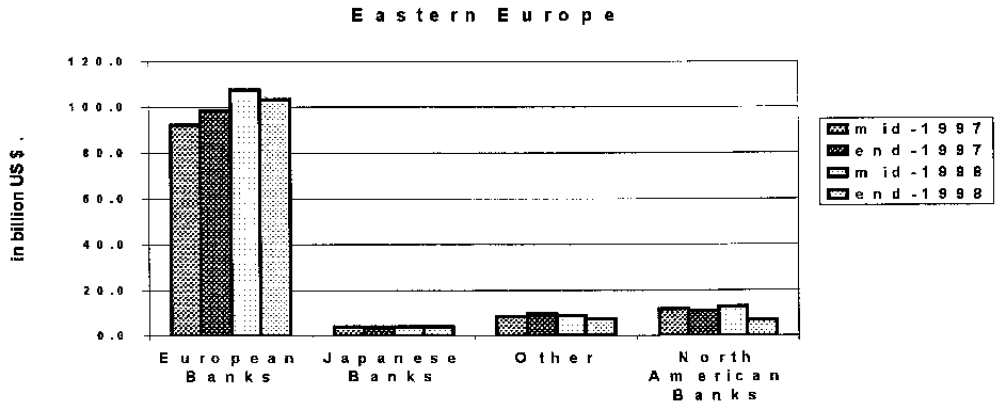


Figure 3. International Bank Claims on Eastern European Countries



Source: Table 2.

Figure 4. Change in Bank Claims for Japanese Banks During the Asian and Russian Crises, by Destination

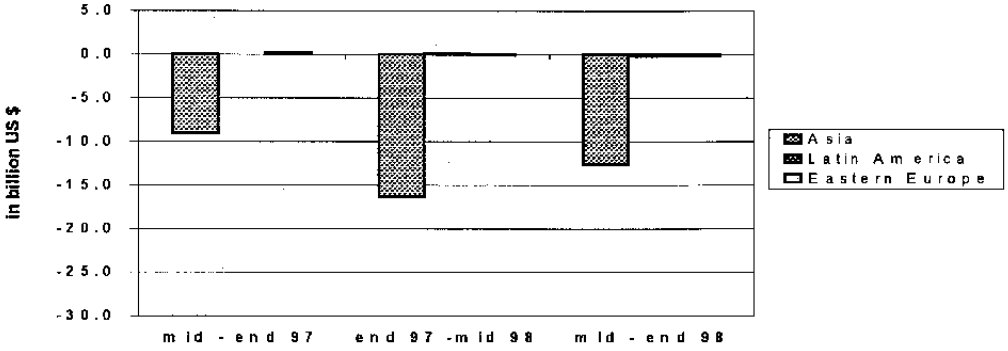


Figure 5. Change in Bank Claims for North American Banks During the Asian and Russian Crises, by Destination

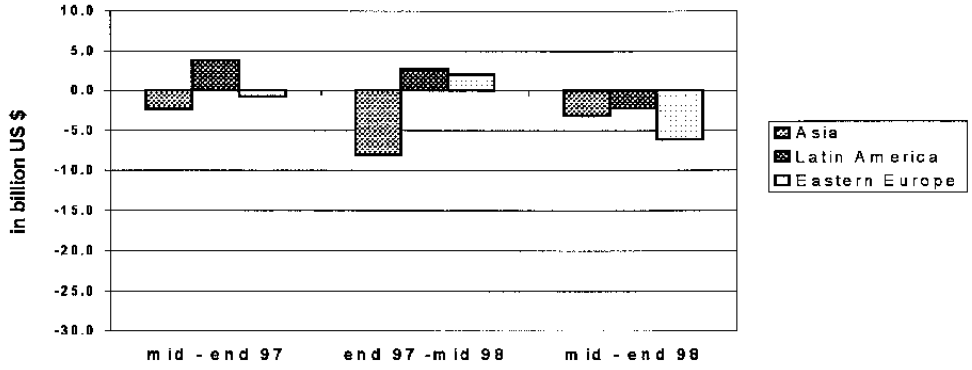


Figure 6. Change in Bank Claims for European Banks During the Asian and Russian Crises, by Destination

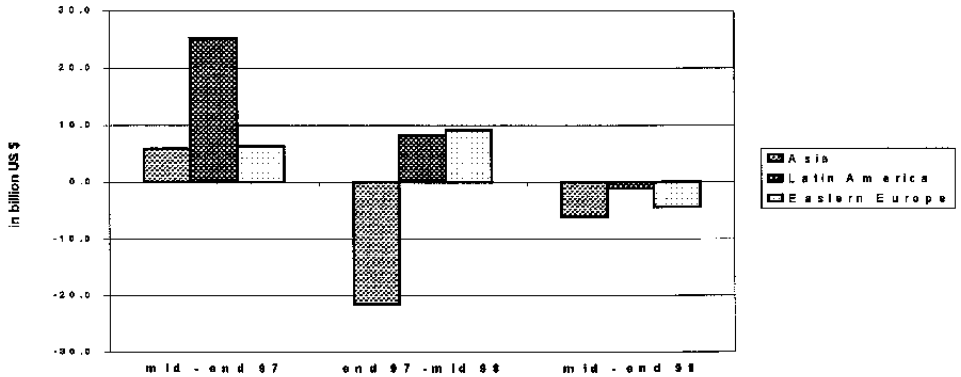
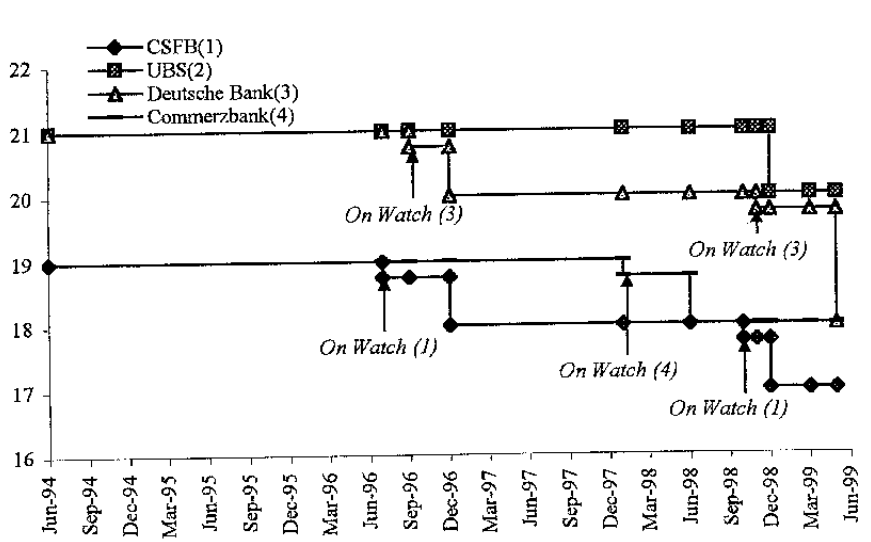
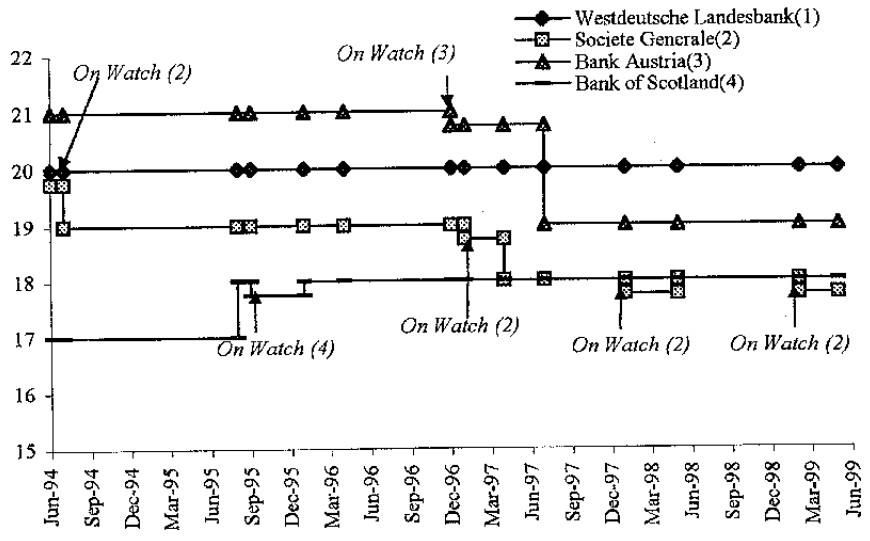
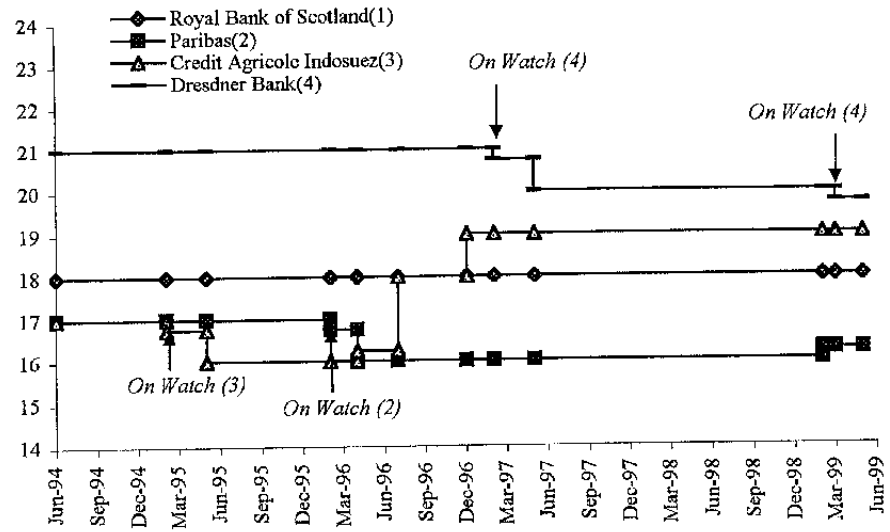


Figure 7. Numerical Ratings - European Banks







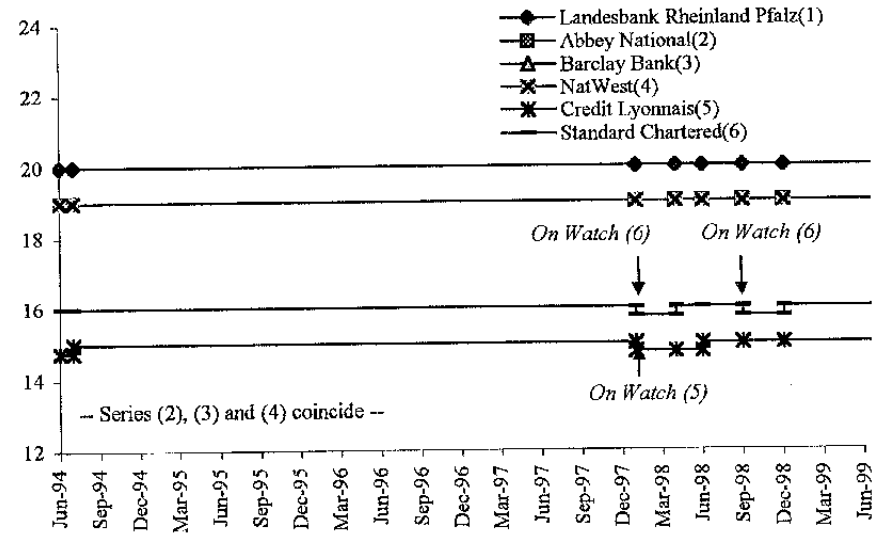


Figure 8. Numerical Ratings - U.S. and Canadian Banks

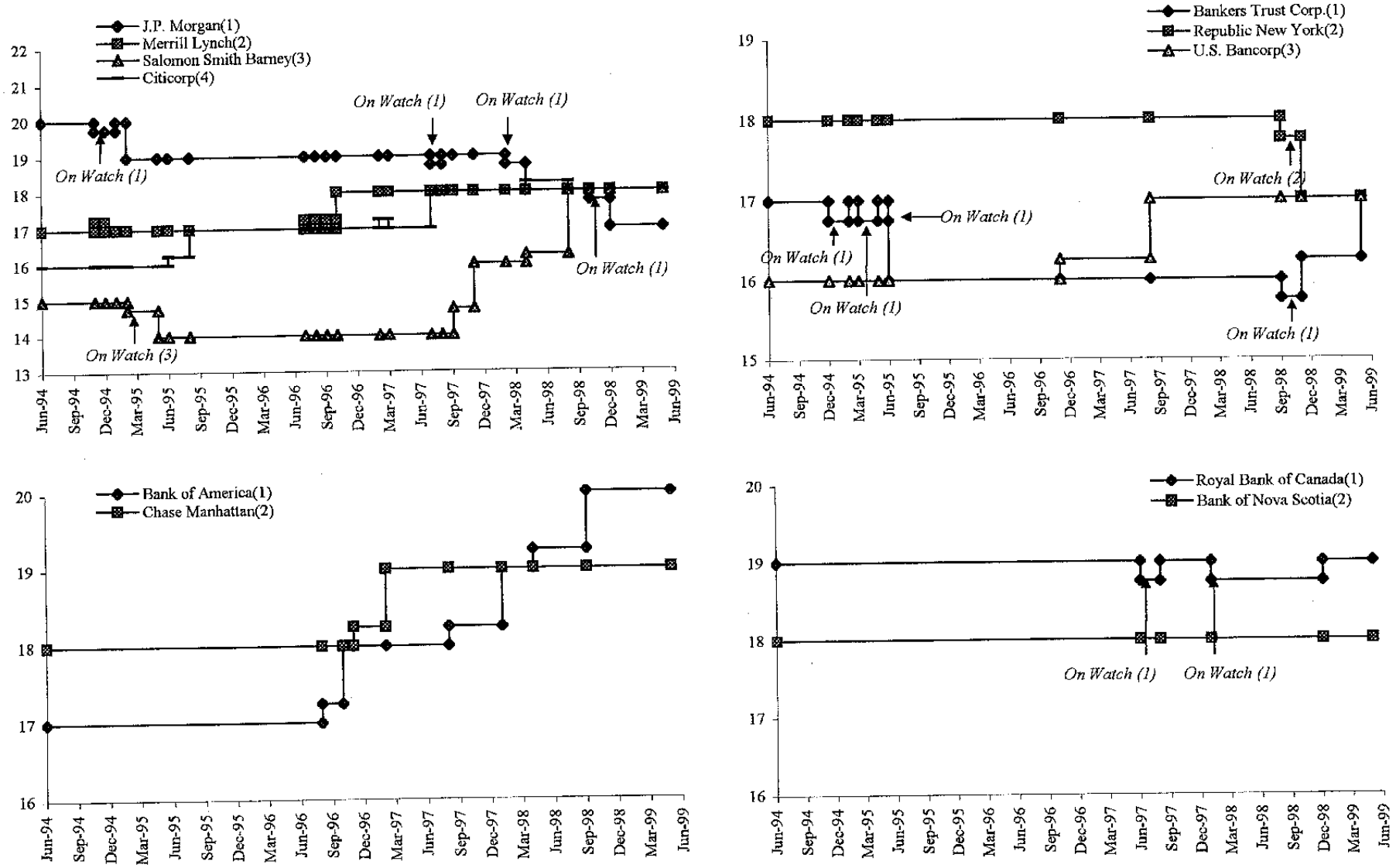
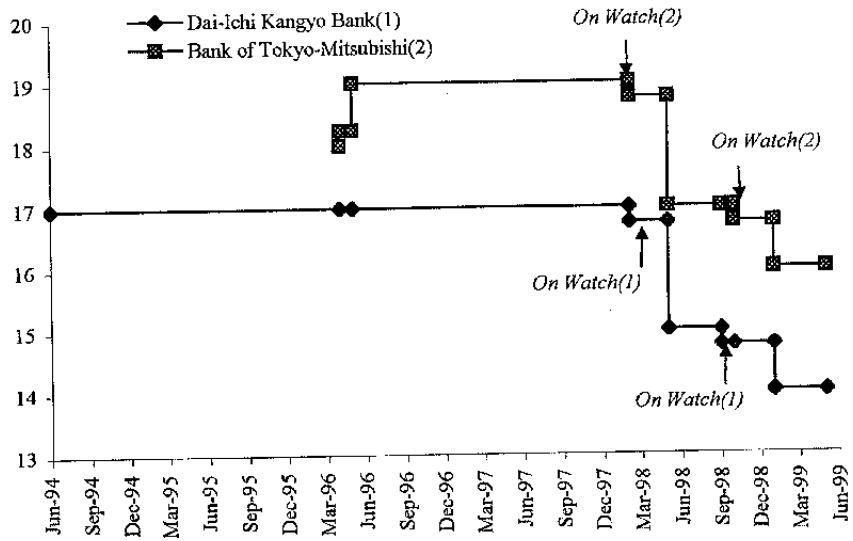
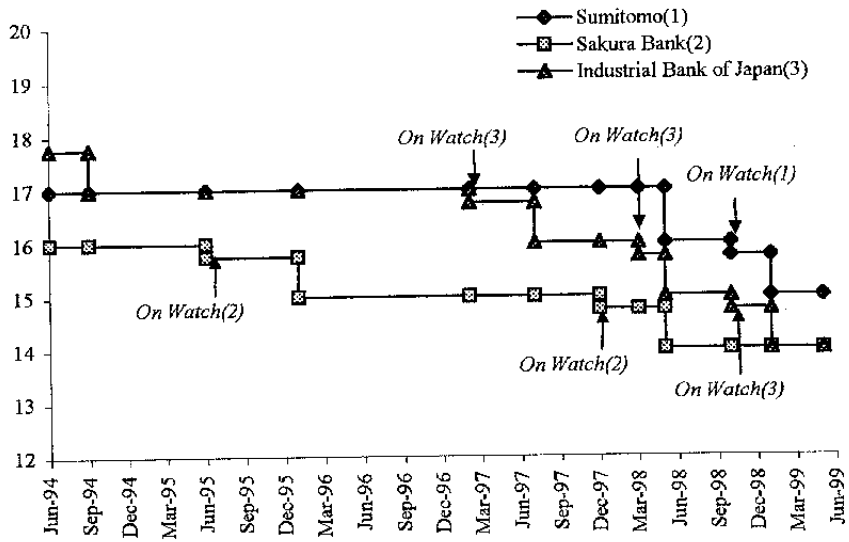
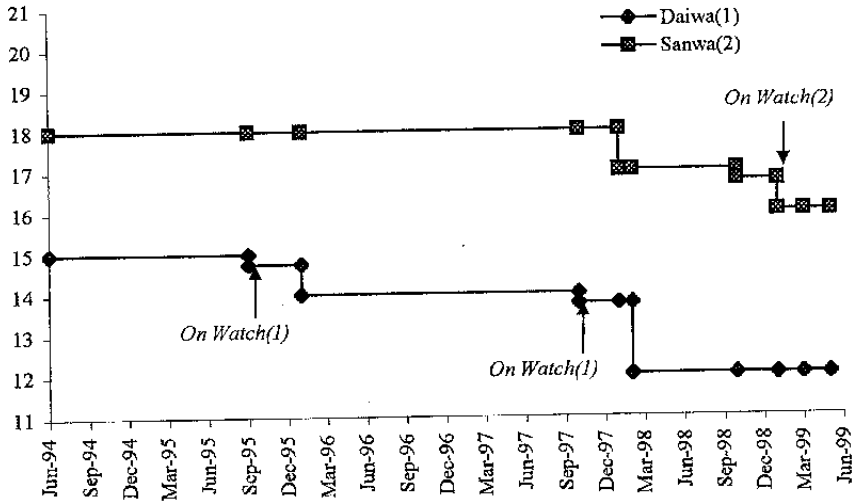


Figure 9. Numerical Ratings - Japanese Banks







References

Bank of International Settlements (1999), "The BIS Consolidated International Banking Statistics", various issues, www.bis.org.

———(1999), *Quarterly Review: International Banking and Financial Developments.*

———(1995), "Guide to the BIS statistics on International Banking", www.bis.org.

Berg, Andrew and Catherine Pattillo (1999a), "Are Currency Crisis Predictable? A Test," *IMF Staff Papers*, V. 46, No. 2 (June).

———(1999b), "What Caused the Asian Crises: An Early Warning System Approach," mimeograph, IMF (August).

Bussiere, Matthieu and Christian Mulder (1999), "External Vulnerability in Emerging Market Economies - How High Liquidity Can Offset Weak Fundamentals and the Effects of Contagion," IMF Working Paper 99/88.

Caramazza, Francesco, Luca Ricci, and Ranil Salgado (1999), "International Financial Contagion," unpublished background paper to the World Economic Outlook, May 1999 (IMF: Washington D.C.).

Dornbusch, Rudiger, Yung Chul Park, and Stijn Claessens (1999), "Contagion: How It Spreads and How it can be Stopped?" mimeograph presented for discussion at the WIDER workshop on financial contagion June 3, 1999.

Eichengreen, Barry, and Donald Mathieson, with Bankim Chadha, Anne Jansen, Laura Kodres, and Sunil Sharma (1998), "Hedge Funds and Financial Market Dynamics," *IMF Occasional Paper No. 166* (Washington DC: IMF, May)

Eichengreen, Barry, and Ashoka Mody (1999), "What Explains Changing Spreads on Emerging Market Debt?" NBER Working Paper No. 6408 (February).

Forbes, Kristin (1999), "How are Shocks Propagated Internationally? Firm-Level Evidence from the Russian and East Asian Crises," mimeo, MIT Sloan School of Management (September).

Glick, Reuven, and Andrew Rose (1999), "Contagion and Trade: Why Are Currency Crisis Regional", *Journal of International Money and Finance*, V. 18.

Institute for International Finance (1999) "Strengthening Relations between Emerging Market Authorities and Private Investors/Creditors", www.iif.com.

Kaminsky, Graciela, Saul Lizondo, and Carmen Reinhart (1998): "Leading Indicators of Currency Crisis", *IMF Staff Papers*, V. 45, No. 1 (March).

Kaminsky, Graciela, and Carmen Reinhart (1998), "On Crisis, Contagion, and Confusion," paper presented at the Duke University Conference "Globalization, Capital Market Crises, and Economic Reform," November. Also presented at the World Bank/IMF/WTO Conference on Capital Flows, Financial Crisis an Policies, April 15-16 1999.

Masson, Paul (1998), "Contagion: Monsoonal Effects, Spillovers and Jumps between Multiple Equilibria", IMF Working Paper 98/142.

Moody's (1998) "Implications of the Asian Problem for Major Banking Systems," Moody's Investors Service Global Research (February).

Peek, Joe, and Eric S. Rosengren (1997), "The International Transmission of Financial Shocks: The Case of Japan," *American Economic Review*, V. 87, No. 4 (September).

Radelet, Steven, and Jeffrey Sachs (1998), "The East Asian Financial Crisis," *Brookings Papers on Economic Activity,* No. 1.

Rodrik, Dani, and Andres Velasco (1999), "Short-Term Capital Flows," Paper Presented at the Annual Bank Conference on Development Economics, April 28-30, Washington D.C.

Sachs, Jeffrey, Aaron Tornell, and Andres Velasco (1996), "Financial Crises in Emerging Markets: The Lessons from 1995," *Brookings Papers on Economic Activity,* No. 1.

Schinasi, Garry J., and R. Todd Smith (1999), "Portfolio Diversification, Leverage, and Financial Contagion," IMF Working Paper 99/136 (October).

Tornell, Aaron (1998) "Common Fundamentals in the Tequila and Asian Crisis," mimeo, Harvard University.

Van Rijckeghem, Caroline, and Beatrice Weder (1999), "Sources of Contagion: Finance or Trade?" IMF Working Paper 99/143 (October).