Kredit und Kapital, 40. Jahrgang, Heft 3, Seiten 381–405
Abhandlungen

German Bank Lending during Emerging Market Crises: A Bank Level Analysis

By Frank Heid, Frankfurt/M., Thorsten Nestmann, Beatrice Weder, Mainz, and Natalja von Westernhagen, Frankfurt/M.*

I. Introduction

How do banks react to a shift in risk aversion? Do they rebalance portfolios within the asset class of emerging markets or do they react with a generalized reduction of their exposure to this asset class? This question remains highly relevant for emerging markets – even in the absence of acute crises – for instance in determining the optimal level of self insurance and reserve holdings.

International banks have been blamed for contributing significantly to the transmission of shocks among emerging markets. The empirical literature on financial contagion is by now very extensive, and there are several studies that document a special role for bank lending. However, most of the existing literature relies on aggregated data on financial flows to assess the role of bank lending as micro data is not available. Our study is one of the first studies that draws on bank specific information gathered by supervisory authorities.

Our data-set contains information on individual credit exposures to emerging markets. Analysing individual bank claims allows us to model bank behaviour during crises periods more accurately than in previous studies. Two main hypotheses have been put forward to explain the role of

* This paper is part of a project between the Bundesbank and the Chair for International Macroeconomics at the University of Mainz. The authors would like to thank Thilo Liebig, Daniel Porath, Dieter Urban, Michael Wedow, Jörg Breitung and participants of seminars held at the Bundesbank, the Young Economist Conference in Warsaw (2004), the Conference on Emerging Markets and Global Risk Management in London (2004) and the IMF course "Policies for Monetary and Financial Stability" in Washington D.C. (2004) for support and discussions. Heinz-Michael Ritter and Bjoern Wehlert have provided many helpful comments on the database for German foreign claims. All errors and inaccuracies are solely our own responsibility.

bank lending during the Asian and Russian crises. One hypothesis is that a sudden increase in risk aversion, triggered by events in the original crisis country, caused banks to cut back on lending to emerging markets. We refer to this hypothesis as the "wake-up call" effect. The other hypothesis states that banks with high exposures to the crisis country were more likely to withdraw from emerging market countries in general than others. We call this the "common-lender" effect. By using micro data on bank lending we are able to discriminate between these hypotheses.

In addition, we are interested in the regional composition of banks' loan portfolios and whether they were altered in the aftermath of the initial crisis. The crucial question is whether banks generally reduced their bank lending to emerging markets or rather re-allocated their funds between regions. We also take a closer look at differences among banking groups, in particular at the behaviour of large commercial banks versus public sector banks. We use claims net of credit guarantees, which should provide a good proxy of banks' actual exposure to emerging markets. This is important since van Rijckeghem and Weder (2003), by using BIS data, show that German lending differed from that of other banking centres during the Russian crisis and attributed this to the special role of government guarantees.[1]

We find that German banks behaved differently during the Asian and Russian crises. During the Asian crisis we observe a significant common lender effect: Banks which were significantly exposed to South Korea reduced their claims on other emerging markets. They did, however, not cut their lending indiscriminately, but rather reallocated claims from Asia to the Western Hemisphere and Emerging Europe. Following the Russian default, however, banks departed from almost all emerging market regions except Emerging Europe. Furthermore, countries' macroeconomic conditions played a role during the Asian crisis but not so during the Russian crisis. With respect to differences among banking groups, we find that, during the Asian crisis, large commercial banks reacted more strongly than public sector banks. By contrast, we find no significant differences between banking groups during the Russian crisis.

The paper is structured as follows. Section II gives a brief outline on the theories of contagion which are relevant in the context of this study. Section III provides details on the data sources, while section IV presents stylised facts about banks' foreign exposures. The empirical methodology

[1] Note that we use a different data source. The aggregated BIS data therefore cannot be compared directly with our data set.

applied in this paper is outlined in section V, with results presented in section VI. Section VII concludes.

II. Theories of Contagion: Formulation of Hypotheses

Many researchers have tried to understand why a crisis spreads from one country to another, i.e. to shed light on the phenomenon of contagion. A general overview of the latter is for instance provided by IMF (1999b) or by Christiansen (2000). Several papers have been compiled in a book on international financial contagion edited by Claessens and Forbes (2001). A more recent survey is also provided by Kaminsky et al. (2003).

In this section we provide a selective discussion of some of the major theories on contagion and discuss their relevance to our analysis. In doing so, we will focus on theories that aim at explaining investors' decisions in the presence of information or market frictions.[2] Theories explaining investors' behaviour in crisis episodes can be broadly divided into the following categories: (i) models on "common lender" and investors' portfolio decisions, (ii) models on "wake-up call" effects and herding behaviour.

1. Common Lenders and Investors Portfolio Decisions

This strand of literature argues that contagion is the result of financial linkages and information frictions. Kaminsky and Reinhart (2000) explicitly stress the role of international banks in transmitting a crisis from one country to another. They point out that a diversified bank may exacerbate the crisis by calling loans not only from the crisis country but also from elsewhere. The rationale for the latter is the need to re-establish the initial level of risk in the bank's portfolio, to adjust capital ratios and to provision for the losses incurred in the crisis country. As a consequence, a country sharing the same lender as the crisis country may suffer from contagion – sometimes regardless of its fundamentals.[3] The

[2] As other, more traditional studies have emphasized the role of trade linkages, we also account for countries' trade patterns in our empirical analysis. See more below.

[3] Furthermore, *Kaminsky/Reinhart* (2000) emphasize the role of investors' equity and bond cross-market hedging strategies in transmitting crises. If market movements between two countries are correlated, an investor (e.g. a bank) can buy assets of country A hedging them by selling assets of country B. Against the

importance of banks as common lenders has also been discussed by Kaminsky and Reinhart (2001), Hernandez and Valdez (2001) and Caramazza et al. (2004).

With regard to investors' portfolio decisions, Schinasi and Smith (2001) show how investors reduce their risky asset positions as a reaction to an adverse shock to a single asset's return distribution to achieve optimal portfolio rebalancing according to Value-at-Risk rules. Kodres and Pritsker (2002) develop a multiple asset rational expectation model that explains financial market contagion by cross-market rebalancing. Their model, which builds on Grossman and Stiglitz' (1980) noisy rational expectation model, assumes that the liquidation value of financial assets consists of two components, one that is driven by macroeconomic factors and one that represents some investors' private information. Contagion occurs when market participants are hit with an idiosyncratic shock to one country and transmit the shock abroad by rebalancing their portfolio. The pattern and severity of financial contagion depends on markets' sensitivity to shared macroeconomic risk factors and the amount of information asymmetries.

2. "Wake-up Call"- and Herding Behaviour

The "wake-up call" hypothesis was introduced by Goldstein (1998) to account for a change in investor sentiment such as an increase in risk aversion. In other words, this hypothesis claims that the initial shock leads investors to re-assess the creditworthiness of emerging market borrowers. Once weaknesses in a crisis country are revealed, investors will move out of other emerging markets as well, sometimes regardless of the country-specific macroeconomic fundamentals. The "wake-up call" hypothesis is closely related to models on herding behaviour and empirically difficult to entangle from the latter. Herding occurs if the investors either follow other investors or the market rather than to make their own assessment of a country's macroeconomic fundamentals. Scharfstein and Stein (1990) demonstrate that under certain circumstances managers simply mimic the investment decisions of other managers, ignoring their own substantive private information. Although socially inefficient, this behaviour can be rational from the perspective of managers who are con-

---

background of an illiquid market in a crisis country, a bank could be forced to sell assets of a country whose market tended to be correlated with the crisis country, thereby spreading the crisis.

cerned about their reputation in the labour market. Banerjee (1992) develops a model of sequential decision making in which decisions of others may reflect potentially important private information. In such a framework it can be rational to imitate the behaviour of other individuals even if one's own private information suggests doing something different. Importantly, the signal received by the first few individuals can determine the direction of the ensuing mass behaviour.

It is important to note that all hypotheses discussed above are consistent with individual rational behaviour, although it may not lead to a social optimum due to informational or market frictions. In the sequel we will therefore not try to assess whether or not investors behaved in a rational way during the Asian and the Russian crises, which seems to be an elusive goal. Instead we attempt to explain which of the above hypotheses – whether founded on investors' rationality or not – is the most relevant for the two crises. In particular, we expect that for the Asian crisis the "common lender" hypothesis is more important than the "wake-up call" hypothesis, and vice versa for the Russian crisis. The reasons for our ex-ante hypotheses become clear by looking at the sequence of events during the two crises.

3. Financial Market Events in the Asian and the Russian Crises

Most analysts date the onset of the Asian crisis to the floatation of the Thai baht on July 2. The devaluation quickly triggered financial turmoil in other emerging markets of South-East Asia, Korea, Hong-Kong, Taiwan and, to some extent, Latin America. Asian equity prices fell by about 50 % from August 1997 to September 1998. Currencies generally depreciated by 50–100 % from August 1997 to the end of the year, and then began a recovery. Market participants attributed the contagion partly to similar vulnerabilities, such as a fragile financial sector, possibly overvalued exchange rates and substantial short term foreign currency denominated liabilities (BIS (1999)). From an investor's perspective, similar macroeconomic vulnerabilities serve as an early warning signal potentially inducing a "flight to quality", whereby banks re-shift their portfolios towards markets with stronger macroeconomic fundamentals. We therefore expect the macroeconomic factors to be significant in our regression analysis. Kaminsky et al. (2003) also identify large capital inflows preceding the crisis as one important factor indicating a country's vulnerability to contagion. If they are right, past credit growth

should also show up as a significant factor in explaining the outflow of funds in our regression analysis. We also expect a significant common lender effect as banks that were afflicted by the initial shock had to rebalance their credit portfolio. However, there was apparently no reason for the banks to re-assess the riskiness of emerging markets in general, not least because investors were said to have been counting on the IMF giving financial support to afflicted countries.[4]

In contrast, we expect a significant "wake-up call" effect for the Russian crisis, which caused more turmoil on financial markets than the Asian crisis. Investors suffered sizeable losses after Russia defaulted on some government debt obligations on 17 August 1998 and the devaluation of the rouble shortly thereafter. German banks were among the investors that were hit most. The currencies of many emerging markets came under intense pressure and the credit spreads of some countries widened considerably. In these circumstances, investors appeared to reassess the vulnerability of emerging markets and their economic fundamentals. Folkerts-Landau and Garber (1998) for instance attribute the change in investor sentiment to the fact that Russia unilaterally imposed a debt restructuring on short notice and with an extremely large haircut.[5] Russia's uncommon behaviour lead investors to rethink the riskiness of their engagements in emerging markets. Hence, heightened concerns about counterparties meeting their obligations and a reduction in available collateral further increased banks' risk perception. In an attempt to reduce their risk exposures and to restore capital adequacy ratios many banks reduced their exposures to emerging markets. The adjustment of exposures took place in both position-taking and hedging activities. The drying-up of liquidity for all but the largest markets further intensified the "flight to safety" (BIS (1999)).

The increased perception of risk towards emerging markets was also induced by doubts about the ability and willingness of industrial countries and international organizations to provide financial support to the affected countries. In particular, the markets were taken by surprise by

---

4 Those expectations turned out to be justified as the IMF bailed out several countries during the Asian crisis. IMF financial support amounted to some $ 35 billion during 1997 to help the three countries most affected by the crisis – Indonesia, Korea, and Thailand (*IMF* (1998)). There was additional financing of some $ 77 billion from multilateral and bilateral sources. This financial support helped to restore investors' confidence.

5 According to *Folkerts-Landau/Garber* (1998), the proposed restructuring deal left about 20 cents on the US Dollar of the pre-conversion value of domestic debt.

the IMF's announcement that its support to Russia was not unconditional (BIS (1999)).[6]

III. Data Sources

The data on foreign claims of German banks, which we use in this paper, is taken from the credit register at the Deutsche Bundesbank. German credit institutions which have exceeded the threshold of € 1.5 million during the reporting period are required to report all claims at the end of each quarter (see Deutsche Bundesbank (1998a)). They must also provide details of the type of their claims as well as of the respective borrowers. Claims are also divided into on-balance-sheet and off-balance-sheet activities.[7]

The importance of off-balance-sheet activities is also acknowledged by the Bank for International Settlements (BIS (1982)). Ideally, the measure of exposure should therefore cover the amount of credit risk arising from actual and potential (future) claims of all kinds. To this extent, however, information is hardly available on a significant scale. To obtain an adequate measure of banks' total credit exposure, we have therefore adjusted the raw data in several ways.

First, we consolidated all claims on emerging markets to exclude interoffice positions between a head institution and its foreign subsidiaries. Second, we subtracted publicly guaranteed claims from total claims to obtain a more accurate measure of banks' effective foreign exposure to credit risk. Although they account for only about 1% of total claims, they can be important for individual countries, as was the case during the Russian crisis. In comparison to other data sources the Bundesbank data allow a much better calculation of banks' true credit exposures. However, we also need to mention its shortcomings. There are no data available on the maturity of loans and on valuation changes (for ex-

6 The IMF resumed lending to Russia not before July 1999. It approved $ 4.5 billion stand-by credit over 17 months to support the government's 1999–2000 economic programme (*IMF* (1999a)).

7 Off-balance-sheet items include derivatives (other than written option positions), guarantees assumed in respect of these, and other off-balance-sheet transactions (*Deutsche Bundesbank* (1998b)). The following items are deemed not to be credit exposures: shares in other enterprises irrespective of how they are shown in the balance sheet and securities in the trading portfolio. Note that BIS data do not include off-balance-sheet claims, a shortcoming that has been noted, for instance, in *van Rijckeghem/Weder* (2003).

ample, write-downs of non-performing loans, currency composition). Furthermore, we have no information on banks' indirect exposures to crisis countries via their lending to other commercial entities such as hedge funds (which themselves face large exposures to crisis countries).

IV. Stylised Facts on German Bank Lending during Crises

1. German Bank Lending is Important for Emerging Markets

The share of German bank lending has increased significantly during the past two decades (Figure 1). In the early 1980s, German bank lending amounted to less than 10 % of total lending to BIS reporting countries. However, this share has increased since the early 1990s and amounted to about 17 % at the time of the Asian and Russian financial crises. While US banks accounted for almost 40 % of all lending in the early 1980s, their share has decreased significantly in the past two decades and was only marginally above German banks' share in the late 1990s.

2. Developing Countries' Share of German Bank Lending Appears to be Remarkably Stable

Total foreign claims to developing countries have increased by almost 40 %, rising from € 86 billion in 1997 to € 118 billion in 1999 (Table 3a). Developing countries more or less receive a constant share of about 11 % of German bank lending per year. Thus, financial crises in emerging markets did not deter German banks from lending to developing countries. Interestingly, the Asian crisis did not lead to a reduction in claims to developing countries per se.[8] Although stable in the aggregate, German bank lending varied significantly at a regional or country level, as the next subsections will show. During the Russian crisis the situation was different as German banks temporarily reduced their exposure to developing countries by 7 % (€ 8 billion) from September 1998 to December 1998.[9]

[8] The Asian crisis started with the 15 %–20 % devaluation of the Thai bath on 2 July 1997 after managed floating of the bath was announced by the central bank of Thailand.

[9] The Russian crisis started with Russia's default on its domestic bond debt on 17 August 1998.

3. German Banks were Significantly Exposed to the Two Main Crisis Countries

Of the four Asian crisis countries, South Korea obtained the largest share (10 % or € 9.7 billion) of German bank lending to emerging markets in the pre-crisis period (Table 3b).[10] By the autumn of 1997 more than 20 % of German exposure to developing countries was invested in crisis countries.[11] Between June 1997 and June 1998 South Korea's share in banks' lending portfolios was cut significantly from 10 % to 6 % and has not recovered since (Table 3b).[12] In September 1997 claims of the large commercial banks and Land banks on Korea both stood at about € 4.7 billion (Table 3b), for both banking groups their largest exposure to emerging markets. However, Land banks' general exposure was more concentrated on Asia than that of the large commercial banks. Thus, the crisis in Korea hit Land banks harder. At the onset of the Russian crisis in June 1998 German banks claims on Russia amounted to € 9.4 billion (see Table 3b), exactly the same amount vis-à-vis South Korea before the Asian crisis.[13] Between June and December 1998, the large commercial banks significantly reduced their claims on Russia by 27 % (€ 1.6 billion) and the Land banks by 10 % (€ 0.36 billion). A key difference between the Russian crisis and the Asian crisis is that the Thai crisis and even the Korean crisis were largely unexpected while the Russian crisis was at least partly so.[14] Thus, Russia's share in banks' credit portfolios decreased by only 1 to 2 percentage points to about 7 % and thus by less than Korea's share after the Korean crisis.

---

10 Other European banks also expanded their lending to Asia significantly in the years preceding the crisis, and claims to Asia on average accounted for 50 % of their portfolio. Of this 50 %, South Korea accounted for about 40 % (see *Kaminsky/Reinhart* (2001)).

11 By November, the crisis had affected Thailand, Singapore, Malaysia, Indonesia, Philippines, Taiwan and Hong Kong.

12 Note that claims on most Asian countries have declined; Korea's share of claims within Asia, albeit reduced by between 2 and 3 percentage points, stabilised at about 27 %.

13 However, total exposure to Russia, i.e. including guaranteed claims, amounted to € 12 billion in June 1998. Thus, in contrast to the situation in Korea, where no claim was publicly guaranteed in September 1997, 20 % of claims to Russia were publicly guaranteed, for example, by Hermes Buergschaften. For a definition of publicly guaranteed claims see the German Banking Act, section 14 (2) sentence 3 number 4.

14 In August 1998, Russia's rating was downgraded twice on 13 and 17 August (see *Kaminsky/Reinhart/Végh* (2003), p. 13).

V. Empirical Model

Our own analysis draws mainly on previous research by van Rijckeghem/Weder (2003). The latter as well as most of the existing literature has analysed credit flows during financial crises by using highly aggregated data. However, by disregarding the individual behaviour of lenders, important differences between banks may have remained undetected. Furthermore, an aggregated analysis is inefficient and possibly biased as it does not make full use of the heterogeneity of the data. By using individual data on the lending flows of German banks, we are able to tackle some important issues in greater detail.

In particular, we would like to address the following questions. What were the determinants of German credit flows to emerging markets during the Asian and the Russian crises? Can it be explained by the so-called "common bank lender" effect? Did German banks respond with a general withdrawal ("wake up call" effect)? To what extent did banks differ in their reaction to the crises? The data which we use to address these issues consist of information on 15 creditor banks and 40 emerging market debtor countries.[15] We use the following reduced form regression equation as a starting point to explain individual bank credit flows:[16]

$$(1) \qquad \mathrm{Flow}_{bc} = c + \alpha\ {}^{*}\mathrm{Exp}_{b0} + \beta\ {}^{*}\mathrm{Exp}_{bc} + \gamma\ {}^{*}\mathrm{Bank}_{b} + \delta\ {}^{*}\mathrm{country}_{c} + \mu_b + \mu_c + \varepsilon_{bc}$$

where subscripts b and c stand for creditor banks and the receiving country, respectively. The subscript 0 indicates the (initial) crisis country (the country where the crisis spread from). The dependent variable is given by the credit flow of bank b to country c excluding the initial crisis country. We calculate bank credit flows for the Asian crisis as the change in exposure between September 1997 and June 1998. For the Russian crisis, we use June 1998 until December 1998. The observation period is partly dictated by the frequency of the data, which is available on quarterly basis only.

Our main bank specific variables are banks' exposures to the crisis country and other emerging market countries. In the context of equation (1), the "common lender" effect is measured by Exp_{b0}, the ex ante exposure of bank b to the crisis country. We expect a negative sign on the coefficient.

---

15 See Table 1 for a complete list of banks and countries in our sample.

16 The respective crisis country (Korea, Russia) has been omitted from the regression.

A general proportional drop in lending due to the "wake up call" effect would be reflected in a negative sign on the variable Exp_{bc}, which represents the exposure of bank b to country c.

Both Exp_{bc} and Exp_{b0} refer to banks' credit exposure just at the start of the crisis. They are normalised with each bank's pre-crisis exposure to emerging markets in total. We included bank dummies for specific banking groups and banks' size as control variables.

In addition to financial linkages, we control for trade competition of each country with the crisis country in common third markets. Trade links proved to be relevant for the spread of currency crises, for example in Glick and Rose (1999) and Corsetti et al. (1999) and may be important in our study as well because of their impact on bank lending decisions. We expect banks to pull out of those countries being vulnerable due to trade linkages with a crisis country. See Table 2 in the Appendix for details of the construction of this variable. With respect to macroeconomic fundamentals we use current account over GDP, budget balance over GDP, M2 over reserves, growth of credit to the private sector and real exchange rate appreciation, all measured before the crisis as explanatory variables.[17] We expect positive signs on current account and budget balances and negative signs on the ratio of M2 to reserves, growth of credit to the private sector as well as real exchange rate appreciation.[18]

As a starting point, we use OLS to estimate equation (1). In addition, we use panel estimation techniques. As our focus is on the behaviour of banks, we first set individual country effects to zero and assume that heterogeneity among countries can be measured by the respective control variables, and regional dummy variables.

Since the fixed effects model makes sense only when we exclude fixed group specific variables,[19] we use the standard random effects model instead, which does not suffer from that deficiency. For example, in the setting where individual bank effects are fixed, it is not possible to determine the coefficients on banks' exposure to the crisis country as it does not vary over countries.[20]

---

17 See Table 2 in the Appendix for sources.

18 This is the same set of variables included in *van Rijckeghem/Weder* (2003). See, for example, *IMF* (1999b) for more details on crisis indicators.

19 In the fixed effects regression group means are subtracted from equation (1) before applying an OLS regression.

20 This is due to the effect that the FE estimator subtracts "time" averages from the corresponding variable.

VI. Results

1. Results for the Asian Crisis

Table 4a shows the results for the Asian crisis. Column (1) shows the results of a regression including all 15 banks. We also ran separate regressions for Land banks (column 2) and for large commercial banks (column 3).

In regression (1) we observe a statistically as well as economically significant common lender effect for German banks. On average, flows to developing countries fell by almost 3 cents for each additional euro in exposure to South Korea before the crisis, holding everything else constant.

There is no evidence of a "wake up call" effect during the Asian crisis. We observe that banks, rather than pulling out of developing countries indiscriminately, shifted claims from the crisis region, Asia, to emerging market countries in the Western Hemisphere and Emerging Europe.[21] Hence, the respective signs on the regional dummies are positive. This is consistent with the view that banks only re-assessed risks in Asia but not for emerging markets in general.

A number of macroeconomic fundamentals turn out to be statistically significant during the Asian crisis. Credit flows were lower to countries that experienced large credit inflows in the year preceding the crisis and that had higher current account deficits in 1996, facts which confirm findings in the literature on early warning systems. The coefficient on budget balance over GDP is also significant, but with an unexpected sign. This can be explained by the fact that Asian countries were the only countries which ran budget surpluses in 1996. It therefore appears that the negative effect of budget discipline is spurious owing to the fact that banks decided to pull out of Asia nevertheless. Trade competition in common third markets also has a positive and significant coefficient for which we have, however, no explanation at hand.

The large commercial banks had significantly larger outflows during the Asian crisis than the Land banks, again pointing to a larger variabil-

[21] Note that claims to the Middle East and Africa have also increased relative to Asia, however. As total claims to these regions are well below claims on Asia, the Western Hemisphere or Emerging Europe, we do not want to interpret the coefficients of the dummy variables for Africa and the Middle East as portfolio changes.

ity of their claims. The overall explanatory power of the regression is rather large with an R^2 of 17 %.

Comparing columns (2) and (3), we observe that Land banks and commercial banks behaved quite similarly except for the common lender effect, which is only significant for Land banks. One reason for this difference may be that the Land banks' exposure to South Korea was far larger in relative terms than that of the commercial banks. However, the result may also be attributed to a low variation in the sub-sample of commercial banks, which consists of only four banks.

Summing up, we find evidence that German banks' credit flows contributed to the transmission of the Asian crisis. Furthermore, instead of a general exodus from emerging markets, banks adjusted their emerging market portfolios by reallocating claims from Asia to the Western Hemisphere and Emerging Europe. We also find that macroeconomic fundamentals play some role in the re-distribution.

2. Results for the Russian Crisis

Table 4b shows the regression results for the Russian crisis. As in the case of the Asian crisis, column (1) shows a regression including all 15 banks, while regressions (2) and (3) show the results for the two banking groups, Land banks and large commercial banks, separately.

Results for the Russian crisis differ sharply from the results for the Asian crisis as we can identify no (negative) common lender effect. This is rather surprising as banks' total exposure to Russia was about the same size as their exposure to South Korea during the Asian crisis. Furthermore, we observe a positive common lender effect in regression (3) for large commercial banks. A higher exposure to Russia leads to larger inflows to other emerging markets holding other variables constant. This somehow counterintuitive result is in line with findings in van Rijckeghem/Weder (2003): when including German banks in their sample, they also find a positive and significant common lender effect for different banking centres.[22] However, their presumption that guarantees were the driving force behind German banks' continued lending during the Russian crisis cannot explain our results as claims exclude

[22] Note that the coefficient is also positive if German banks are excluded but remains statistically insignificant. Other banking centres therefore do not seem to differ that much with respect to the common lender effect of German banks.

guarantees.[23] Thus, other factors seem to have determined German lending, and more research is needed to explain this behaviour.

In contrast to the Asian crisis, there was a very large and highly significant "wake up call" effect for German banks. We observe a general outflow from emerging markets of about 18 % of initial exposures.[24] Thus, as far as the evidence of that effect is concerned, German banks in the present study do not differ from other banking centres, as found in van Rijckeghem/Weder (2003). In fact, the proportional outflow is more than twice as large as what van Rijckeghem and Weder (2003) found for different banking centres, a finding which may in part be attributed to the fact that we consider claims excluding guarantees. The increase in general risk aversion may be explained by two factors. First, banks which had faced large losses in the Asian crisis did not want to experience this in the Russian crisis again. Second, the LTCM crisis, which occurred shortly after the Russian crisis, had also contributed to a rise in general risk aversion towards emerging markets.

Macroeconomic conditions did not seem to matter for banks' credit flows as none of the macro controls is significant. Surprisingly, Emerging Europe, which has strong economic links to Russia, experienced fewer portfolio outflows than Asia. Furthermore, there was no difference in flows between Emerging Europe and the Western Hemisphere that is not explained by other variables in the regression.[25]

Large commercial banks' flows do not seem to differ from those of the Land banks in the Russian crisis as the dummy on commercial banks is not significant. The variation in flows is surprisingly well explained by our model, the R^2 for (1) is 24 %.

Separate regressions for Land banks (2) and large commercial banks (3) differ only on the common lender effect variable.

---

23 Several differences between German banks analysed in *van Rijckeghem/Weder* (2003) and in this study should be noted. First, we look at claims to 40 instead of 30 emerging markets, second, banks' exposure to Russia in our sample is only about half the size of that for BIS reporting banks and, third, in our data only 20 % (2.5/(9.4+2.5)) of claims are publicly guaranteed in June 1998 instead of 50 %–60 %, as assumed by van Rijckeghem and Weder for the BIS reporting banks.

24 Note that aggregated BIS data on German banks show that, despite a large exposure to Russia, German banks had on average a positive inflow to emerging markets. See *van Rijckeghem/Weder* ((2003), p. 517).

25 As in the Asian crisis, we do not interpret the coefficients on the dummy variables for the Middle East and Africa as portfolio reallocation as their total shares in banks' portfolios are rather small.

3. Sensitivity of Regression Results

We run a number of sensitivity checks for both crises alike, which are not shown here to save space but are available from the authors upon request. First, we check for cross currency valuation effects since the stock of claims is reported only in Euro. For this purpose, we use additional information on the currency composition of the total of German banks and their foreign branches and subsidiaries to correct for exchange rate shifts. We find that results remain almost unchanged to results in column (1) in Tables 4a and 4b. Second, to account for omitted variables, we run a regression where macroeconomic variables, regional dummies as well as the trade competition variable are replaced by a country dummy. Again, with respect to the other variables, results hardly differ from those displayed in Tables 4a and 4b.

Third, we estimate a panel model with bank specific effects.[26] Although the Breusch-Pagan test shows that the random effects model is more appropriate than pooled OLS, the coefficients remain almost the same for all variables considered. The same holds true for a panel regression where we allow for country specific effects (and individual bank effects set to zero). Thus, neither bank nor country specific effects appear to play an important economic role.[27]

Fourth, we include additional variables that may influence banks' lending decisions. In particular, we include the logarithm of total assets in our baseline specification as a proxy for bank size, but it does not appear to play a role. Other financial linkages, apart from those arising from common bank lenders, have been discussed in the literature. Buissière/Fratzscher (2002) show that the probability of a crisis transmission significantly increases if pre-crisis stock market returns are highly correlated. Similarly, Kaminsky/Reinhart (2000) find that contagion spreads first to countries whose stock market returns exhibit a high degree of co-movement with the initial crisis country. However, the correlation of stock market returns with the crisis country (prior to the crisis) does also

[26] The panel dimension is bank while the "time dimension" of this particular panel model is given by the cross section of countries.

[27] To further cross-check our results, we also run a regression with country specific fixed effects (a regression with fixed effects for banks is not feasible for the reasons described in section 3. As before, results on the coefficients are very close to the OLS results in column (1); however, the explanatory power decreases to just 0.3 %. Note that the Hausman test for fixed versus random effects indicates anyway that the random effects model should be applied.

not have a significant impact on bank credit flows either. The last sensitivity check includes the probability of default (PD) of a country instead of macroeconomic variables, assuming that the PD is to a large extent influenced by prevailing macroeconomic conditions. As the previous two additional controls, the PD remains, however, insignificant.

VII. Summary and Conclusion

Our main findings can be summarized as follows. First, the behaviour of German banks was fundamentally different in the two crisis episodes considered. While they mainly shifted emerging markets portfolios after the outbreak of the Asian crisis, they reduced their emerging markets investments across the board following the Russian crisis. During the Asian crisis, banks with a larger exposure to South Korea withdrew from emerging markets with deteriorating macroeconomic conditions and lent ceteris paribus more to countries with better macroeconomic conditions. However, a large part of the re-distribution may also be attributed to the fact that banks re-assessed risks for the different regions. By contrast, neither banks' exposure to Russia nor macroeconomic conditions or regional considerations played a role in banks' lending decisions during the Russian crisis, where all emerging countries across the board suffered from the withdrawal of German banks. Against this background, countries should ceteris paribus increase their foreign currency reserves in order to be able to withstand a change in investor sentiment at least in the short run.

Second, the large commercial banks and Land banks appear to differ in their behaviour during the crises. For instance, the large commercial banks reacted more aggressively than the Land banks during the Asian crisis. Differences are not as pronounced during the Russian crisis. It is difficult to assess why Land banks differed in their reaction to the outbreak of the crisis. One reason might be that Land banks hold claims of longer maturity and, therefore, could not pull out as quickly as commercial banks. Another reason might be that they pursued different lending policies or were less risk sensitive due to the guarantees in place at the time.

Overall our findings confirm the view that bank lending to emerging markets is a volatile source of funds, which in times of increased risk can dry out rather quickly. Even German banks, which have generally been less reactive to the crises, displayed a very similar pattern of ad-

justment as was observed for other banking systems. An interesting question for further research is whether this pattern of adjustment will be altered by improved risk management systems in the wake of Basel II.

References

Banerjee, A. (1992): A simple model of herd behavior. Quarterly Journal of Economics, CVII(3): 797–817. – *BIS* (1982): Management of bank's international lending (Country Risk Analysis and Country Exposure Measurement and Control). Basel Committee Publications No 1, Bank for International Settlements. – *BIS* (1999): A review of financial market events in autumn 1998. Basel Committee on the Global Financial System, Bank for International Settlements. – *Bussiere,* M., *Fratzscher,* M. (2002): Towards a new early warning system of financial crises. Working paper series 145, European Central Bank. Forthcoming in Journal of International Money and Finance. – *Caramazza,* F., *Ricci,* L., *Salgado,* R. (2004): Trade and financial contagion in currency crises. Journal of International Money and Finance, 23 (1): 51–70. – *Christiansen,* H. (2000): International Financial Contagion. Financial Market Trends, 76: 65–108. – *Claessens,* S., *Forbes,* K. J. (2001): International Financial Contagion. Boston, MA: Kluwer Academic Press. – *Corsetti,* G., *Pesenti,* P., *Roubini,* N. (1999): What caused the Asian currency and financial crisis? Japan and the World Economy, 11 (3): 305–373. – *Deutsche Bundesbank* (1998a): Monthly Report, August 1998. – *Deutsche Bundesbank* (1998b): Instruction sheet for the reporting of large exposures and loans of 3 million deutsche Mark or more pursuant to sections 13 to 14 of the banking act. In: Banking Regulations 7. – *Folkerts-Landau,* D., *Garber,* P. M. (1998): Capital flows from Emerging markets in a closing environment. Deutsche Bank Research. – *Fratzscher,* M. (2003): On currency crises and contagion. International Journal of Finance and Economics, 8 (2): 109–129. – *Glick,* R., *Rose,* A. K. (1999): Contagion and trade: Why are currency crises regional? Journal of International Money and Finance, 18 (4): 603–617. – *Goldstein,* M. (1998): The Asian financial crisis. Washington DC: Institute for International Economics. – *Grossman,* S. J., *Stiglitz,* J. E. (1980): On the impossibility of informationally efficient markets. American Economic Review 70: 393–408. – *Hernandez,* L. F., *Valdez,* R. O. (2001): What drives contagion: Trade, neighborhood, or financial links? International Review of Financial Analysis, 10 (3): 203–18. – *IMF* (1998): IMF Survey, 27(17). – *IMF* (1999a): IMF Survey, 28(15). – *IMF* (1999b): International financial contagion. In: World Economic Outlook, Chapter 3: 66–87. – *Kaminsky,* G. L., *Reinhart,* C. M. (2000): On crises, contagion, and confusion. Journal of International Economics, 51: 145–168. – *Kaminsky,* G. L., *Reinhart,* C. M. (2001): Bank lending and contagion: Evidence from the Asian crisis. In Regional and global capital flows: Macroeconomic causes and consequences, Chicago: University of Chicago Press for NBER. – *Kaminsky,* G. L., *Reinhart,* C. M., *Vegh,* C. A. (2003): The unholy trinity of financial contagion. Journal of Economic Perspectives, 17 (4): 51–74. – *Kodres,* L. E., *Pritsker,* M. (2002): A rational expectations model of financial contagion. Journal of Finance, 57 (2): 768–799. – *Rijckeghem,* v. C., *Weder,* B. (2001): Sources of contagion: Is it finance or trade? Journal of International Economics, 54: 293–308. – *Rijckeghem,* v. C., *Weder,* B. (2003): Spillovers through banking centers: a panel analysis of

bank flows. Journal of International Money and Finance, 22: 483–509. – *Scharfstein,* D. S., *Stein,* J. C. (1990): Herd behavior and investment. The American Economic Review, 80(3): 465–479. – *Schinasi,* G. and *Smith,* T. (2001):Portfolio diversification, leverage, and financial contagion. In S. Claessens and K. J. Forbes (Eds.), International Financial Contagion, pp. 187–221. Boston, MA: Kluwer Academic Press.

Appendix

Table 1

Corporate Banking Groups and Countries in the Sample

Large commercial banks
Bayerische Hypo- und Vereinsbank München AG Konzern
Commerzbank AG Frankfurt Konzern
Deutsche Bank AG Frankfurt Konzern
Dresdner Bank AG Frankfurt Konzern
Land banks
Bankgesellschaft Berlin AG Konzern
Bayern LB Holding AG München Gruppe
Hamburgische Landesbank Girozentrale Hamburg Gruppe
Landesbank Baden Württemberg Stuttgart Gruppe
Landesbank Nordrhein Westfahlen AG Düsseldorf Gruppe
Landesbank Rheinland Pfalz Girozentrale Mainz Gruppe
Landesbank Sachsen Girozentrale Leipzig Gruppe
Landesbank Schleswig Holstein Kiel Gruppe
Norddeutsche Landesbank GZ Hannover Gruppe
Sparkassen und Giroverband Hessen Thüringen Frankfurt Gruppe
Sparkassen und Giroverband Saarbrücken Saar Gruppe
Developing countries
Argentina, Bolivia, Brazil, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Egypt, Estonia, Ghana, Hungary, India, Indonesia, Israel, Jordan, Kenya, Latvia, Lithuania, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russia, Slovak Republic, Slovenia, South Africa, South Korea, Thailand, Tunisia, Turkey, Uruguay, Venezuela.

Table 2

Description of Variables

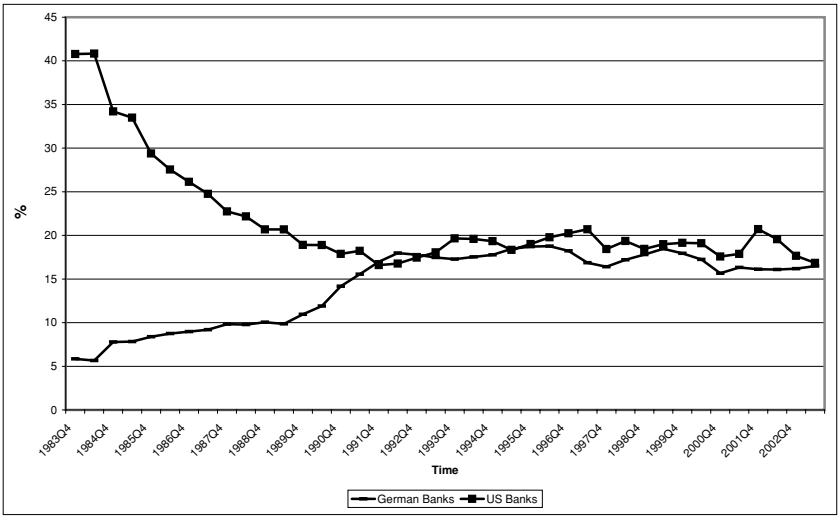
Variable	Description	Source
Flows	For Asian crisis: stock of claims by country in 1998, end of second quarter minus stock in 1997, end of third quarter over stock of claims on all emerging markets in 1997, end of third quarter (in €). For Russian crisis: stock of claims by country in 1998, end of fourth quarter minus stock in 1998, end of second quarter over stock of claims on all emerging markets in 1998, end of second quarter (in €).	Deutsche Bundesbank, Credit register for loans of three million Deutsche Mark or more
Common bank lender	For Asian crisis: stock of claims on South Korea in 1997, end of third quarter over stock of claims on all emerging markets, 1997, end of third quarter (in €). For Russian crisis: stock of claims on Russia in 1998, end of second quarter over stock of claims on all emerging markets in 1998, end of second quarter (in €).	Deutsche Bundesbank, Credit register for loans of three million Deutsche Mark or more
Wake up call	For Asian crisis: stock of claims by country in 1997, end of third quarter over stock of claims on all emerging markets, 1997, end of third quarter (in €). For Russian crisis: stock of claims by country in 1998, end of second quarter over stock of claims on all emerging markets in 1998, end of second quarter (in €).	Deutsche Bundesbank, Credit register for loans of three million Deutsche Mark or more
Log assets	Logarithm of banks' total assets (in €) in accordance with section 25 (2) of the German Banking Act.	Deutsche Bundesbank, (Bakis Database)
Credit growth to private sector	Annual credit growth in the year preceding the crises, 1996 for Asian crisis and 1997 for Russian crisis.	IMF, International Financial Statistics
Current account	Current account over GDP in the year preceding the crises, 1996 for Asian crisis and 1997 for Russian crisis.	IMF, International Financial Statistics
Budget balance	Budget balance over GDP in the year preceding the crises, 1996 for Asian crisis and 1997 for Russian crisis.	IMF, International Financial Statistics

Continue page 400

Table 2: Continued

Variable	Description	Source
M2/Reserves	M2 over reserves in the year preceding the crises, 1996 for Asian crisis and 1997 for Russian crisis.	IMF, International Financial Statistics
Real effective exchange rate appreciation	The average of the real effective exchange rate in the 12 months before the crisis divided by the average in the previous three years.	Glick and Rose (1999) own calculations using IMF, International Financial Statistics
Trade share	$Tr\_share_i = \sum ((x_{ok} + x_{ik})/(x_o + x_i)) * (1 - \lvert(x_{ok} - x_{ik})/(x_{ok} + x_{ik})\rvert)$ xik = Bilateral exports from country i to country k. x0k = Bilateral exports from crisis country 0 to k. x0: All exports to crisis country 0. xi: All exports to country i.	Glick and Rose (1999), own calculations for South Korea and Russia using Direction of Trade Statistics, IMF
Probability of default	Using long-term foreign currency ratings for sovereigns, sovereign probability of default rates are obtained by merging sovereign ratings to one year corporate default rates. For Asian crisis: third quarter 1997, for Russian crisis: second quarter 1998.	Standard and Poor' s
Correlation of stock market returns	Monthly correlation of countries' stock market returns with stock market return in crisis country over the three years preceding the crises.	Morgan Stanley Capital International on Datastream
Regional dummies	Dummy for regions in accordance with IMF classification: Asia, Africa, Middle East, Western Hemisphere, Emerging Europe.	IMF
GB	Dummy for large commercial banks: 1, for *Land* banks: 0.	Authors

Source: Total foreign claims by nationality of reporting bank (historical time series), Consolidated Banking Statistics, Bank for International Settlement (BIS). Data are semi-annual, e.g. 1983Q4 refers to December 1983.



Source: Total foreign claims by nationality of reporting bank (historical time series), Consolidated Banking Statistics, Bank for International Settlement (BIS). Data are semi-annual, e.g. 1983Q4 refers to December 1983.

Figure 1: German and US Banks' Claims as a Percentage of Total Claims to Developing Countries

Table 3a

Foreign Claims# of German Banks from 1997 to 1999

Time	Total claims All Banks (€ billion)	Total claims of LCBs* and LBs* (€ billion)	Claims of LCBs* and LBs* on developing countries (€ billion)	Claims of LCBs* and LBs* on developing countries (%)
199703	864	783	86	11.0
199706	893	809	93	11.5
199709	938	848	97	11.4
199712	1,000	907	107	11.8
199803	1,124	1,023	108	10.5
199806	1,125	1,022	112	11.0
199809	1,198	1,089	112	10.3
199812	1,035	924	104	11.3
199903	1,124	1,003	114	11.4
199906	1,220	1,094	118	10.8

Source: Deutsche Bundesbank, authors. # All claims exclude guarantees. * LCB stands for "Large commercial bank", LB stands for "Land bank". See Table 1 for a detailed list of banks included in our sample.

Table 3b

Exposure[#] of LCBs* and LBs* to South Korea and Russia

Time	LCBs' claims on South Korea (€ billion)	LCBs' claims on Russia (€ billion)	LCBs' claims on South Korea as a percentage of total claims on developing countries	LCBs' claims on Russia as a percentage of total claims on developing countries	LBs' claims on South Korea (€ billion)	LBs' claims on Russia (€ billion)	LBs' claims on South Korea as a percentage of total claims on developing countries	LBs' claims on Russia as a percentage of total claims on developing countries
199703	4.7	2.2	8.8	4.1	4.9	2.4	15.2	7.4
199706	4.7	2.9	8.2	5.0	5.0	2.5	14.0	7.0
199709	4.7	3.6	7.8	5.9	4.7	2.6	12.9	7.0
199712	4.6	4.4	7.0	6.6	4.3	3.1	10.4	7.6
199803	3.5	5.2	5.4	7.9	3.9	3.3	9.4	7.9
199806	3.1	5.8	4.7	8.7	3.8	3.6	8.2	7.7
199809	3.2	5.2	4.6	7.5	3.4	3.4	8.1	7.9
199812	3.1	4.2	5.0	6.8	3.2	3.2	7.6	7.5
199903	3.8	4.7	5.5	6.7	3.7	3.4	8.1	7.6
199906	3.6	4.9	4.9	6.7	3.2	3.2	7.0	7.1

Source: Deutsche Bundesbank, authors. # All claims exclude guarantees. * LCB stands for "Large commercial bank", LB stands for "Land bank". See Table 1 for a detailed list of banks included in our sample.

Table 4a

Regression Results for Asian Crisis

	(1) Baseline specification All banks OLS	(2) Baseline specification Land banks OLS	(3) Baseline specification Commercial banks OLS
Common bank lender	–0.0289**	–0.032*	–0.015
	(0.015)	(0.018)	(0.024)
Wake up call	–0.0193	–0.0009	–0.092
	(0.057)	(0.062)	(0.129)
Credit growth	–0.0001***	–0.0001**	–0.0001*
	(0.00003)	(0.00004)	(0.00005)
Current account/GDP	0.076***	0.060*	0.111**
	(0.027)	(0.033)	(0.048)
Budget balance/GDP	–0.102***	–0.105**	–0.097
	(0.038)	(0.044)	(0.074)
M2/Reserves	0.0001	0.00003	0.0003**
	(0.0001)	(0.00008)	(0.0001)
Trade share	0.021**	0.019	0.025
	(0.011)	(0.014)	(0.019)
Africa	0.010*	0.006	0.018**
	(0.005)	(0.006)	(0.008)
Middle East	0.012***	0.009	0.016**
	(0.004)	(0.005)**	(0.007)
Western Hemisphere	0.019***	0.016***	0.023***
	(0.004)	(0.005)	(0.007)
Eastern Europe	0.024***	0.020**	0.030**
	(0.006)	(0.008)	(0.013)
Commercial banks	–0.0043**	—	—
	(0.0021)		
R^2	0.17	0.15	0.26
N	367	234	133

Notes: Dependent variable: bank credit flows between September 1997 and June 1998 normalised by each bank's total exposure to developing countries. *, **, *** refer to 10%, 5% and 1% level of significance, respectively. Constant not reported. Standard errors in parentheses. OLS standard errors are corrected for heteroscedasticity using the Huber/White/sandwich estimator of variance. Reference region is Asia. Reference banking group is Land banks. Exchange rate appreciation is omitted owing to high correlation with credit growth. For construction of variables see Table 2.

Table 4b

Regression Results for Russian Crisis

	(1) Baseline specification All banks OLS	(2) Baseline specification Land banks OLS	(3) Baseline specification Commercial banks OLS
Common bank lender	0.004	–0.014	0.067**
	(0.015)	(0.017)	(0.030)
Wake up call	–0.182***	–0.164***	–0.204***
	(0.040)	(0.05)	(0.034)
Credit growth	$7e^{-07}$	$3.91e^{-06}$	$5.13e^{-06}$
	(0.00002)	0.00003	0.00002
Exchange rate appreciation	–0.006	–0.005	–0.008
	(0.016)	(0.017)	(0.031)
Current account/GDP	0.015	0.023	–0.003
	(0.013)	(0.018)	(0.020)
Budget balance/GDP	0.003	–0.005	0.019
	(0.023)	(0.027)	(0.037)
M2/Reserves	0.000006	–0.00001	–0.00007
	(0.0001)	(0.0002)	(0.0002)
Trade share	0.0003	–0.003	0.0004
	(0.006)	(0.009)	(0.007)
Africa	–0.004***	–0.006***	–0.0004
	(0.001)	(0.002)	(0.0015)
Middle East	–0.004**	0.006**	0.0003
	(0.002)	(0.002)	(0.002)
Western Hemisphere	–0.002	–0.003	–0.0003
	(0.0015)	(0.002)	(0.002)
Asia	–0.005**	–0.009***	0.004
	(0.002)	(0.003)	(0.004)
Commercial banks	–0.0002	—	—
	(0.001)		
R^2	0.24	0.26	0.33
N	415	272	143

Notes: Dependent variable: bank credit flows between June 1998 and December 1998 normalised by each bank's total exposure to developing countries. *, **, *** refer to 10%, 5% and 1% level of significance, respectively. Constant not reported. Standard errors in parentheses. OLS standard errors are corrected for heteroscedasticity using the Huber/White/sandwich estimator of variance. Reference region is Emerging Europe. Reference banking group is Land banks. For construction of variables see Table 2.

Summary

German Bank Lending during Emerging Market Crises: A Bank Level Analysis

This paper studies the reaction of bank lending in times of higher risk aversion. In particular, we analyse German bank lending during the Asian and Russian crises, using a bank level data set from the Deutsche Bundesbank. Our aim is to gain more insight into the pattern of bank lending during financial crises in emerging markets. We find that German banks reacted to the Asian crisis mainly by reallocating their portfolios among emerging markets. In addition, lending of large commercial banks was less stable than the lending of public sector banks. By contrast, banks' behaviour during the Russian crisis is mainly characterised by a general withdrawal from emerging markets. Differences between the banking groups were not as pronounced as during the Asian crisis. (JEL F30, F32, F34)

Zusammenfassung

Die Kreditvergabe deutscher Banken während Emerging-Markets-Krisen: Eine Analyse auf Einzelbankebene

Dieser Artikel untersucht die Kreditvergabe von Banken in Zeiten erhöhter Risikoaversion. Wir untersuchen die Reaktionen deutscher Banken während der Asien- und der Russlandkrise unter Verwendung von Einzelbankdaten der Deutschen Bundesbank. Eine Untersuchung dieser Frage kann Aufschluss darüber geben, welche Rolle Banken allgemein in der Übertragung von Währungs- und Wirtschaftskrisen in Schwellenländern spielen. Die empirischen Resultate zeigen, dass die deutschen Kreditinstitute auf die Asienkrise vorwiegend mit Portfolioumschichtungen innerhalb ihres Kreditportfolios aufstrebender Schwellenländer antworteten. Dabei zeigt sich, dass die privaten Kreditbanken stärker reagierten als die Landesbanken. Im Gegensatz dazu war das Verhalten der Banken während der Russlandkrise stark durch einen generellen Rückzug aus allen Schwellenländern gekennzeichnet, wobei Unterschiede zwischen den beiden untersuchten Bankengruppen weniger deutlich als während der Asienkrise zutage traten.