

## Emerging markets in the financial crisis: the effect of cross-border bank loans

At the latest with the collapse of Lehman Brothers in September 2008, the financial and economic crisis spread to the emerging market economies (EMEs). International bank loans played a significant part in transmitting the crisis from the industrialised countries. Moreover, this had already been the case in earlier periods of crisis. This article makes clear that a rise in global risk aversion, pressure among banks of the lender countries to consolidate, a weak macroeconomic and financial situation in the emerging markets and a low level of monetary and financial integration are major factors in explaining the decline in cross-border banking activities. Beyond the statistical significance, this article examines the economic relevance of these factors in different crisis periods. As a result, it is shown that in the current crisis global factors were mainly responsible for transmitting the financial shock. Nevertheless, significant regional differences may also be identified among the EMEs. For instance, the countries of central and eastern Europe posted smaller outflows of cross-border bank loans than other EMEs. This can primarily be explained by their close monetary and financial integration with the euro area.

## Spillover of the financial and economic crisis to the emerging markets

*Though delayed, effect of financial and economic crisis on emerging markets in some cases considerable*

At the beginning of the financial and economic crisis, the industrialised countries in particular were hard hit by the financial market upheavals. After Lehman Brothers collapsed in September 2008, however, financial stress in the emerging markets intensified. The crisis was most acute in the fourth quarter of 2008/first quarter of 2009, when the problems in the financial markets spread to the real economy and, faced with the heavy slump in world trade, most emerging markets saw their economic output fall sharply for the first time since the Asian crisis of 1997-98.

*International bank loans play a part in the spread of financial turmoil*

International banks are important investors in the EMEs. It is therefore not surprising that bank loans from industrialised countries to emerging markets are also an important transmission channel of financial turmoil.<sup>1</sup> A comprehensive empirical analysis of the determinants of cross-border bank lending is of particular interest for a number of reasons. First of all, it can provide general insights into how financial crises spread and why emerging markets are affected by “financial stress” to a different extent. Such an investigation lies at the centre of this article.<sup>2</sup>

*Development of cross-border bank flows in times of crisis also relevant to the financial stability of the lenders*

This is of importance not only from the borrower countries’ viewpoint. Gaining more insightful information on the key determinants of cross-border bank claims and on the impact of financial stress periods is also of relevance to the financial stability of the industrialised countries given the possible negative feedback

loop. Not least of all, this is also true of euro-area banks, many of which lent substantial volumes to the emerging markets of Asia, Latin America and, in particular, central and eastern Europe. Moreover, extensive ties often exist also as a result of direct investment relationships with the observed economies.

## International bank loans to emerging markets between 1990 and 2009: rising trend, but sharp crisis-induced cyclical fluctuations<sup>3</sup>

International bank lending from industrialised countries to emerging markets rose sharply

<sup>1</sup> See International Monetary Fund, World Economic Outlook, April 2009. In the earlier literature on the transmission of financial crises the focus was placed primarily on the influence of joint trade relations. See R Glick and AK Rose (1998), International Financial Contagion, World Economic Outlook, Chapter 3, pp 66-87. In later works, the transmission of crises was increasingly seen to be driven by financial linkages. See G Kaminski and CM Reinhart (2000), On Crisis, Contagion and Confusion, Journal of International Economics, 51, pp 145-168.

<sup>2</sup> This analysis examines banks’ cross-border positions and bank loans from 17 industrialised countries to 28 emerging markets in the three regions Asia, central and eastern Europe and Latin America to identify important determinants. The EMEs are located in Asia (China, India, Indonesia, Malaysia, the Philippines, South Korea, Taiwan, Thailand and Vietnam), central and eastern Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey) and Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela). The industrialised countries included in the study are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Switzerland, the United Kingdom and the United States.

<sup>3</sup> The data on which the following sections and the empirical study are based are provided by the Bank for International Settlements (BIS). The total international bank assets include cross-border loans as well as other external positions such as, for example, holdings of bonds, money market instruments and equities which were issued by banks and non-banks in the emerging market economy. Among the countries observed, cross-border bank loans predominate, however. For this reason, the terms cross-border bank loans, claims, external positions and foreign assets are used synonymously.

*Cross-border bank loans followed strong upward trend, ...*

over the past 20 years, with loans to the group of countries observed here rising more than threefold since the beginning of the 1990s. This is equivalent to an average increase of 9% per year. To a considerable extent, this increase was driven by loans to the central and east European economies, where the annual increase – starting from a low level – averaged 16%. By comparison, the growth rates in Asia and Latin America were, at 10% and 4%, respectively, considerably more moderate. Overall, in September 2009, banks from industrialised countries held assets in the observed emerging markets totalling US\$1,645 billion, including loans of US\$1,206 billion.<sup>4</sup> Roughly 40% of this total amount was accounted for by the central and east European economies. Measured in terms of economic strength, these bank exposures were equivalent to almost half of the GDP of the observed EMEs.

*... were significant in terms of volume ...*

*... and strongly influenced by financial turmoil*

The increase in bank loans from industrialised countries to the emerging markets in the period under review was not constant, however, but repeatedly experienced sharp fluctuations. However, financial crises were found to have different effects on the direction and volume of capital flows.

*Effects of the Mexican crisis were rather limited, ...*

The Mexican crisis of 1994-95 had only a moderate and temporary impact on cross-border bank lending. Primarily the Latin American economies were affected by banks' reluctance to extend new loans, although the central and east European countries, which were undergoing an initial transition period during

<sup>4</sup> End-of-period levels (see adjacent table).

### Cross-border bank assets vis-à-vis selected emerging markets

Item	Amounts outstanding <sup>1</sup> end of period, US\$ billion		Percentage change, <sup>2</sup> averages	
	External positions <sup>3</sup>	Cross-border loans <sup>4</sup>	External positions <sup>3</sup>	Cross-border loans <sup>4</sup>
Vis-à-vis all 3 regions <sup>5</sup>	.	.	8.8	6.7
1990–1994	525	573	7.1	.
1995–1999	646	536	6.1	– 2.1
2000–2004	809	607	3.5	1.6
2005–2008	1,695	1,291	25.3	24.7
2008–2009	1,645	1,206	– 17.4	– 16.5
Vis-à-vis Europe <sup>5</sup>	.	.	15.9	21.5
1990–1994	43	44	– 0.4	.
1995–1999	94	75	13.8	16.1
2000–2004	217	153	16.8	14.2
2005–2008	666	516	38.6	40.4
2008–2009	644	494	– 10.2	– 6.8
Vis-à-vis Asia <sup>5</sup>	.	.	9.8	3.8
1990–1994	273	340	15.4	.
1995–1999	303	266	6.7	– 6.8
2000–2004	381	305	3.6	2.0
2005–2008	679	519	22.4	20.4
2008–2009	656	477	– 25.1	– 26.9
Vis-à-vis Latin America <sup>5</sup>	.	.	3.6	2.8
1990–1994	209	188	1.8	.
1995–1999	249	195	4.3	1.6
2000–2004	210	149	– 2.8	– 4.7
2005–2008	349	257	15.7	15.5
2008–2009	345	234	– 13.4	– 10.3

Sources: BIS, Bundesbank calculations. — <sup>1</sup> Amounts outstanding at the end of the last quarter in the period, in US\$ billion (no exchange rate adjustment). For the current period, 2009 Q3. For cross-border loans, the end of the first period refers to 1995 Q4. — <sup>2</sup> Annual percentage changes (no exchange rate adjustment), averages. — <sup>3</sup> External positions of BIS reporting banks from industrialised countries vis-à-vis all sectors (bank and non-bank sector) in 28 emerging markets. — <sup>4</sup> Cross-border loans of BIS reporting banks from industrialised countries vis-à-vis all sectors (bank and non-bank sector) in 28 emerging markets. — <sup>5</sup> Percentage change refers to the entire sample (1990 Q1 to 2009 Q3 for external positions, 1995 Q4 to 2009 Q3 for cross-border loans).

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this time, were also impaired. For former members of the Council for Mutual Economic Assistance (COMECON), the switch from a centrally planned economy to a market-economy system brought substantial structural change to the financial sectors in any case, and made them extremely vulnerable to additional exogenous disturbances.

*... whereas Asian crisis brought significant decline in international bank loans*

The impact of the Asian crisis of 1997-98 (and of the Russian crisis, which immediately followed it) was far more pronounced and hampered lending in particular to Asian emerging markets. Thailand, Indonesia, Malaysia and the Philippines were the most severely affected economies. In individual quarters in the years 1997 to 1999, they even experienced a reduction in cross-border lending. But Latin American countries – notably Brazil and Argentina – were also hit, albeit with a certain time lag, in particular due to the default by Russia.

*New millennium marked by exceptionally strong capital inflows to emerging markets*

At the beginning of the new millennium, the foreign assets of banks from the industrialised countries held in the emerging markets of central and eastern Europe and of Asia rose appreciably. Here, too, Latin America followed with a slight time lag. Far-reaching liberalisation measures, complex new financial products and expectations of comparatively high returns in a global environment of low interest rates prompted international banks to expand substantially their activities in the emerging markets, above all in central and eastern Europe. Moreover, most of the latter countries profited from their admission to the European Union. Between mid-2007

and mid-2008, capital inflows to the respective regions reached all-time highs.

These massive capital inflows as a result of bank loans – in central and eastern Europe, figures of more than 10% of GDP were posted – were in some cases far too high to be absorbed. Thus, they contributed to overheating in some economies. In addition, the current account positions of some countries proved to be unsustainable.

*In relation to income, international loans to central and eastern Europe especially pronounced*

The dynamic inflows of funds to the EMEs started to abate in the final quarter of 2008. At that time, tensions in the international money and credit markets were turning into a global confidence crisis. Large international banks started to cut back their cross-border assets significantly across the board. Although this was true, primarily, of claims on borrowers in other industrialised countries, the emerging markets were affected as well. This trend persisted in the fourth quarter of 2008 and at the beginning of 2009 as claims on the non-banking sector plummeted. Yet there were also interesting regional differences in this general “sudden stop” environment. At least in the short term, cross-border capital flows to countries with a large share of foreign banks – particularly in central and eastern Europe – were found to be more stable during this time.<sup>5</sup> However, this did not prevent the abrupt adjustment of the macro-economic imbalances, which had grown before the crisis and were suddenly revealed by

*At end-2008, international banks cut back lending to emerging markets severely, ...*

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<sup>5</sup> This is found in particular in the case of the absolute amounts. Yet it also applies if one takes as a basis for the values in relation to GDP the pre-crisis levels of external liabilities.

### Cross-border bank assets of major industrialised countries vis-à-vis selected emerging markets\*



Sources: BIS, Bundesbank calculations. — \* Exchange rate adjusted changes q-o-q. The industrial creditor countries include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Switzerland, the United Kingdom and the USA. The selected EMEs are catching-up countries located in Asia (China, India, Indonesia, Malaysia, the Philippines, South Korea, Taiwan, Thailand and Vietnam), central and eastern Europe (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey) and Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela). These groups of countries also form the basis for the empirical studies.

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it, from triggering a massive slump in the real economy in many of these countries.

*... from mid-2009 there were signs of a return to normal, and recently there have even been large inflows again*

The cut-back in assets by international lenders decelerated in the second quarter of 2009, however, and as a result of the nascent real economic recovery signs emerged that cross-border flows of funds to the emerging markets were stabilising. The economies of Asia and Latin America recorded inflows again as from mid-2009.<sup>6</sup>

However, cross-border lending by banks from industrialised countries to the emerging markets recovered at only a moderate pace, not least because international banks were still reducing their balance sheets. In contrast, portfolio shifts by international investors are the main reason that overall capital flows to the EMEs have already risen markedly again. Besides the improving growth prospects<sup>7</sup> and rising yield differentials, growing risk appetite among international investors is also likely to have contributed to the considerable increase in equity buying, for example, above all in the big emerging markets of Latin America and Asia such as Brazil, China and India.<sup>8</sup> Overall, therefore, the volatility of cross-border capital flows appears to be increasing, ie large outflows are very quickly being compensated by sizeable inflows. This represents a major challenge for economic policy and for the flexibility of the financial markets in the economies in question.

## Cross-border bank loans to EMEs: an empirical analysis of the driving factors

The description of how cross-border bank loans from industrial economies to the emerging markets have developed in recent years is supplemented in the following by an empirical analysis of the main drivers of this development. The analysis focuses on the question as to what factors in times of crisis are closely linked to the transmission of financial shocks via the bank lending channel from industrialised countries to the EMEs.

Thus, given that indicators which are intended to represent financial stress are explicitly taken into account, identifying determinants of cross-border bilateral bank lending goes beyond the traditional push and pull factors,<sup>9</sup> which largely use macroeconomic fundamentals in the lender and borrower countries as

*Empirical analysis to examine determinants of international bilateral bank loans ...*

*... focusing on the influence of financial stress indicators*

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<sup>6</sup> The slight delay in the recovery of capital flows to the European emerging markets is probably due to the fact that Latin America and Asia are driving the economic upswing. By contrast, after a comparatively pronounced slump in real economic activity in the new EU member countries, the upswing has been slower to unfold.

<sup>7</sup> Growth in the emerging markets is expected to be at least 6% in 2010-11 after a moderate 2% in 2009. See International Monetary Fund (2010), World Economic Outlook, Update January 2010.

<sup>8</sup> In some economies, portfolio flows grew so vigorously during 2009 that risks of a renewed overheating are being discussed. In response, some countries are considering measures to dampen capital flows while others have already taken action. See J Ostry, A Gosh, K Habermeier, M Chamon, M Qureshi and D Reinhart (2010), Capital Inflows: The Role of Controls, Staff Position Note 4, International Monetary Fund.

<sup>9</sup> See S Jeanneau and M Micu (2002), Determinants of International Bank Lending to Emerging Market Economies, Working Paper 112, Bank for International Settlements; E Papaioannou (2008), What Drives International Bank Flows? Politics, Institutions, and other Determinants, Journal of Development Economics 88, pp 269-281; A Garcia-Herrero and MS Martinez-Peria (2005), The Mix of International Banks' Foreign Claims: Determinants and Implications for Financial Stability, Working Paper 525, Bank of Spain.

explanatory factors. Instead, the study concentrates in particular on the impact of financial stress and examines whether and to what extent global risk variables, as well as financial stress factors in the lender and borrower countries, constitute key determinants of cross-border bank claims.<sup>10</sup>

*The variables of the gravity model ...*

The findings of the empirical studies confirm on the one hand the significance of the chosen approach using a gravity model. Thus, the distance between the two economies plays an important role in explaining bilateral credit flows.

*... such as distance and incomes in the lender and borrower country drive the volume of international bank loans to EMEs*

Where there is a substantial distance between lender and borrower, bilateral lending volumes to the EMEs decrease significantly. Geographical distance – or factors such as cultural distance, which are probably implicitly taken into account through this variable – is therefore still of relevance to volumes of cross-border assets, regardless of the tremendous progress made in communication and information technology.<sup>11</sup> Differences in income between the lender and borrower country also have a significant effect on bilateral lending. As expected, a larger home market in the borrower country boosts the volume of loans granted by industrialised economies, whereas the empirical link to income in the lender country – contrary to the positive correlation normally expected in gravity models – proves negative. One reason for this could be that financial centres cancel out the expected positive link between the size of the lender country and the volume of cross-border assets.<sup>12</sup>

Moreover, cross-border loans react in the manner expected to relative differences in interest rates and growth between industrialised economies and the EMEs, in that higher interest and growth rates in the borrower countries imply larger inflows of cross-border bank loans.

Besides the standard variables of the gravity model, the financial stress and risk indicators also prove to be significant determinants of cross-border bank lending. Both global and country-specific factors in the lender and borrower countries affect the transmission of financial stress.

For example, a deteriorating sentiment in the international financial markets – in the shape of greater risk aversion on the part of international investors and higher expected short-

*Financial stress indicators are significant determinants of cross-border bank loans*

*Global risk aversion, ...*

<sup>10</sup> To date, only few empirical studies link the traditional push and pull factors to financial stress indicators. See C Rijckeghem and B Weder (2003), Spillovers through Banking Centers: A Panel Data Analysis of Bank Flows, *Journal of International Money and Finance* 22, pp 483-509; F Heid, T Nestmann, B Weder di Mauro and N von Westernhagen (2004), German bank lending during emerging market crisis: A bank level analysis, Deutsche Bundesbank Research Centre, Discussion Paper, Series 2, No 4/2004; The World Bank (2008), The Changing Role of International Banking in Development Finance, *Global Development Finance*; P McGuire and N Tarashev (2008), Bank Health and Lending to Emerging Markets, *BIS Quarterly Review* 12, BIS; C Buch, K Carstensen and A Schertler (2009), Macroeconomic Shocks and Banks' Foreign Assets, Kiel Working Paper 1254, Kiel Institute for the World Economy.

<sup>11</sup> This suggests that distance represents other variables not taken into account in the model, such as cultural differences, different time zones and preferences. Thus, it is argued that distance should not only be interpreted as an indicator of information and transport costs. See C Buch (2002), Are Banks Different? Evidence from International Data, *International Finance*, 5, pp 97-114.

<sup>12</sup> Examples here include Switzerland and Austria as well as London's special role as an international financial centre. In 2006, ie before the financial crisis, these three economies were responsible for roughly 40% of all cross-border bank lending to the emerging markets observed.

## The impact of financial tensions on bank lending to selected countries: an empirical analysis

This empirical study<sup>1</sup> on the impact of financial risk indicators on cross-border bank flows is based on a panel of 17 industrialised economies with exposures to 28 countries in the three regions central and eastern Europe, Asia and Latin America. The period under review runs from the first quarter of 1993 to the fourth quarter of 2008. Referring to a gravity model, bilateral loans from industrialised economies to the countries under observation are estimated by standard variables used in the gravity approach as well as by financial risk measures in the lender and borrower countries and at global level. The underlying regression equation for the “Basic model” reads

$$LOANS_{ij,t} = \rho_0 + \rho_1 DISTANCE_{ij,t} + \rho_2 GDP_{-j,t} + \rho_3 GDP_{-i,t} + \rho_4 INTEREST_{ij,t} + \rho_5 GROWTH_{ij,t} + \rho_6 EXCHANGE_{ij,t} + \rho_7 X_{ij,t} + \epsilon_{ij,t}$$

where the dependent variable  $LOANS$ <sup>2</sup> represents the exchange rate adjusted change<sup>3</sup> in the external position of banks in an industrialised economy  $i$  vis-à-vis all sectors in a borrower country  $j$  at time  $t$ ;  $DISTANCE$  is the distance between country  $i$  and  $j$  (as measured between their respective capitals);  $GDP_i$  and  $GDP_j$  represent the gross domestic product in the countries in question;  $INTEREST$  is the short-term interest rate differential and  $GROWTH$  the growth differential between the lender and the borrower country;  $EXCHANGE$  is the bilateral exchange rate (in currency units of country  $j$  per currency unit of country  $i$ );  $X$  is a vector of control variables and  $\epsilon$  the error term.<sup>4</sup>

In order to study what specific channels contribute to spillover effects in emerging market economies, four models focusing on financial risk indicators<sup>5</sup> were additionally specified.

The “Global model” is based on the idea that global influences are the main determinants of cross-border bank flows. Besides the standard variables used in the gravity model, the Chicago Board Options Exchange S&P 100 Volatility Index ( $VIX$ ) and the average yield spread between US corporate and government bonds ( $RISK\_AVERSION$ ) are included. Both these indicators are proxies for the state of the global financial markets; while the  $VIX$  is considered a measure of market players’ uncertainty, the yield spread reflects international investors’ risk aversion.<sup>6</sup> Greater uncertainty and pronounced risk aversion can be expected to lower bank lending.

The “Lender model” assumes that the industrialised economy’s financial characteristics have a significant influence on cross-border bank positions. According to Krugman (2008), the balance sheets of international financial intermediaries are an important source of spillover effects. This paper concentrates on the “common lender” effect, which takes into account the fact

that financial stress in a creditor country is determined by that country’s exposure to the primary crisis country.<sup>7</sup> The indicator is measured as the sum of the external assets BIS reporting country  $i$  holds vis-à-vis the primary crisis country (or crisis countries)  $k$  in relation to the sum of all external assets held by the country under review. Banks in industrialised economies with greater exposure to the primary crisis country (or crisis countries) will presumably be worse hit by the crisis and are therefore likely to reduce their positions vis-à-vis other countries, for example in order to meet capital requirements and reduce risk exposures.<sup>8</sup>

In addition, an indicator of the health of the lender country’s banking sector is used, measured as the deviation of the banking sector subindex from the overall equity index ( $BANK\_HEALTH\_LENDER$ ). This is based on the hypothesis that a banking sector that underperforms the market as a whole – as measured by share prices – might be under stress and is consequently forced to re-think its lending activities. If, say, banks in industrialised economies are saddled with a large percentage of non-performing loans in their home market, the share price is likely to suffer, which could impair the level of their international positions in other countries.

The “Risk model” assumes that country-specific risk factors render an individual borrower country more vulnerable to the transmission of financial stress. Risk factors that are used in the sense of early-warning indicators include the ratio of the general government balance to GDP ( $GOV\_BALANCE$ ). A larger fiscal deficit goes hand in hand with a higher probability of future default. Consequently, the variable should implicitly also take into account differences in country risk. As in the “Lender model”, an indicator of banks’ health in the borrower country  $j$  ( $BANK\_HEALTH\_BORROWER$ ) is used as an additional country-specific indicator of risk. A stable banking sector in the borrower country should have a positive impact on the volume of loans granted.

The “Integration model” implies that the extent of international financial and monetary integration between the lender and borrower countries influences the transfer of financial stress. In this context, the estimate takes into consideration an indicator of bilateral financial linkages ( $FINANCE\_OPEN$ ), measured as the ratio of all banks’ outstanding assets and liabilities in country  $i$  vis-à-vis country  $j$  relative to the GDP of country  $j$ . In addition, the empirical approach controls for the exchange rate regime  $ER\_REGIME$  based on the Reinhart-Rogoff classification (2004).<sup>9</sup> One would expect a higher degree of financial integration and more fixed exchange rate regimes to induce a greater flow of credit. On the other hand, a decline in integration in times of crisis would also be accompanied by a greater outflow of funds.

1 For more detailed information, see S Herrmann and D Mihaljek (2010), *The Determinants of Cross Border Bank Flows to Emerging Markets – New Empirical Evidence on the Spread of Financial Crises*, BIS Working Paper, forthcoming. — 2 The data are taken from the Locational Banking Statistics published by the Bank for International Settlements (BIS). The external positions include cross-border loans as well as other foreign assets such as, for instance, holdings of bonds, money market instruments and shares issued by banks and non-banks in country  $j$ . As international bank loans predominate among the countries under review, the terms cross-border bank loans, external positions and foreign assets are used synonymously. — 3 Exchange rate adjusted changes in positions may assume negative values if country  $j$  repays more old loans to country  $i$  in a given quarter than it

receives new loans. Following E Papaioannou (2008), *What Drives International Bank Flows? Politics, Institutions and other Determinants*, *Journal of Development Economics*, 88, pp 269-281, the absolute values are logarithmised and originally negative values given a negative sign. — 4 All variables are logarithms, with only interest rate and growth differentials and exchange rate changes given in percentage points or percent. The estimated coefficients can thus be interpreted as elasticities or semi-elasticities. — 5 The four models provide specific explanatory factors over and above the “Basic model”, which are not entirely independent of one another. The explanatory power of the four models can be compared using their coefficient of determination. — 6 Actual default risk is also a factor here. — 7 Three periods of crisis are identified: the Mexican crisis (1994-95) in which



## Determinants of cross-border bank flows

Dependent variable: log of quarterly, exchange rate adjusted change in external position (in US\$ million) of country *i* vis-à-vis country *j* at time *t*

Item	Basic model	Global model	Lender model	Risk model	Integration model
DISTANCE	-0.594 (-8.51)***	-0.660 (-3.20)***	-0.693 (-8.77)***	-0.690 (-4.64)***	-0.315 (-1.93)***
GDP_j	1.038 (10.67)***	1.198 (12.24)***	1.098 (8.77)***	0.789 (6.75)***	1.14 (9.26)***
GDP_i	-0.715 (-5.14)***	-0.972 (-6.40)***	-0.733 (-3.55)***	-0.656 (-3.95)***	-0.667 (-2.96)***
INTEREST	0.011 (4.50)***	0.005 (1.93)***	0.012 (4.30)***	0.016 (3.82)***	0.015 (5.19)***
GROWTH	0.044 (7.84)***	0.030 (5.03)***	0.046 (7.00)***	0.040 (6.10)***	0.049 (7.12)***
EXCHANGE	-0.015 (-6.76)***	-0.011 (-4.99)***	-0.016 (-6.27)***	-0.028 (-8.31)***	-0.011 (-4.49)***
VIX		-0.027 (-5.80)***			
RISK_AVERSION		-0.002 (-4.02)***			
COMMON LENDER_US			-0.023 (-2.20)**		
COMMON LENDER_AS			-0.010 (-0.95)		
COMMON LENDER_MX			-0.286 (-3.88)***		
BANK_HEALTH_LENDER			0.001 (2.52)**		
GOV_BALANCE				0.080 (6.59)***	
BANK_HEALTH_BORROWER				0.006 (11.01)***	
FINANCE_OPEN					0.165 (10.50)***
ER_REGIME					-0.380 (-9.66)***
R <sup>2</sup>	0.03	0.03	0.04	0.03	0.04
N	30,464	30,464	30,464	30,464	30,464
Durbin-Watson	2.02	2.08	2.01	2.08	2.09

Standard error in brackets. \*\*\* Significant at the 1% level; \*\* Significant at the 5% level; \* Significant at the 10% level.

The five models are estimated using a random effects model.<sup>10</sup> The results of the five specifications are shown in the table above.

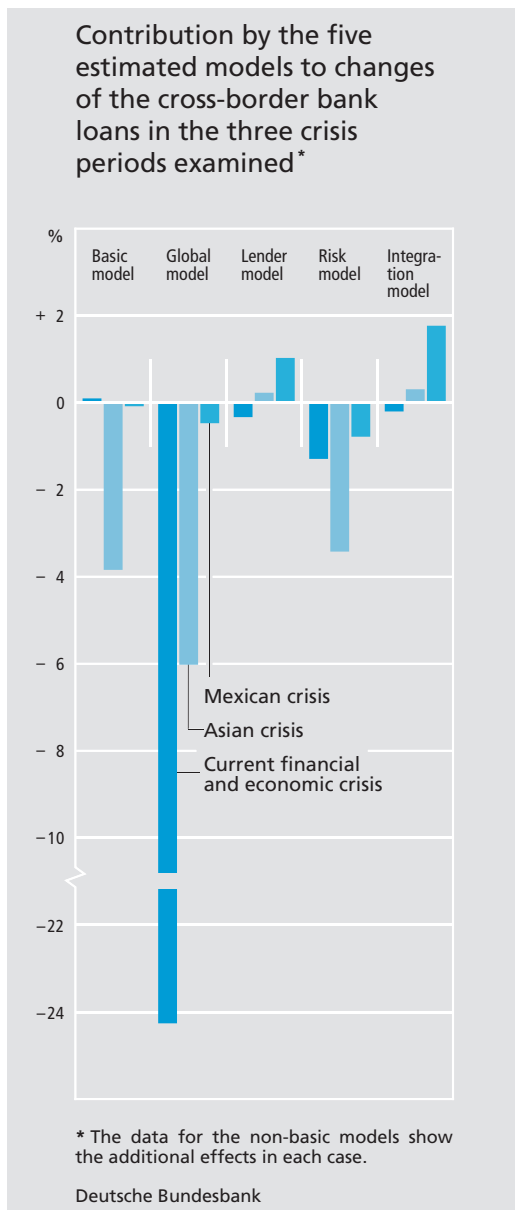
As anticipated, a smaller distance between lender and borrower, a larger home market in the catching-up economy, a greater interest rate and growth differential in favour of the borrower country and an appreciation of the emerging market currency have a beneficial impact on cross-border lending by industrialised economies. Contrary to the assumptions made in the gravity approach, the size of the domestic market in the lender country is negatively correlated with the volume of loans granted. One

reason could be that important banking groups are not always based in the largest economies by GDP.<sup>11</sup>

As regards the influence of financial turmoil, it can be shown that industrialised economies reduce their cross-border bank loans in times of crisis if they reassess the global risk or if their banking sector is itself exposed to the primary crisis country. Moreover, a deterioration in the macroeconomic and financial situation in borrower countries will contribute to the decline in loans from industrialised economies. A lower degree of monetary and financial integration will also negatively influence capital flows to emerging markets.

Mexico was the primary crisis country; the Asian crisis (1997-98), with Hong Kong, Indonesia, Malaysia, South Korea and Thailand as the primary crisis countries; and the current financial and economic crisis in which the United States is the primary crisis country. — 8 C Rijckeghem and B Weder (2003), Spillovers through Banking Centers: A Panel Data Analysis of Bank Flows, *Journal of International Money and Finance* 22, pp 483-509, find empirical evidence for the common lender effect. At the microeconomic level, this effect is confirmed by F Heid, T Nestmann, B Weder di Mauro und N von Westernhagen (2004), German bank lending during emerging market crises: A bank level analysis, Deutsche Bundesbank Research Centre, Discussion Paper Series 2, No 04/2004. — 9 CM Reinhart and K Rogoff (2004), The Modern History of Exchange Rate Arrangements: A Reinterpretation, *Quarterly Journal of Economics*,

119(1), pp 1-48. — 10 The Hausman test confirms that the random effects estimator is indeed an efficient model. It includes country-specific fixed effects, which is not the same as a fixed-effects estimator comprising bilateral fixed effects (17 industrialised economies multiplied by 28 emerging markets). To avoid a quasi-singular matrix, individual fixed effects have to be removed (Global model: US/MX; Lender model: FI/GR/NO/US/CH; Risk model: US/LT; Integration model: GR/NO/CN). — 11 Examples include the financial centres of London, Austria or Switzerland. Alternative estimation methods can also be used to identify positive signs. Other empirical studies, too, point to a change in sign depending on the model set-up. See S Blank and C Buch (2010), International Bank Portfolios: Short and Long Run Responses to Macroeconomic Conditions; *Review of International Economics*, forthcoming.



term market volatility – has a dampening effect on cross-border bilateral lending by industrialised countries. In this context, the VIX volatility index for the US equity market and yield differentials between US corporate and government bonds serve as global risk indicators.

Moreover, the characteristics of the lender country have a major bearing on its banks'

cross-border activities in times of crisis. The more the group of lenders itself is affected by the consequences of the financial and economic crisis, the less able it is to continue granting cross-border loans to EMEs (the so-called common lender effect). Thus, the financial distress within a group of countries affects third countries as well. This effect played a major role in the latest crisis. At first, the financial crisis hit primarily the group of industrialised countries, and the underlying empirical studies confirm that the financial stress suffered by the banking sectors in these countries had an adverse impact on lending to the EMEs.

Empirical studies also support the assumption that individual risk factors in the borrower country dampen bilateral lending. For instance, a difficult public finances situation in the borrower country – for example, a high public deficit – is detrimental to the assessment of the potential borrower. In much the same way, difficulties experienced in the borrower country's banking sector change the investor's perception of risk and reduce the EME's ability to attract external funding from industrialised countries.

Furthermore, the extent of financial and monetary integration between lender and borrower country determines whether and how strongly contagion effects impact on international lending relationships. It has been found that closer bilateral financial integration is positively correlated with the volume of new bank loans. It can therefore be assumed that a higher initial level of financial interaction between lender and borrower has

*... financial characteristics of the lender, ...*

*... risk factors in the emerging markets and ...*

*... the extent of monetary and financial integration between lender and borrower country determined the volume of international bank loans*

a positive effect on future transactions. This implies a certain persistence of lending relationships. By the same token, however, a decline in financial integration in times of crisis could have a negative impact on capital flows to emerging markets in the longer term.<sup>13</sup> Nor is this countered by the fact that capital flows to the EMEs have made an unexpectedly fast recovery in the current crisis, as other factors such as a marked decline in risk aversion on the part of investors may have played a major part in this development.

The exchange rate regime in place in the borrower country also has a significant effect on bilateral lending. It may be observed that more flexible exchange rate regimes are accompanied by a greater withdrawal of loans in times of crisis. However, this does not imply that fixed exchange rate regimes are automatic stabilisers in each and every case. Rather, it cannot be ruled out that fixed exchange rate regimes such as those in the EMEs of central and eastern Europe contributed to substantial internal and external imbalances in the run-up to the crisis. Empirical studies point to a link between an exchange rate peg and financial distortions such as excessive credit growth,<sup>14</sup> pronounced current account deficits and high foreign debt.<sup>15</sup> It is possible that these factors amplified the impact of the crisis on the real economy<sup>16</sup> and indirectly even made the countries in question more vulnerable to the withdrawal of financial resources as a result of general uncertainty in the financial markets.<sup>17</sup>

### What influence do crisis-driven developments in the financial markets have on cross-border bank loans?

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Over and above the impact of general determinants on the development of cross-border banking flows, it is interesting to calculate the relative contributions of the indicators examined to the estimated bilateral banking flows. This can be done by means of a contribution analysis.<sup>18</sup> Having examined their statistical significance, therefore, this article now focuses on the economic relevance of the variables used in the model.

*Contribution analysis examines economic significance of the variables*

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13 See S Claessens, G Dell’Ariccia, D Igan and L Laeven, Lessons and Policy Implications from the Global Financial Crisis, Working Paper 44, International Monetary Fund.

14 This is also seen as a cause of later banking crises, particularly in connection with excesses on the equity market. See D Gerdesmeier, H-E Reimers and B Roffia (2009), Asset Price Misalignments and the Role of Money and Credit, Working Paper 1068, European Central Bank.

15 AR Gosh, JD Ostry and C Tsangarides (2010), Exchange Rate Regimes and the Stability of the International Monetary System, Working Paper, International Monetary Fund, forthcoming. The authors point out that fixed exchange rates delay the adjustment of external imbalances and increase the risk of a financial crisis.

16 There is no evidence of the exchange rate regime having a direct impact on the amount of the growth losses in the wake of the crisis. However, empirical studies reveal a link between excessive credit growth, pronounced current account deficits and high foreign debt and the implications of the crisis for the real economy. See P Berkmen, G Gelos, R Rennhack and JP Walsh (2009), The Global Crisis: Explaining Cross-Country Differences in the Output Impact, Working Paper 280, International Monetary Fund. Nor can it be ruled out that the imbalances that existed in the new EU member states before the crisis are to blame for the fact that the upswing in Europe is unfolding with a time lag compared with the other emerging market regions.

17 A large share of foreign bank loans in proportion to the total inflow of capital – this, too, might be the result of the fixed exchange rate regime – may also heighten the risk of insolvency. See H Tong and SJ Wei (2010), The Composition Matters: Capital Inflows and Liquidity Crunch during a Global Economic Recession, Working Paper 164, International Monetary Fund.

18 The contribution of each variable is calculated by multiplying the estimated parameters by the average values of each explanatory variable in a given period of time.

In the context of the chosen approach to explaining developments in cross-border capital flows, it becomes clear how global and country-specific stress factors affecting the lender and borrower countries are to be assessed in terms of their respective contribution to the development of cross-border loans in certain financial stress periods. In this way, insights can be gained into the factors through which financial stress is transmitted by way of international bank loans, and the main determinants in each individual crisis period can be identified.

*Global factors responsible for collapse of bank lending to emerging markets in current financial crisis*

In the current financial and economic crisis, global factors have been identified as the main drivers of a withdrawal of bank funds from the observed countries. The dramatic rise in global risk aversion and in the expected short-term financial market volatility was largely responsible for the reluctance to lend to EMEs over the last two years. Over and above these factors, the only relevant contribution resulted from a deterioration of the risk factors in the emerging markets themselves. In this, the increasingly unfavourable development of the banking sectors in the EMEs during the course of the crisis played a decisive part.

*In the Asian crisis, too, greater risk aversion and higher expected market volatility were main drivers of the decline in cross-border bank lending*

Global factors also made the biggest contribution to the retrenchment in cross-border loans during the Asian crisis, although not nearly to the extent observed in the most recent period of crisis. Moreover, at that time two other factors drove deleveraging in the emerging markets. First, the decline in lending flows was caused by falling growth rates in the borrower countries compared with the

economic developments in the lender countries. Second, the industrialised countries' lending flows were dampened by deteriorating financial indicators in the EMEs, ie rising public deficits and growing tensions in the banking sectors of central and eastern Europe, Asia and Latin America.

By contrast, the deteriorating global sentiment played a more subordinate role in the Mexican crisis. This seems entirely plausible as the crisis was limited to one region. The deterioration of the country-specific risk indicators in the countries examined, notably Latin America, were primarily responsible for the decline in banks' cross-border positions. Overall, however, the outflow of credit was not as dramatic as that witnessed in the current financial and economic crisis or, in a weaker form, during the Asian crisis. The sound condition of the lender countries which were not primary crisis countries themselves was a key reason why, among other things, the cross-border exposure volumes to the emerging markets as a whole could largely be sustained during this period.

*By contrast, Mexican crisis was driven more by country-specific determinants*

During the current financial and economic crisis, the central and east European economies posted a more modest outflow of loans than the emerging markets of Asia and Latin America. If one considers the effect of the variables examined on the volume of international bank loans in the current crisis and compares the three regions, several factors seem to have contributed to this diverging development.

*In current financial crisis, withdrawal of international loans from central and eastern Europe more moderate than from emerging Asia and Latin America*

*A stabilising effect on banking flows to central and eastern Europe was triggered by healthier banking sectors, ...*

On the one hand, the more stable banking sectors in the central and east European economies had a positive impact on the volume of loans granted. Among other things, this could be explained by the high foreign bank penetration in the region, which expedited the efficiency and stability of the banking sectors there and was reflected, also in times of crisis, in comparatively robust lending volumes from the industrialised countries.

*... among other things, in connection with large-scale support measures by international institutions, ...*

In addition, it may be assumed, however, that the large number of support measures by European and international organisations also played a major role in stabilising the central and east European banking sectors. Special mention should be made here of the considerable financial assistance given to a number of countries in the shape of International Monetary Fund (IMF) stand-by arrangements as well as by the EU and the World Bank.<sup>19</sup> An, on the whole, stabilising effect was probably also achieved by the “Vienna Initiative”, by which the European Commission, the International Monetary Fund, the European Bank for Reconstruction and Development, the European Investment Bank, the World Bank as well as large European banks with branches in the new EU member countries at the beginning of 2009 together agreed to provide the central and east European economies with international support.

*... and strong financial market integration as well as closer monetary linkage*

Last but not least, the strong financial market integration and the high degree of monetary linkage of the European economies observed probably also impacted positively on inflows of cross-border bank loans, ie they stabilised

international lending to a greater extent in Europe than in Asia and Latin America.<sup>20</sup>

The fact that cross-border bank loans from the industrialised countries to central and eastern Europe were retrenched to a lesser extent than those to Asia and Latin America does not imply, however, that the new EU countries as a whole were less severely affected by the financial and economic crisis than the observed Asian or Latin American EMEs. On the contrary, some of the economies in central and eastern Europe suffered particularly pronounced declines in income. This illustrates that this analysis deals with only a very specific aspect in connection with the financial and economic crisis. Even with regard to capital flows, one must bear in mind that the cross-border bank loans observed represent only a part of aggregate inter-

*Cross-border bank loans represent only part of capital flows to emerging markets*

<sup>19</sup> In November 2008, a support package was approved for Hungary totalling roughly US\$26.2 billion that consists of an IMF stand-by arrangement in the amount of US\$16.5 billion, EU assistance of US\$8.4 billion and US\$1.3 billion from the World Bank. Roughly 70% of the IMF funds have been disbursed to date. In December 2008, Latvia was awarded a financial aid package totalling US\$10.6 billion, of which US\$2.4 billion was granted in the form of a stand-by arrangement, US\$4.4 billion by the EU and US\$0.6 billion by the World Bank. So far, roughly 35% of the funds under the stand-by arrangement have been made available. Since May 2009, Romania has received roughly US\$6.9 billion from an overall package of US\$27.1 billion, of which US\$6.6 billion is being financed by the EU and US\$1.3 billion by the World Bank. The IMF has also approved support for Latin American countries – for example, flexible credit lines have been granted to Colombia (SDR 7.0 billion) and Mexico (SDR 31.5 billion) – and Poland (SDR 13.7 billion). However, none of the countries has made use of these funds so far. Moreover, the ECB granted Hungary and Poland access to euro liquidity under swap transactions (see press releases of 16 October 2008 and 21 November 2008). The Federal Reserve provided Brazil, South Korea and Mexico with dollar liquidity under swap transactions (see press release of 29 October 2008).

<sup>20</sup> See European Central Bank, External adjustment in central and eastern Europe, Monthly Bulletin, January 2010, pp 12-13.

## Developments in external assets of banks in Germany during the financial crisis

German banks are important lenders among those countries which report to the Bank for International Settlements (BIS). The development of German banks' external positions therefore warrants further investigation. The data are based on the consolidated external assets of German banks, including their foreign branches and subsidiaries, as well as foreign banks located in Germany.<sup>1</sup> Unlike the aggregated data collected by the BIS, which underlie empirical estimates, these data enable a detailed breakdown by maturity and banking group. It should be noted, however, that the following descriptive analysis of external assets does not differentiate between supply and demand factors.

Since autumn 2007, strains on the international financial markets have also affected the external assets of banks in Germany. Since as early as summer 2007, cross-border claims have stagnated on the back of a continuous increase over a number of years. Total assets vis-à-vis non-residents amounted to roughly €3,500 billion at that time, two-thirds of which was attributable to foreign non-banks. Foreign subsidiaries and branches of the German banking system – especially of large banks – were, in July 2007, the principle contributors to the end of the period of growth of cross-border assets due to the real estate crisis in the USA. By contrast, domestic institutions continued to increase their external assets, *inter alia* because they felt obliged to support their troubled foreign special purpose vehicles or to transfer the assets of these entities to their own balance sheets.

Following the collapse of Lehman Brothers in autumn 2008, the effects of the financial crisis were even more intensely felt in the banking sector in Germany, triggered by the strong rise in global risk aversion, the crisis of confidence amongst banks and the freeze on the money markets. Between October 2008 and December 2009,

banking groups' external assets fell by a quarter, with the drop in cross-border claims on foreign banks being roughly equivalent to that of non-banks.<sup>2</sup> Credit institutions' positions vis-à-vis the USA and the United Kingdom alone fell by €248 billion and €207 billion, respectively, in this period. The decrease in external assets was primarily due to the fall in loans, whereas the reduction in securities holdings, especially debt securities, was considerably less pronounced.

External assets vis-à-vis the sample of countries<sup>3</sup> mentioned in the main text were likewise not unaffected by these developments; however, the reduction was more moderate than the overall reduction in cross-border assets and took hold at a later stage. Following a decrease<sup>4</sup> at the end of 2006, primarily for statistical reasons, all institutions' consolidated external positions vis-à-vis emerging markets initially continued to rise, reaching a high of €230 billion or approximately 7% of banks' total foreign exposures in August 2008. This reflects, among other things, the long-standing assumption that emerging markets are largely protected from the financial crisis and boost the global economy with their growth.<sup>5</sup> Intragroup flows – in other words, lending by parent institutions to their foreign branches – continued to grow by a volume similar to that of all institutions' assets to banks and non-banks outside the group. Thus, intragroup links initially had a stabilising effect on capital flows to emerging markets as well.

The intensifying problems on industrialised countries' financial markets did not spread to emerging markets until autumn 2008. Consequently, there was a sharp reduction in the external exposures of German banks towards emerging markets: in October 2009, they were 13% down on the high of August 2008. While cross-border assets vis-à-vis banks fell by 25%, positions towards

<sup>1</sup> Unless otherwise specified, this consolidated approach was used as a basis for the investigation. The period of analysis includes data from March 2002 to December 2009. — <sup>2</sup> Data corrections to take account of reductions in assets due to write-offs are not possible. Domestic MFIs (excluding foreign branches and subsidiaries) reported value adjustments of roughly €22 billion on securities and roughly €16 billion on loans between January 2007 and January 2010. However,

this represents only the lower bound of actual write-offs. Statistical adjustments were also made as a result of insolvencies (approximately €19 billion). — <sup>3</sup> This analysis investigates emerging markets in the regions of Asia (China, India, Indonesia, Malaysia, the Philippines, South Korea, Taiwan, Thailand and Vietnam), central and eastern Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia, and Turkey)

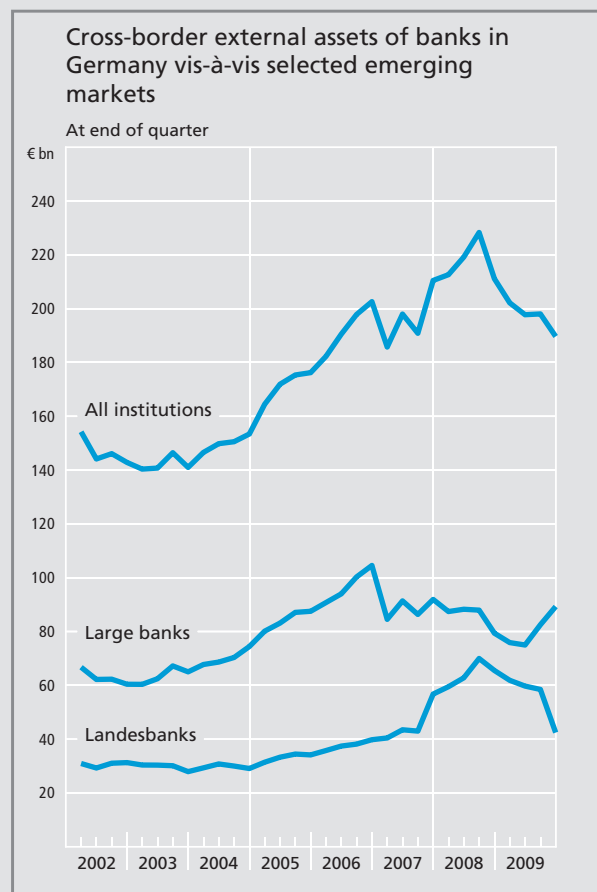
non-banks fell by just 7%. This indicates that banks were keen to maintain long-term lending relationships with enterprises. At 5%, the withdrawal of funds from central and eastern Europe was considerably more moderate than capital outflows from Asia or Latin America, which amounted to 23% and 24%, respectively, in the same period.<sup>6</sup> In terms of cross-border positions, this would, from a German perspective at least, seem to contradict the common hypothesis that the sharp drop in growth in central and eastern Europe compared with other emerging economies was caused primarily by declining capital flows from industrialised countries.

Trends in lending to the Asian, central and eastern European and Latin American countries under review reveal major differences between large banks and Landesbanks. While large banks have not expanded their external exposures significantly since spring 2007 – when payment defaults on subprime loans in the USA shot up from a very low level – Landesbanks' assets to emerging markets continued to grow considerably until autumn 2008. In central and eastern European economies, Landesbanks did not reduce their external assets until the end of 2009. The sale of a subsidiary, which operated mainly in central and eastern Europe, also played a role here.

The developments observed partly reflect the different maturity structures of assets, which may stem from the different business plans of large banks and Landesbanks in emerging markets. At an average of 44%, the percentage of short-term assets held by large banks at the onset of the financial crisis was twice as high as that held by Landesbanks, where external assets with a maturity of less than one year accounted for just 22% of all assets. Thus, large banks were probably in a better position to react quickly to the change in conditions; however, their

and Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela). — 4 The reduction in cross-border assets at the end of 2006 was driven primarily by decreasing assets to new EU member states following the sale of the eastern European subsidiary of a bank in Germany. — 5 To a certain extent, the continued increase is, however, also due to the takeover of a banking group operating mainly in central and eastern Europe by a German group of banks at

holdings of cross-border assets were also more volatile as a result. This was confirmed recently when large banks once again expanded their exposures in catching-up countries in Asia. As well as Landesbanks, however, there are also other institutions, such as credit cooperatives or development banks, which maintained mainly longer-term exposures in emerging markets and may have consequently contributed to the moderate and delayed reduction in assets in these countries.



the end of 2007. — 6 Subsequently, the "Vienna Initiative" may have also helped stabilise capital flows to central and eastern Europe. Since the beginning of 2009, the EU Commission, International Monetary Fund, European Bank for Reconstruction and Development, European Investment Bank, World Bank and large European banks with branches in central and eastern Europe have used this forum to speak in favour of international support for central and eastern European economies.

national capital inflows to the emerging markets; other categories, notably portfolio investment, may be far more significant in terms of volume, depending on the country.<sup>21</sup>

## Conclusion

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After rising strongly in the previous years, cross-border bank lending to the emerging markets declined substantially in the current financial and economic crisis. The main reasons were greater uncertainty worldwide and higher risk aversion on the part of the lending banks. However, a comparatively healthy banking sector, close monetary and financial integration in Europe and external support measures were responsible for the central and east European countries experiencing

less pronounced outflows of international bank loans than emerging Asia and Latin America.

Whereas emerging markets themselves can scarcely influence the development of global determinants in times of crisis, measures taken by the borrower countries with a view to improving their own fundamentals can help safeguard the flow of cross-border funds, even when financial markets are strained. Ensuring fiscal sustainability is especially important; and as a general principle, it is essential to take timely action to prevent internal and external imbalances from building up.

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<sup>21</sup> A large number of other factors also play a part in explaining why the crisis affects economies to a different extent. See International Monetary Fund, *Differential Impact*, Finance and Development, March 2010.