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The euro area crisis and cross-border bank lending to emerging markets[1]

Cross-border bank lending to emerging markets dropped sharply in the second half of 2011 as the euro area crisis intensified. We use the BIS international banking statistics to identify the key drivers of this decline. Our results indicate that the latest contraction in cross-border bank lending was largely linked to the deteriorating health of euro area banks.

JEL classification: F34, G15, G21.

As the euro area crisis intensified in the second half of 2011, cross-border bank lending to emerging market economies (EMEs) dropped sharply (Graph 1). The decline marked the end of the continuous nine-quarter recovery that followed the post-Lehman contraction in 2008–09. Furthermore, the recovery in the first quarter of 2012 came to an abrupt halt in the second. This raises questions for policymakers: what caused this lending decline? Was it that demand for credit fell in EMEs? Did country risk rise? Or were the key drivers linked to the health of the advanced economy banks that supply EMEs with cross-border credit? And, if yes, which banking systems contributed the most to the decline?

We answer these questions by using the BIS international banking statistics (IBS) in a panel regression framework. The analysis covers quarterly cross-border bank lending data for 40 EMEs between the third quarter of 2005 and the second quarter of 2012. We develop a new methodology which combines information from the two main BIS IBS data sets. This novel approach is the first to simultaneously use actual exchange rate-adjusted cross-border lending flows to EMEs and trace these flows to individual home country banking systems.

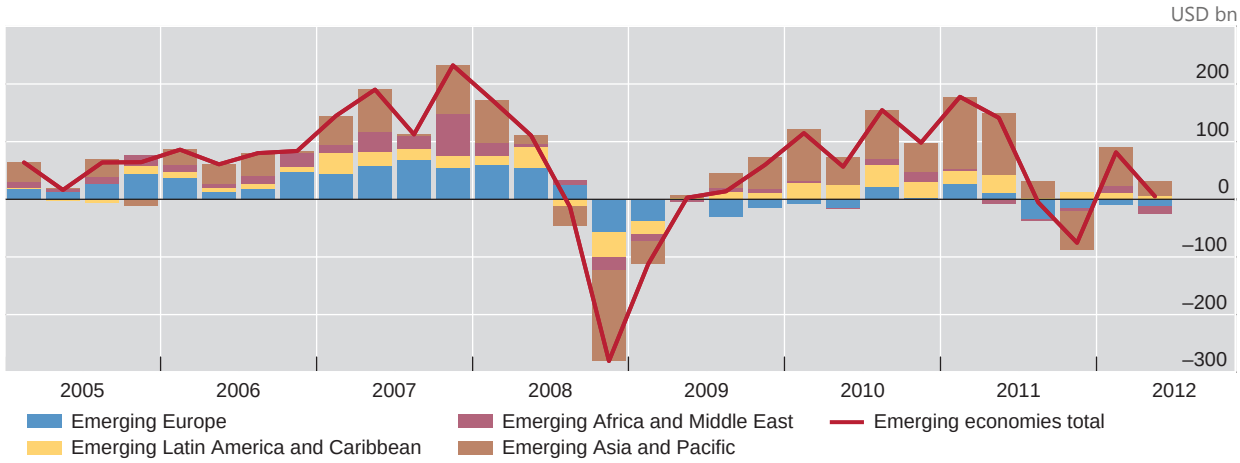
We use the panel regression results to decompose the quarterly fluctuations in cross-border lending to EMEs into components attributable to EME credit demand, EME country risk and the health of the banking systems that supply the cross-border credit.

Our results indicate that home country factors related to the health of advanced economy banks played a crucial role during the late 2011 lending

[1] The authors thank Claudio Borio, Stephen Cecchetti, Dietrich Domanski, Patrick McGuire, Nikola Tarashev, Christian Upper and Adrian van Rixtel for useful comments and discussions. Bat-el Berger provided excellent research assistance. The views expressed are those of the authors and do not necessarily reflect those of the BIS.

Adjusted flows to emerging economies

Graph 1



Source: BIS locational banking statistics by residence.

downturn. Furthermore, by allocating the contributions of home country factors to national banking systems, we find that euro area banks accounted for most of the explained contraction in cross-border credit during the second half of 2011. The negative impact of euro area banks was especially pronounced in emerging Europe.

This special feature is organised as follows. The first section introduces the data. The second details the regression analysis used to identify home and host country factors, and the third decomposes cross-border lending flows according to these factors. The fourth discusses the methodology and the main results. The final section concludes with some policy implications.

Data

We use both main data sets from the BIS international banking statistics. The first data set, the BIS locational banking statistics by residence ("locational data set" hereafter), defines creditors and debtors according to their residence, consistently with national accounts and balance of payments principles. The second data set, the BIS consolidated banking statistics ("consolidated data set" hereafter), groups cross-border claims according to the nationality of banks (ie according to the location of banks' headquarters), netting out inter-office positions. For instance, if an Italian bank's Austrian subsidiary lends to a firm in Hungary, then the locational data set would register the loan as an Austrian claim on Hungary; by contrast, the consolidated data set would record it as an Italian bank's claim on Hungary.

Each of the two data sets has distinct advantages. On the one hand, in the locational data set, the quarterly changes in banks' cross-border claims are adjusted for exchange rate fluctuations. This is not the case in the consolidated data set, where the currency composition of cross-border claims is unknown. From this perspective, therefore, the locational data set is a better choice, since periods of large contractions in cross-border lending to EMEs tend to coincide with significant exchange rate movements.

On the other hand, the locational data set does not provide information on the nationality of lending banks. As a result, it cannot be used to identify the impact of potential home country constraints associated with individual banking systems. From this perspective, therefore, the consolidated data set is superior, as it can help to estimate banking system-specific home country factors.

Existing studies on the determinants of foreign bank lending to EMEs reflect these relative advantages. For instance, McGuire and Tarashev (2008) use the consolidated data set to construct the dependent variable in their model. As a consequence, they are able to study how the health of individual national banking systems affects foreign lending to EMEs, but at the expense of working with data that have not been adjusted for exchange rate fluctuations. By contrast, Takáts (2010) uses the locational data set in order to construct his dependent variable. As a result, he is able to work with exchange rate-adjusted cross-border lending flows, but cannot decompose the estimated global home country factor into banking system-specific factors.

Our approach is novel because it combines information from the locational and the consolidated data sets in a way that allows us to identify banking system-specific home country factors, while still working with exchange rate-adjusted flows. We acquire exchange rate-adjusted flows from the locational data set and employ the consolidated data set to assign weights to individual national banking systems in the construction of two financial sector stress indices, which allow us to link changes in currency-adjusted flows to individual national banking systems. While several previous studies have also used information from both of the above data sets to analyse cross-border bank lending to EMEs (McGuire and Tarashev (2008), McCauley et al (2010), Cetorelli and Goldberg (2011) and Avdjiev et al (2012)), ours is the first to relate exchange rate-adjusted cross-border bank lending flows to national banking systems.

Regression analysis

We estimate the impact of credit demand, host country risk and home country bank health on cross-border bank lending to 40 EMEs[2] in a panel regression. We focus on the period between the third quarter of 2005 and the second quarter of 2012. Our dependent variable is the quarter-on-quarter growth rate in BIS reporting banks' exchange rate-adjusted cross-border claims, obtained from the locational data set.

We construct three groups of explanatory variables. First, we use real GDP growth in the recipient country in order to identify credit demand. Second, we use EME sovereign credit default swap (CDS) spreads in order to assess the impact of perceived country risk. Finally, in order to identify home country factors, we construct two indices which measure the health of the banking systems which lend to a given EME. In both indices, we assign weights to banking systems based on

[2] Argentina, Brazil, Bulgaria, Chile, China, Chinese Taipei, Colombia, Costa Rica, Croatia, the Czech Republic, Ecuador, Egypt, Estonia, Hong Kong SAR, Hungary, India, Indonesia, Israel, Jordan, Korea, Latvia, Lithuania, Macedonia (FYR), Malaysia, Mexico, Morocco, Peru, the Philippines, Poland, Romania, Russia, Singapore, South Africa, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela and Vietnam.

their share of foreign claims on that EME. We obtain these foreign claims from the consolidated data set on an immediate borrower basis.

The first index (FI^{cds}) represents a weighted average of lending banking systems' CDS spreads. Formally, for borrower country *i* at time *t*, the index is defined as:

$$FI_{i,t}^{cds} = \sum_j \left(\frac{FC_{i,j,t-1}}{\sum_j FC_{i,j,t-1}} \right) CDS_{j,t} \qquad (1)$$

where $FC_{i,j,t-1}$ stands for the outstanding stock of foreign claims of banks headquartered in country *j* on the residents of country *i* at the end of period *t*-1 (obtained from the consolidated data set), and $CDS_{j,t}$ stands for the average bank CDS spread in country *j* during period *t*.

The second index (FI^{vol}) represents a weighted average of home country financial sector equity price volatilities. Formally, for borrower country *i* at time *t*, it is given by:

$$FI_{i,t}^{vol} = \sum_j \left(\frac{FC_{i,j,t-1}}{\sum_j FC_{i,j,t-1}} \right) \mathrm{VOL}_{j,t} \qquad (2)$$

where $FC_{i,j,t-1}$ is defined as above, and $VOL_{j,t}$ stands for the volatility of the financial sector equity sub-index in country *j* during period *t*.

The index weight assigned to each banking system is equal to its share in foreign lending to the respective EME. As a result, the indices are most sensitive to changes in the stress indicators for the banking systems that account for the largest share of foreign credit. For example, the values of the two indices for Mexico are most sensitive to changes in the stress indicators for Spanish banks, which account for the largest share of foreign lending to Mexican residents. Those same indices are much less sensitive to fluctuations in the stress levels of, say, Austrian banks, which account for a relatively minor fraction of the foreign credit in Mexico. The opposite is true for the relative weights assigned to those two banking systems in the indices for Hungary, where Austrian banks provide much more foreign credit than Spanish banks.

Equation (3) formalises the regression setup:

$$d\log XBC_{i,t} = \alpha + \beta d\log GDP_{i,t} + \gamma CDS_{i,t} + \delta FI_{i,t}^{cds} + \theta FI_{i,t}^{vol} + \nu_i + \varepsilon_{i,t} \qquad (3)$$

where $XBC_{i,t}$ is the outstanding stock of exchange rate-adjusted cross-border claims on country *i* at the end of period *t* (obtained from the locational data set), $GDP_{i,t}$ is the four-quarter moving average of real GDP of country *i* at period t, $CDS_{i,t}$ is the average sovereign CDS spread of country *i* during period *t*, FI^{cds}_{it} and FI^{vol}_{it} are the values of the financial sector stress indices for country *i* during period *t*, defined in equations (1) and (2), v_i are country-specific fixed effects, and ε_{it} is the error term.

The coefficient estimates from the regression are summarised in Table 1. The regression model is able to explain a substantial part of the total variation in the quarterly growth rate of cross-border bank lending to EMEs. All coefficients have the expected sign. Stronger GDP growth in a given EME implies higher cross-border

Regression results[1]

Sample period: Q3 2005 – Q2 2012 Table 1

Variables	Coefficient	Standard error	T-statistic	Probability
GDP growth (host)	1.6560	0.2587	6.40	0.0000
CDS (host)	–0.0025	0.0010	–2.54	0.0112
FI CDS (home)	–0.0151	0.0026	–5.69	0.0000
FI volatility (home)	–0.2873	0.1010	–2.84	0.0045
R squared	0.18			
Number of observations	1020			

[1] Regression results based on equation (3) in the main text.

Sources: BIS consolidated and locational banking statistics; Datastream; Markit; national data.

bank lending to its residents, while higher EME sovereign CDS spreads imply lower lending. Increased home country banking systems' stress levels, in terms of both CDS spreads and equity volatility, reduce cross-border bank lending.

All coefficients are statistically and economically significant. GDP growth and the two financial stress indices (FI^{cds} and FI^{vol}) are significant at the 1% level and the EME sovereign CDS spread at the 2% level. The estimated impact of individual independent variables is also substantial. For instance, a one percentage point increase in the real GDP growth rate in the host EME is associated with a 1.6 percentage point higher growth rate of cross-border lending to that country. A 100 basis point increase in the host EME sovereign CDS spread implies a 25 basis point decline in the growth rate of cross-border claims on that EME. Furthermore, a 100 basis point increase in the weighted average CDS spread of foreign creditor banks lowers the growth rate of cross-border credit to an EME by approximately 1.6 percentage points. Similarly, a one percentage point increase in the weighted average volatility of the financial sector equity sub-indices in the home economies reduces the growth rate of cross-border credit by roughly 30 basis points.

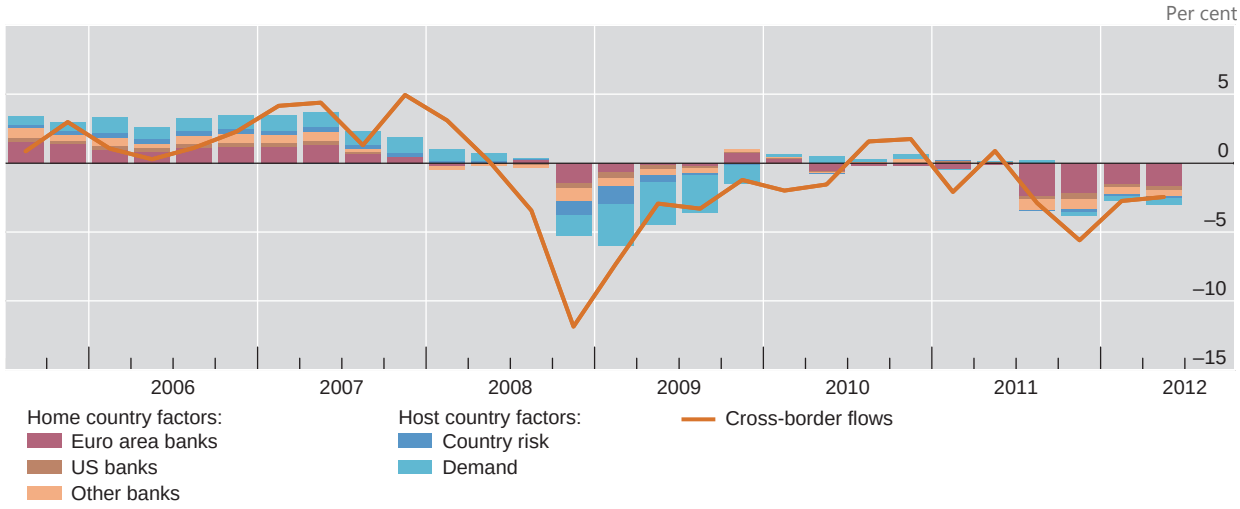
Decomposition analysis

We use the estimates from our regression model to decompose the fluctuations of cross-border claims on EMEs into contributions from credit demand factors, country risk factors and banking system-specific home country factors.[3] We sum the contributions of FI^{cds} and FI^{vol}, the two banking system-specific stress indices, in order to calculate their joint impact. We allocate this joint home country factor to three nationality-based groups of banks – euro area banks, US banks and other banks.

[3] In our decomposition analysis, we focus on deviations from trend. More precisely, we remove host country-specific trends in our dependent variable by subtracting from it the constant and the country-specific fixed effects. In order to obtain the contributions of the independent variables we multiply their de-meaned realisations by the respective estimated coefficients. Importantly, this transformation is used only to ease graphical exposition and has no impact on the results: by design, all coefficients, standard errors, t-statistics and p-values in Table 1 remain unchanged in the de-meaned regression.

Decomposition of cross-border bank flows to emerging markets

Based on the regression results in Table 1; average demeaned quarter-on-quarter changes — Graph 2



Sources: BIS consolidated and locational banking statistics; Datastream; Markit; national data; authors' calculations.

Graph 2 displays the decomposition of the de-meaned cross-border bank lending flows to EMEs. The orange line shows the average deviation of cross-border lending flows from their trend growth. The bars show the contributions of the various factors based on our estimates. Factors linked to home countries are shown in earth colours, while factors linked to host countries are represented by water colours. The gap between the bars and the line corresponds to the part of lending variation that our model does not explain, ie the role of the error term in the regression.

In line with the findings of McGuire and Tarashev (2008) and Takáts (2010), our estimates suggest that home country factors (red, brown and yellow bars combined) played a major role in driving cross-border bank lending to EMEs throughout the sample period. On average, they account for roughly half of the explained variation. The contributions of host country credit demand (light blue bars) and country risk (dark blue bars) were also significant, jointly accounting for the other half of the explained variation.

According to our estimates, the importance of home country factors increased sharply during the downturn in cross-border bank lending that took place in the second half of 2011. During this period, home country factors contributed to more than 90% of the explained contraction. By contrast, these factors accounted for only around one half of the explained contraction during the post-Lehman period.

Decomposing the estimated home country factors into impacts of national banking systems suggests that euro area banks (red bars) played a dominant role in the late 2011 contraction in cross-border bank lending to EMEs. Euro area banks were responsible for roughly 70% of the shrinkage attributed to home country factors. By contrast, the corresponding share during the post-Lehman period was approximately 40%. The results suggest that banking sector stress in the late 2011 downturn was disproportionately more concentrated on euro area banks than on their counterparts from the rest of the world. This finding confirms policy concerns, discussed for instance in BIS (2012a) and BIS (2012b), that deleveraging by euro area banks could substantially lower lending to EMEs.

Reflecting the heterogeneity of EMEs, there are significant differences among the patterns observed in the four major EME regions (Graph 3). In emerging Europe, the post-Lehman decline in cross-border bank lending was somewhat milder than average (upper left-hand panel). This could reflect European banks' commitment to the region and possibly the success of the Vienna initiative.[4] However, cross-border bank lending (orange line) remained well below its pre-Lehman trend during the subsequent recovery. And, in the second half of 2011, this weak growth turned into the largest plunge among EME regions. In fact, the late 2011 lending decline was comparable to the post-Lehman contraction in emerging Europe. Furthermore, lending growth also remained well below trend in the first half of 2012. Our decomposition suggests that euro area banks were mainly responsible for this

Decomposition of cross-border bank flows to emerging markets, by region

Based on the regression results in Table 1; average demeaned quarter-on-quarter changes, in per cent — Graph 3

[1] Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia (FYR), Poland, Romania, Russia, Turkey and Ukraine. [2] China, Chinese Taipei, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Thailand and Vietnam. [3] Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela. [4] Egypt, Israel, Jordan, Morocco, Tunisia and South Africa.

Sources: BIS consolidated and locational banking statistics; Datastream; Markit; national data; authors' calculations.

[4] The Vienna initiative, launched in January 2009, was a coordination effort that brought together international financial institutions, European institutions, regulatory and fiscal authorities and the largest banking groups operating in emerging Europe. Its main goal was to prevent a large-scale withdrawal of cross-border banking groups from the region.

decline, accounting for more than 85% of the explained contraction (red bars). Their elevated financial stress levels constrained lending to emerging Europe during this period even more than in the aftermath of the Lehman bankruptcy.

While emerging Asia experienced a very sharp decline in the post-Lehman period, cross-border bank lending recovered fast and remained strong compared to its trend until late 2011 (upper right-hand panel). Our estimates suggest that home country factors caused most of the explained contraction in cross-border lending to the region during the second half of 2011.

In contrast to emerging Asia and Europe, Latin America experienced only a modest slowdown in cross-border lending growth in the second half of 2011 (lower left-hand panel). Though our estimates suggest that home country factors associated with euro area banks had a negative impact on lending to the region, other factors offset this effect. In the Middle East and Africa (lower right-hand panel), home country constraints linked to euro area banks also seem to have lowered lending in late 2011, though substantially less than in emerging Europe.

In sum, our results show that home country factors related to advanced economy banks, especially to those in the euro area, led to substantial cross-border bank lending declines in the second half of 2011. The euro area crisis affected cross-border bank lending to emerging Europe particularly negatively.

Discussion

In this section we discuss several aspects of our methodology and results in order to place them in a proper context.

An important limitation of our methodology is that it provides indirect, rather than direct, evidence on the home country factors driving cross-border bank lending. More specifically, we do not use actual currency-adjusted data on bilateral cross-border flows since such data are not available. Instead, our results are based on an estimated econometric relationship which assigns an identical reaction to the same level of stress in all national banking systems. As a consequence, the strength of our results depends on the robustness of the estimates.

A potential concern, which applies to all similar empirical studies, is endogeneity. This does not seem to be a major concern for our home country variables. Over the past seven years, EME lending changes were unlikely to have significantly stressed any major banking systems, as EME lending represents a relatively minor fraction of those banking systems' international portfolios. Similarly, it is hard to believe that changes in international bank lending drove sovereign CDS spreads in EMEs. However, it is conceivable that a sharp decline in cross-border bank lending in a given quarter could have constrained investment or consumption, and thereby GDP growth, in some EMEs. In order to dispel this concern, we reran our regression model after lagging the host GDP variable by one quarter. All coefficients remained robust, suggesting that endogeneity, if present, does not substantially affect our results.

The precise regression setup and our choice of explanatory variables are also worth discussing. We use foreign claims, as opposed to cross-border claims, to determine the weights in our financial stress indices because consolidated cross-border claims would be misleading. The reason is that many internationally active

banks make cross-border loans to their EME subsidiaries, which then use the funds to lend locally. Such positions are reflected both in cross-border claims in the locational data and in foreign claims in the consolidated data. However, they are not included in the cross-border claims of the consolidated data, where intrabank positions are netted out.[5]

Furthermore, the simultaneous inclusion of the two financial stress indices may appear redundant since both of them are designed to capture banking system stress. Nevertheless, they capture two distinct aspects of bank stress. The bank equity volatility index captures fluctuations in risk aversion and uncertainty about banks' future earnings and dividends. The bank CDS spread index gauges the ability of banks to fund their cross-border asset holdings by issuing debt. These can be quite different, as indicated by the lack of empirical correlation between the two indices in our sample. This further suggests that multicollinearity is not an issue. In addition, all benchmark coefficient estimates remain robust to excluding either of the two indices.

As with any econometric model, one could think of expanding the regression framework to include additional drivers of cross-border bank lending to assess the robustness of the framework. One such additional variable could be EME equity price volatility, which might be seen as mirroring the financial sector equity volatility stress index. The inclusion of EME equity volatility does not substantially affect our other coefficients. By contrast, its own coefficient – though it has the right sign – is not statistically significant. In short, our regression model is robust to the inclusion of EME equity price volatility, but such inclusion is not warranted.

Another possibility would be to extend the model with a variable that captures global financial shocks. In fact, Takáts (2010) has shown that the VIX, as a global home country shock indicator, can explain a substantial part of the variation of cross-border bank lending, especially during the post-Lehman episode. This remains true in our sample: the VIX is a significant driver of cross-border bank lending. We could, in principle, extend the model to include the VIX, but only at the price of excluding our financial equity volatility stress index due to strong multicollinearity. Reassuringly, replacing the equity volatility stress index with the VIX leaves the estimated coefficients and main decomposition results virtually unchanged. However, we choose not to perform such a replacement in our benchmark model since it would eliminate a major advantage of our framework: its ability to attribute equity-related lending fluctuations to individual banking systems.

Finally, it is worth noting that the economic impact of cross-border bank lending on a given economy depends on its share in overall bank lending to that economy. In turn, this share depends both on the importance of foreign banks in financing the economy and on the importance of cross-border bank lending in the activity of foreign banks. For example, in Latin America foreign banks play a substantial role, but cross-border lending is a relatively less important part of their operations, because foreign banks tend to fund most of their lending to the region locally (McCauley et al (2010)). By contrast, in emerging Asia, cross-border lending represents a much larger part of the operations of foreign banks, but the overall role of foreign banks tends to be small (BIS (2011)). As a result, the economic

[5] Our results are robust to replacing our benchmark weight variable (ie foreign claims from the consolidated data set on an immediate borrower basis) with any of the following variables: (i) foreign claims from the consolidated data set on an ultimate risk basis; (ii) cross-border claims from the consolidated data set on an ultimate risk basis; and (iii) foreign claims less local liabilities in local currencies from the consolidated data set on an immediate borrower basis.

impact of fluctuations in cross-border lending to that region also tends to be moderate. Finally, cross-border bank lending is most important for emerging Europe. In that region, foreign banks play a dominant role in financing the economy and cross-border bank lending is also substantial. Thus, emerging Europe is the EME region in which a given percentage change in cross-border bank lending has the largest economic impact.

Conclusion

In this feature, we seek to identify the key drivers of cross-border bank lending to EMEs over the past seven years, with a special focus on the latest contraction in the second half of 2011. To do so, we introduce a novel methodology, which relies on combining data from the locational and the consolidated data sets of the BIS international banking statistics. This allows us to estimate the contributions of home country factors associated with individual national banking systems while working with cross-border lending flows that are properly adjusted for exchange-rate movements.

Our results indicate that home country constraints linked to advanced economy banks drove virtually the entire late 2011 plunge in cross-border bank lending to EMEs. Moreover, our estimates suggest that euro area banks were responsible for around 70% of the decline attributed to home country factors. The impact of euro area banks was particularly large in emerging Europe, where they accounted for over 85% of the explained lending decline in the second half of 2011.

Our findings confirm policy concerns that international banks might transmit financial shocks from advanced to emerging economies. While financial links to advanced economy savings, markets and technology are likely to benefit EMEs, the very same links could also serve as propagation channels for advanced economy shocks. Furthermore, a large concentration of cross-border lending from a small group of advanced economy banking systems exposes EMEs to country- or region-specific shocks. In this regard, our results suggest that the latest pullback in cross-border lending activity was the most severe in those EMEs, such as the countries of emerging Europe, that were the most dependent on euro area banks.

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