CHAPTER 2

INTERNATIONAL BANKING AFTER THE CRISIS: INCREASINGLY LOCAL AND SAFER?

SUMMARY

Two developments stand out among the changes in international banking since the global financial crisis. First, direct cross-border lending as a share of total banking assets has declined, mostly because of the retrenchment of European banks. Second, the share of local lending by foreign bank affiliates has remained steady. Global banks in particular have refocused their activities on some key markets, leaving space for other banks to expand. As a result, intraregional financial linkages have deepened, especially in Asia.

Although the cutback in cross-border lending was triggered by the crisis, regulatory changes and weaknesses in bank balance sheets have contributed significantly to the subsequent retrenchment. Better-capitalized banks were more likely to maintain cross-border lending. Macroeconomic factors have also played a role.

The relative shift on the part of foreign banks away from cross-border lending and toward more local lending through affiliates has a positive effect on the financial stability of host countries. Cross-border lending compounds adverse domestic and global shocks. In contrast, foreign-owned subsidiaries, particularly those with better-capitalized parent banks, tend to behave less procyclically than domestic banks around domestic crises.

In principle, international banking has benefits that are not examined in this chapter. For example, global banks contribute to the allocation of global savings across countries, with positive effects on investment and growth. The reduction in cross-border lending may diminish some of those benefits.

Policymakers should therefore strive to maximize the benefits of international banking while mitigating risks. The findings of this chapter lend support to recent financial reforms that strengthen the resilience of global banks. They also emphasize the need for more international cooperation to deal with regional or global shocks.

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Introduction

International banking has changed since the global financial crisis. Two developments stand out. International banks, especially European ones, have reduced their cross-border lending, that is, their direct lending to non-affiliated entities in other countries. At the same time, loans extended locally by banks' affiliates abroad have remained steady. Other changes include a retrenchment of international banks from certain market segments, the emergence of new actors to fill the resulting gaps, and some regionalization where global banks are replaced by ones with a more regional focus.

The drivers of these changes have been both internal and external to the banking sector. The sharp and prolonged process of deleveraging of banks and households since 2008 has had a strong effect on credit supply and demand. Large U.S. and European banks have been cleaning up their balance sheets and selling legacy assets while trying to reduce their reliance on less stable funding sources, such as short-term wholesale funding. At the same time, banks have been pressed by supervisors to shore up capital, while abstaining from reducing domestic credit supply. Different economic conditions across countries and recent financial reforms, such as those aiming at restricting certain types of operations by banks, as well as new capital and liquidity standards, have also affected banks' global operations and their organizational structure.

The reduction in cross-border banking flows can in principle have opposite effects on financial stability. The retrenchment in cross-border lending may reduce risk sharing and diversification for banking groups (Allen and others 2011), because investing or lending abroad allows banks to reduce their exposure to domestic shocks (Schoenmaker and Wagner 2011). From the perspective of recipient countries, cross-border lending may also lower the volatility of domestic credit because foreign banks, which are less exposed to domestic shocks, are more able to withstand local stress. Then again, cross-border flows are also likely to contribute to the transmission of foreign shocks and may thus increase volatility (Bruno and Shin, forthcoming; IMF 2014c). For example, deleveraging by international banks can reduce funding sources for banks in host countries. These banks in turn may be forced to contract lending even in the absence of domestic credit problems. Moreover, cross-border lending is often seen as less stable than local lending through local subsidiaries and branches (Schnabl 2012), partly because host countries can restrict the ability of parent banks to withdraw liquidity from their subsidiaries.[1] The overall financial stability effect of the observed patterns of changes in global banking is therefore unclear without further examination.

This chapter provides a comprehensive picture of recent changes in international banking, analyzes what is driving those changes, and investigates the potential consequences for financial stability. The results should not be interpreted as providing a full cost-benefit analysis of the changing patterns of banking globalization. In particular, the role of international banks in the global allocation of savings and in contributing to financial deepening is not explored.[2]

The analysis finds that, jointly with bank balance sheet weaknesses, regulatory changes can explain a substantial portion of the decline in the ratio of cross-border claims to GDP between the precrisis and postcrisis periods. The results are based on data collected in a survey conducted specifically for this chapter. Macroeconomic factors, including monetary policy factors, have also played a role.

The financial stability implications of the relative shift away from cross-border lending and toward more local lending by branches and subsidiaries may be positive from the perspective of host countries. A comparison reveals that cross-border banking flows have historically been much more volatile and sensitive than portfolio flows to global financial conditions. Consequently, a reduction in their relative importance is likely to reduce the global transmission of volatility and contagion. The analysis also finds that cross-border lending is associated with a strong transmission of global shocks to domestic banking systems, and does not help dampen local shocks. By contrast, confirming existing findings in the literature, the chapter finds that local lending by foreign subsidiaries is more resilient in the face of domestic shocks.

The strengthening of regional linkages, particularly in Asia, implies a heightened exposure to shocks emanating from within the region. It also means that shocks originating outside the region can propagate faster within the region once they hit a country's

[1]The shift toward local funding may also enhance the effectiveness of monetary policy by tightening the link between domestic interest rates and credit supply (Forbes 2014).

[2]For example, foreign bank presence is also often associated with greater efficiency and competition in host countries' banking sectors (Claessens and Laeven 2004; Cull and Martínez Pería 2010). Enhanced competition in turn may also affect financial stability; these issues are not explored here.

banks. This prospect may call for a strengthening of regional safety nets to address idiosyncratic and regional shocks.

Financial reforms that contribute to strengthening the soundness of parent banks can help limit the transmission of negative foreign shocks by affiliates of foreign banks. Increased cooperation among national regulators and supervisors—not only in matters of cross-border resolution, but also on the implementation of Basel standards and on accounting standards—is key to reconciling banking globalization with financial stability.

What Has Changed?

From Cross-Border Banking to Multinational Banking

Cross-border bank lending has declined since the global financial crisis, while international banks have shifted their international business models toward more local operations. Cross-border claims as a share of total banking assets of host countries have not recovered to their precrisis level (Figure 2.1, panel 1).[3] Local loans extended by affiliates of foreign banks did fall slightly in 2007 and 2008 but have since stabilized. Their share in total foreign claims (the sum of cross-border claims plus loans extended through affiliates abroad) has thus grown from less than 43 percent to about 49 percent. Most of those loans are in local currency; their share rose mildly after the crisis, most likely because of foreign currency funding pressures (McGuire and von Peter 2009), and has not returned to its precrisis level even after the pressures abated (Figure 2.1, panel 2).

The shift from cross-border banking to multinational banking with more local and likely locally funded operations is more pronounced in some banking systems than in others. McCauley, McGuire, and von Peter (2012) show that global French and Spanish banks in particular have increased the share of their local operations whereas internationally operating Japanese banks continue to conduct mostly cross-border operations. Differences in business models can be related to differences in funding models. Multinational banks tend to rely less on wholesale funding and were thus less affected by disruptions in the wholesale funding market during the crisis.

One question is whether the precrisis level of cross-border claims reflected an anomaly—that is, the outcome of a temporary, unsustainable boom. Although this question extends beyond the scope of the chapter, it is worth noting that international claims (which include cross-border claims and local claims of foreign bank affiliates in foreign currency—see Figure 2.2) grew steadily between 2002 and 2007, with the growth rate picking up only somewhat in 2007 (Figure 2.1, panel 1). This at least indicates that the observed levels in 2007–08 were part of a longer-term trend (which may well have been unsustainable).

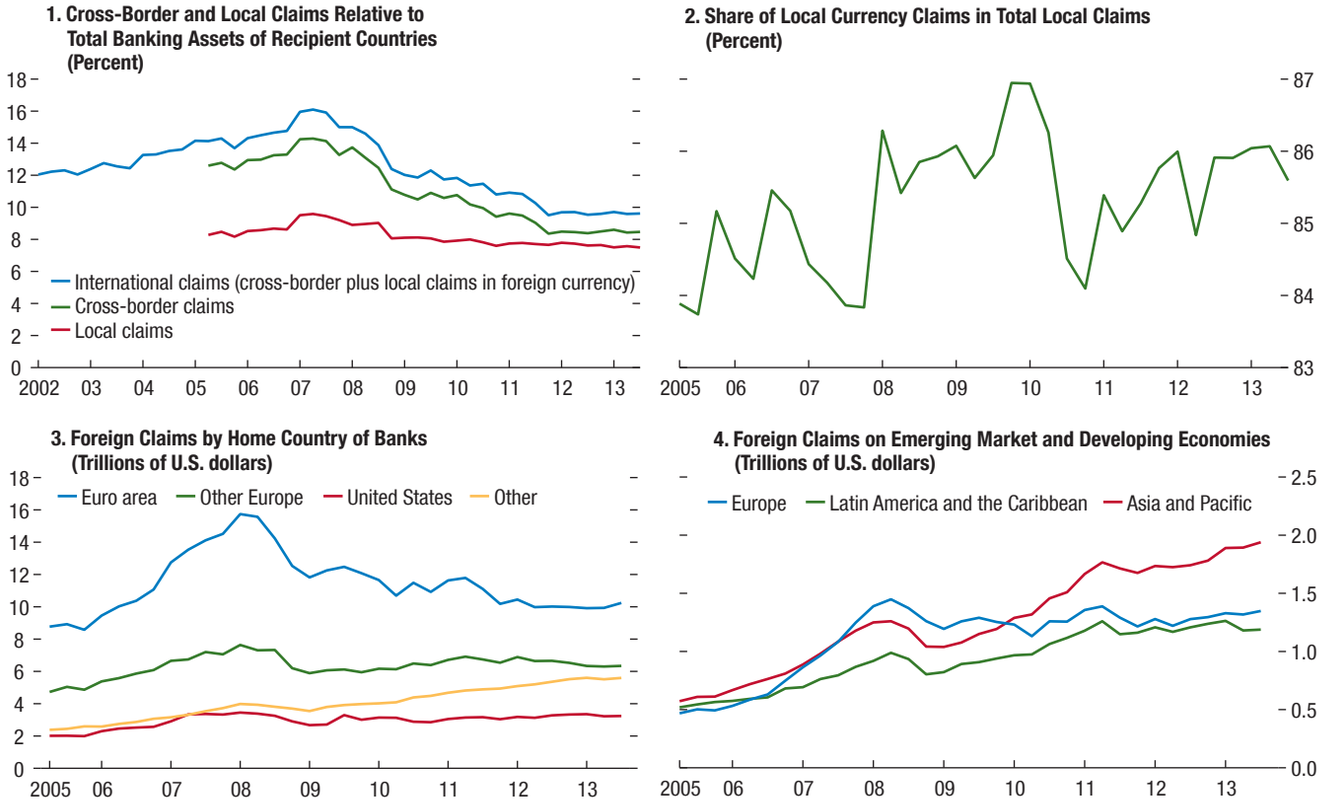
The reduction in cross-border lending and lending through affiliates is mainly due to euro area banks; banks from other areas have only partially offset that reduction (Figure 2.1, panel 3). Foreign claims of European banks dropped sharply in the wake of the global crisis and have continued to decline since then. The drop in claims from euro area banks has been general across all regions of the world. Claims vis-à-vis non-euro-area countries have dropped more than intra-euro-area claims. U.S. and U.K. banks also retrenched in 2008, but their foreign claims have partially recovered. Foreign claims from other areas, particularly from Japan, have grown quickly.

Foreign claims on emerging market and developing countries dropped in all regions in 2008 and have exhibited different recovery patterns. Claims on the Asia and Pacific region have nearly doubled since their 2008 trough (Figure 2.1, panel 4). Those on Latin America and the Caribbean have also exceeded their precrisis peak, although growth has slowed since 2011. Meanwhile, outstanding claims on emerging and developing Europe are still hovering slightly below their precrisis levels.

Overall, international banks have somewhat reduced the number of branches and subsidiaries they hold abroad. Based on a sample of 64 countries, including both advanced and emerging market economies, the total number of affiliates of foreign banks shrank by about 5 percent between 2008 and 2013. The drop essentially comes from a reduction in the number of subsidiaries, especially in the European Union, while the total number of branches has risen marginally

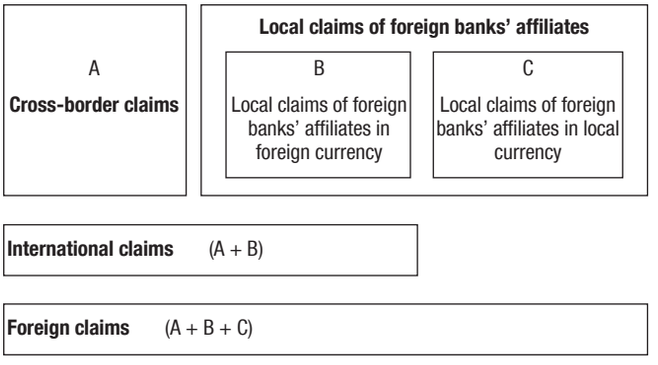
[3]Strictly speaking, "banking claims" include not only loans but also deposits with other banks and holdings of securities and participations. Following the Bank for International Settlements' terminology, "foreign banking claims" are defined as the sum of "cross-border claims" (for example, a direct loan of a bank in a given country to a firm in another country) and "local claims" of affiliates of foreign banks in local or foreign currency (for example, a loan from a branch or subsidiary of a foreign bank in a given country to a firm in that same country). "International claims" include cross-border claims and only the part of local claims denominated in foreign currency. See Figure 2.2. This chapter considers claims reported on a consolidated basis; that is, intragroup positions are netted out.

Figure 2.1. Developments in Foreign Banking Claims



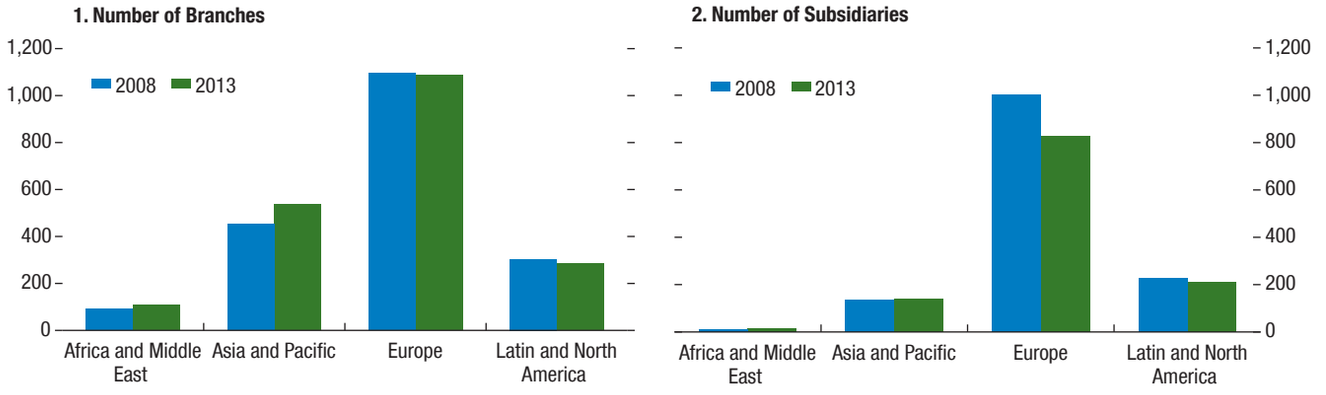
Sources: Bank for International Settlements (BIS), Consolidated Banking Statistics; IMF, International Financial Statistics database; and IMF staff calculations.
Note: Claims include deposits and balances placed with other banks, loans and advances to banks and nonbanks, and holdings of securities and participations. Foreign claims are the sum of cross-border claims and local claims of affiliates of foreign banks. International claims include cross-border claims and local claims in foreign currency. In panel 1, the ratios are calculated by dividing claims of all BIS reporting countries by total bank assets for all host countries with available data for each period. In panel 2, the share of local claims in local currency is estimated by dividing local claims in local currency on an immediate risk basis by the total local claims on an ultimate risk basis, after correcting for the difference in foreign claims in the two bases. Panels 1, 3, and 4 are based on ultimate risk basis data. The data in panels 1, 2, and 3 are adjusted for statistical breaks following Cerutti (2013). The observation period ends in 2013:Q3. In panel 3, "Other" consists of Australia, Canada, Chile, India, Japan, Singapore, Taiwan Province of China, and Turkey.

Figure 2.2. Types of Claims in Bank for International Settlements Consolidated Statistics



Source: Cerutti, Claessens, and McGuire 2012.
Note: Cross-border claims and total local claims of foreign banks' affiliates are reported on an ultimate risk basis (that is, allocated to the country in which the final risk lies) whereas international claims are compiled on an immediate risk basis (allocated to the country of residence of the immediate counterparty). Cross-border claims do not include intragroup positions. See Annex 2.1.

Figure 2.3. Number of Branches and Subsidiaries of Foreign Banks in 2008 and 2013, by Region



Sources: National authorities; and IMF staff estimates.
Note: Africa and Middle East = Bahrain, Botswana, Israel, Jordan, Kuwait, Nigeria, Oman, Qatar, Saudi Arabia, South Africa, United Arab Emirates; Asia and Pacific = Australia, China, Hong Kong SAR, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand; Europe = Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom; Latin and North America = Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Paraguay, Peru, and the United States. See Fiechter and others 2011.

(Figure 2.3). There is no evidence of increased subsidiarization at the expense of branches.[4] Since 2008, only 7 of the 64 sample countries experienced an increase in the number of foreign subsidiaries and a simultaneous decline in the number of foreign branches.

The decline in the number of foreign affiliates partially reflects the refocusing of global banks' international operations on core markets and businesses. Having strengthened their balance sheets and reduced risk exposures to meet risk-based requirements, global banks are reallocating capital to core businesses and markets, shrinking capital markets activities, rebalancing their business models away from capital-intensive activities to more fee-based businesses, and refocusing their geographical presence on fast-growing markets (Claessens and van Horen 2014) or on markets in which they have a competitive edge (see Chapter 1 of the October 2014 *Global Financial Stability Report*).

[4]Operating in the form of a subsidiary versus a branch has legal implications. Subsidiaries are entities legally independent from the parent bank and have to fulfill regulatory requirements, including capital and liquidity ratios, on a stand-alone basis in the host country. In addition to consolidated supervision by the home supervisor, subsidiaries are regulated and supervised by the authorities in the host country. In contrast, branches are an integral part of the parent company and are typically subject to more limited supervision by host supervisors (Fiechter and others 2011; IMF 2013b). Host country authorities generally prefer the subsidiary model, and some countries are implementing measures that require foreign banks to operate as subsidiaries under certain conditions.

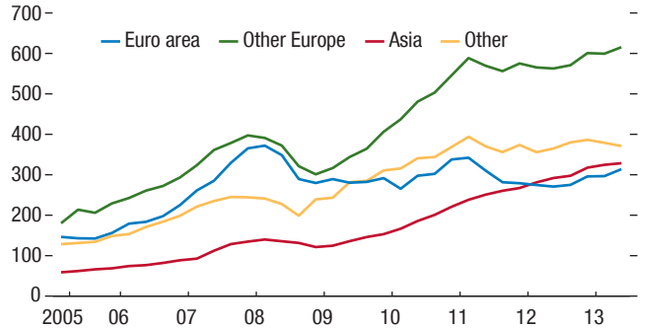
A Trend toward Regionalization?

The reduction in the exposures of euro area banks to some regions has left a gap that local banks have, at least partially, filled. In Asia in particular, the retrenchment of euro area banks has been accompanied by increased regionalization. According to data from the Bank for International Settlements (BIS), foreign banking claims of euro area banks in the emerging and developing Asia and Pacific region have declined since 2008 and have not recovered to their precrisis level, despite the region's high growth (Figure 2.4, panel 1). This decline has been more than offset by the expansion of banks from Asian countries, particularly Japan. The increase in claims of other European countries, which likely reflect those of British banks with a very large Asian presence, such as HSBC and Standard Chartered, was remarkable in 2009 and 2010, but growth has since slowed. Claims of Chinese banks are not reported to the BIS, but anecdotal evidence suggests a significant increase.

An analysis of Asian banks' geographical allocation of assets shows an increased concentration in the region. The share of regional assets more than doubled between the precrisis and postcrisis periods, rising from about 10 percent to close to 20 percent of total assets, whereas the share of domestic assets declined from 84 percent to 73 percent (Figure 2.4, panel 2). These changes reflect in particular the recent

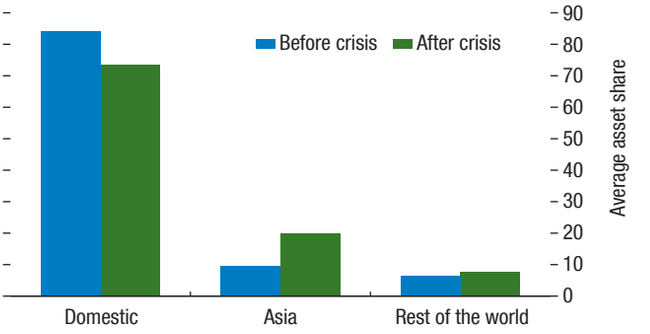
Figure 2.4. Banking Regionalization in Asia

1. Foreign Claims on Emerging Market and Developing Asia and Pacific by Home Country of Banks (Billions of U.S. dollars)



Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Foreign claims are the sum of cross-border claims and local claims of affiliates of foreign banks. "Asia" consists of Australia, India, and Japan. "Other" consists of Canada, Chile, Turkey, and the United States. The panel is based on ultimate risk basis data. China does not report its banking claims to the Bank for International Settlements.

2. Geographic Breakdown of Assets of Asian Banks (Percent)



Sources: Datastream/Worldscope; and IMF staff calculations.
Note: Average geographic breakdown of Asian banks' assets as a percentage of their total assets before and after the global financial crisis (from 2002 to 2007 and from 2008 to 2013, respectively).

internationalization and regionalization of Chinese banks (see Box 2.1 for a comparison of the internationalization strategies of Chinese and Japanese banks).

Other regions of the world do not show a comparable degree of regionalization. In Latin America, the retrenchment of European banks was short-lived and has been accompanied by an increase in lending by U.S., Canadian, and Latin American banks. Colombian banks, for instance, have aggressively expanded in Central America.[5] In emerging Europe, the share of European banks in total foreign claims declined slightly, reflecting both the deleveraging that took place in the region in the aftermath of the crisis and the effect of the Vienna Initiative in preventing a sudden and massive reduction in cross-border financing (Figure 2.5, panel 2). In Africa, the rapid regional expansion of pan-African banks in recent years has contributed to increasing cross-country linkages across that continent (Box 2.2).

Correlation networks based on banks' stock returns illustrate patterns in financial interconnections across different markets.[6] Figure 2.6 shows the networks in 1998–2007 and 2010–14 using data from both advanced and emerging market and developing economies. Each colored square represents a bilateral correlation between two banks' stock returns after removing the effect of strong common factors (for instance, a shock to the whole banking industry). Significant correlations tend to be clustered by countries and regions, which underscores the importance of local factors such as common balance sheet or market exposures, common accounting practices, or technological linkages. More than 90 percent of the significant correlations in both periods are between banks within the same region. Although most banks are not directly connected to one another, the combination of strong linkages within countries and regions and the presence of a few cross-regional links (via so-called hub banks) may allow for rapid transmission of shocks across regions.

[5]Colombia does not report international banking statistics to the BIS; the regional expansion of Colombian banks is therefore not reflected in Figure 2.5, panel 1.

[6]The correlation networks used in this section are derived from spatial-econometric techniques described in Saldías and Craig (forthcoming) and Bailey, Holly, and Pesaran (forthcoming), applied to banks' daily stock returns. These networks are obtained by applying first spatial dependence methods to detect and filter the effects of strong common factors and then a thresholding procedure to select the significant bilateral correlations.

Intraregional linkages increased in the postcrisis period in Europe, Middle East, and Africa (EMEA) countries and especially in Asia. Cross-regional linkages, represented by colored squares outside the diagonal blocks in Figure 2.6, were more frequent during the precrisis period (1998–2007). EMEA banks in particular exhibited many linkages with banks in Asia and the Americas, which contributed to the propagation of the crisis across regions. The regionalization of banking linkages since 2010 partially reflects increased correlations within countries, illustrated by a larger concentration of colored squares within each diagonal block, especially in Asia, but also actual growth in the share of regional cross-country interconnections after the crisis.

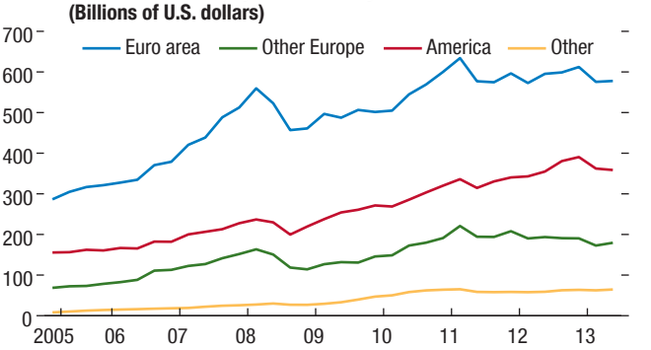
Changes in Corporate Borrowing

The decline in cross-border lending by banks has been accompanied by a surge in international nonfinancial corporate bond issuances (Figure 2.7, panel 1). This surge has been driven to a large extent by the rapid increase in bond issuances from emerging markets (see Chapter 1 of the October 2014 *Global Financial Stability Report*). Faced with bank credit constraints, firms, especially large ones, may have turned to capital markets to obtain financing. The low level of interest rates has also encouraged risk taking by private investors and fueled the demand for higher-risk debt securities. One question is to what extent the reduction in cross-border banking and the expansion in direct capital market borrowing by nonfinancial firms may have affected their borrowing costs.

All else equal, a less globalized banking system may imply greater heterogeneity of bank funding costs for firms across countries. The decline in cross-border lending may limit arbitrage opportunities for firms and reduce competitive pressures for domestic banks when capital markets are shallow. It also makes lending interest rates more dependent on the condition of the domestic banking sector. The cross-country divergence of bank lending rates was one of the features of the euro area crisis and the main sign of the fragmentation of euro area financial markets (see Box 2.4 and Chapter 1 of the October 2013 *Global Financial Stability Report*). Higher dispersion of corporate borrowing costs at the global level would potentially have adverse consequences for private investment in some countries because firms with profitable investment opportunities may struggle to obtain funding

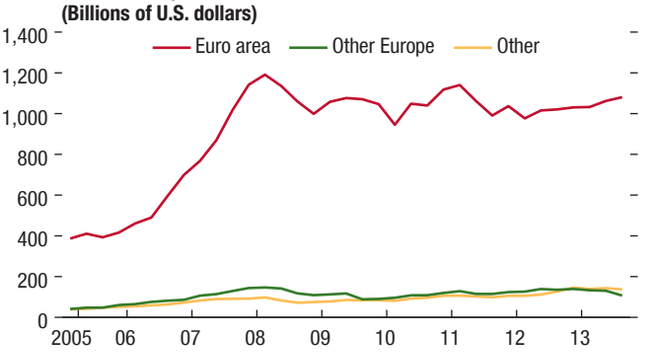
Figure 2.5. Trends in Latin America and Europe

1. Foreign Claims on Emerging Market and Developing Latin America and the Caribbean, by Home Country of Banks (Billions of U.S. dollars)



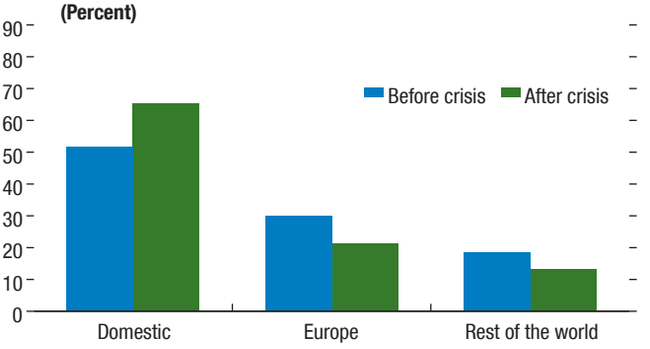
Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Based on ultimate risk basis data. "America" consists of Canada, Chile, and the United States. "Other" consists of Australia, India, Japan, and Turkey.

2. Foreign Claims on Emerging Market and Developing Europe, by Home Country (Billions of U.S. dollars)



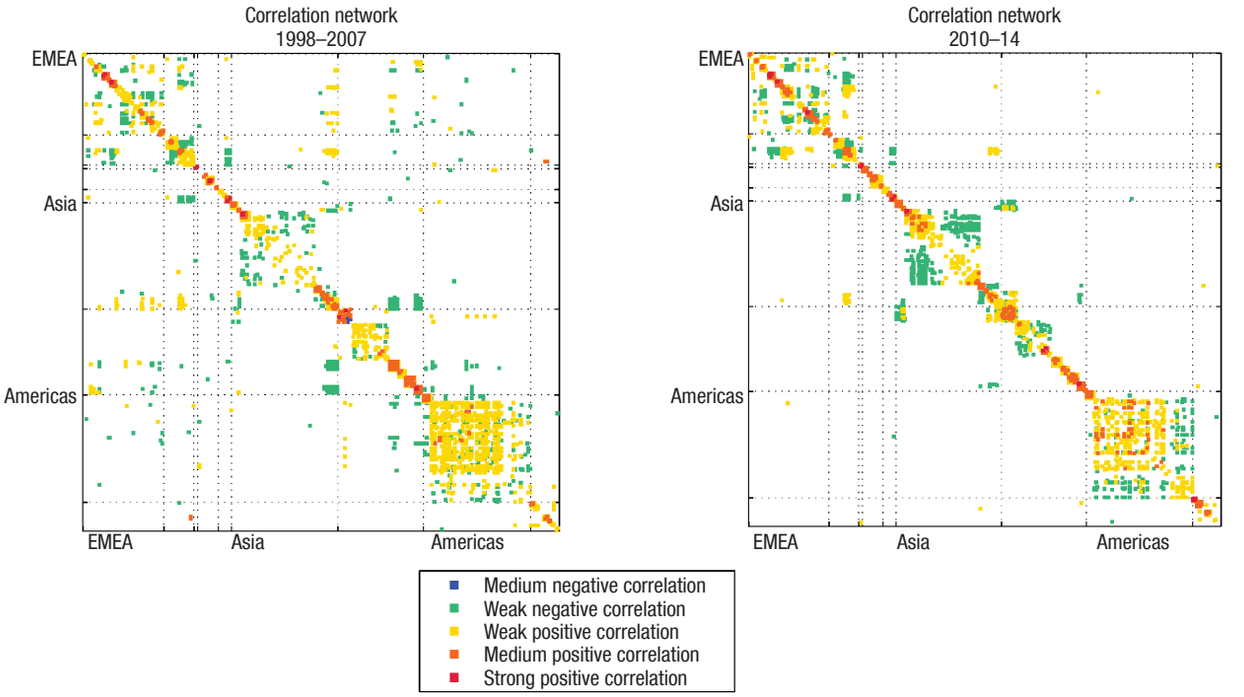
Sources: Bank for International Settlements, Consolidated Banking Statistics; and IMF staff calculations.
Note: Based on ultimate risk basis data. "Other" consists of Australia, Canada, Chile, India, Japan, Turkey, and the United States.

3. Geographic Breakdown of Assets of European Banks (Percent)



Sources: Datastream/Worldscope; and IMF staff calculations.
Note: Average geographic breakdown of European banks' assets as a percentage of their total assets before and after the global financial crisis (from 2002 to 2007 and from 2008 to 2013, respectively).

Figure 2.6. Precrisis and Postcrisis Geographic Correlation Networks from Banks' Stock Returns



Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: The networks are constructed from daily stock returns of 506 banks located in 62 countries. Each colored square represent a bilateral correlation between two banks after removing the effect of strong common factors. The matrix is symmetric, which allows for identifying clusters by square areas. The banks are grouped into nine sub-regions and three regions (Europe, Middle East, and Africa; Asia; and Americas), then sorted by country (alphabetically) and size (market capitalization) within each region. The nine sub-regions are advanced European economies, emerging and developing Europe, Commonwealth of Independent States, advanced Asian economies, emerging and developing Asia, advanced American economies, Latin America and the Caribbean, Middle East, North Africa, Afghanistan, and Pakistan, and sub-Saharan Africa. The sub-regions follow the country classification in the *World Economic Outlook*. EMEA = Europe, Middle East, and Africa.

or face higher borrowing costs as a result of lower banking competition. Panel 2 in Figure 2.7 illustrates the changes in the dispersion of manufacturing firms' borrowing costs since 1990, after accounting for firm and country characteristics.[7]

There is no clear evidence of increased dispersion of corporate borrowing costs following the global financial crisis. Corporate borrowing costs have converged across countries since 1990, in line with the rise of financial globalization. The recent changes in international banking patterns described in this chapter do not seem to have reversed this trend. Although the cross-country dispersion of corporate funding costs seemingly rose slightly after 2008 and again after the debt crisis in Europe in 2011, it has recently declined.[8] However, in euro area countries, the dispersion of corporate borrowing costs did rise after 2008 compared with the precrisis period.

Summary

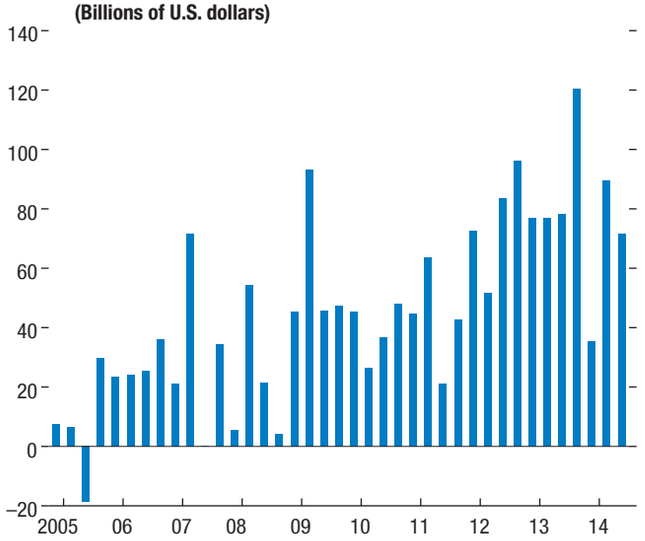
Cross-border lending is the dimension of global banking that has shrunk most sharply since the global financial crisis. Local claims of affiliates of foreign banks have remained more resilient despite an overall reduction in the number of foreign subsidiaries and branches. Euro area banks retrenched the most. Where they were replaced by other, more regionally focused

[7]This dispersion is interpreted as a sign of financial frictions that distort the allocation of resources among firms (Gilchrist, Sim, and Zakrajšek 2013).

[8]Because the borrowing cost measure is backward looking (it represents the average interest cost on outstanding debt and not the cost on newly obtained loans), the estimation does not capture the most recent changes in borrowing costs.

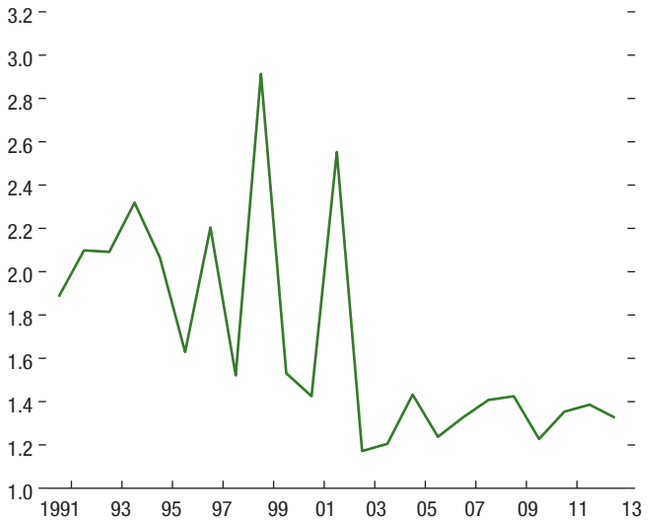
Figure 2.7. Changes in Corporate Borrowing

1. Net Issues of International Debt Securities by Nonfinancial Corporations
(Billions of U.S. dollars)



Sources: Bank for International Settlements, Debt Securities Statistics; and IMF staff estimates.

2. Cross-Country Dispersion of Corporate Borrowing Costs
(Percent)



Sources: Datastream/Worldscope; IMF staff estimates.
Note: The figure plots the standard deviation of median manufacturing firms' borrowing costs across countries, after accounting for firm and macroeconomic characteristics, including country risk. The two spikes in the figure correspond to the years following the Asian crisis in 1998, and the Argentine crisis in 2001. Corporate borrowing costs are computed from listed firms' balance sheet and income statement data as the ratio of firms' interest expenses to total debt.

banks, international banking linkages have become more regional. Yet these developments do not seem to have led to a larger dispersion of corporate borrowing costs.

The Drivers of the Changes in International Banking

Changes in Regulations on Banks' International Operations

This section examines the drivers of the previously described changes in international banking. The analysis builds on the results of a confidential survey about the regulations applicable to banks' international operations in both home and host countries (see Annex Table 2.1.1 for a list of the survey questions). Answers were collected from bank supervisors in 40 countries that are among the top recipients of international banking claims according to BIS data.[9]

The survey results show that many countries tightened regulations on banks' international operations or strengthened their supervision between 2006 and 2014, while a more limited number loosened them (Figure 2.8). The supervisory authorities in many countries are now more likely than before to limit banks' activities—for instance, by imposing ring-fencing measures in a discretionary way. Many resolution authorities obtained more powers over local branches of foreign banks. Some countries amended banking secrecy laws to enhance information sharing about banks' operations and balance sheets with foreign supervisors. In contrast, a few countries have loosened regulations regarding foreign banking presence (for example, conditions for a foreign bank's acquisition of a domestic bank) and activity (for example, cross-border lending and borrowing).

The proportion of countries that tightened their regulations on banks' international operations is higher in advanced economies than in emerging market economies (Figure 2.9). There is, however, little evidence that countries that experienced

[9]Survey respondents were Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Croatia, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, Indonesia, Ireland, Italy, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Portugal, Romania, Russia, Saudi Arabia, Singapore, the Slovak Republic, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom, and the United States.

Box 2.1. The International Expansion of Chinese and Japanese Banks

This box compares the international expansion strategies of Chinese and Japanese banks and discusses some implications for financial stability.

Banks headquartered in China and Japan expanded rapidly after the global financial crisis. Strong balance sheets, growth opportunities outside the domestic economy, and the retrenchment of euro area and U.S. banks from Asia have been common factors behind their international expansions. However, their growth also differs in several important ways, including scales, business lines, and funding patterns.

The scale of international expansion

Japanese banks and, to a more limited extent, Chinese banks, have increased their assets and loans overseas as a share of total assets and loans, respectively (Figure 2.1.1). From 2009 to 2013, the average ratio of overseas loans to total loans for the three largest Japanese banks rose from 15 percent to about 26 percent.[1] The same numbers for the four largest Chinese banks were 6.1 percent and 9.2 percent.

This box was prepared by Kai Yan.

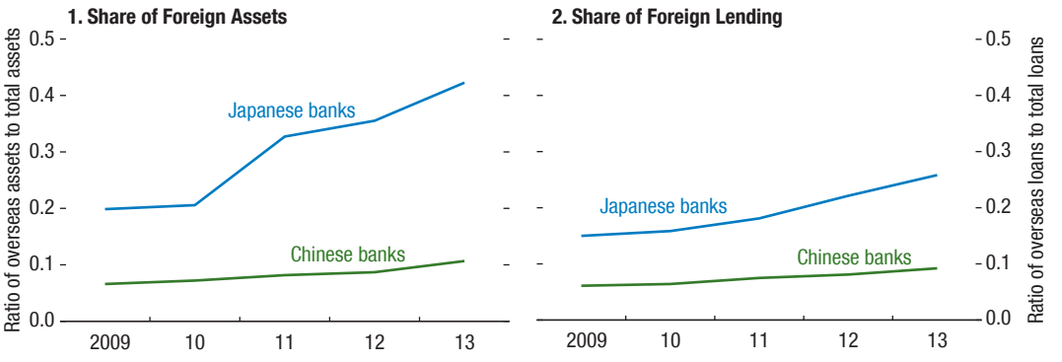
[1]The data set includes the four largest banks in China (Industrial and Commercial Bank of China, China Construction Bank, Bank of China, and Agricultural Bank of China), and the three largest banks in Japan (Mitsubishi, Mizuho, and Sumitomo). Mizuho does not report assets and liabilities based on geographic segments. The average for Japanese banks in Figure 2.1.1, panel 1, and Figure 2.1.3, panel 2, is thus computed using data for the two remaining banks.

Although Chinese banks expanded rapidly after the financial crisis, their global business is still limited in scale and much smaller than that of Japanese banks, which were among the world's biggest creditors before the Japanese banking crisis of the late 1990s. The internationalization of Chinese banks remains primarily driven by a follow-your-customer strategy. In contrast, limited domestic growth prospects and new business opportunities abroad for Japanese banks, particularly following the retrenchment of European banks, added incentives for them to expand abroad (Lam 2013). The degree of internationalization also varies greatly among the four largest Chinese banks. The proportion of both international assets and international loans has exceeded 20 percent for the Bank of China, but is still less than 5 percent for the Agricultural Bank of China.

Business models and expansion strategies

Both Chinese and Japanese banks generate major portions of their revenues abroad from net interest income (Figure 2.1.2). For Chinese banks, corporate loans amount to more than 80 percent of the total loan portfolio, with most of them coming from Chinese customers' foreign subsidiaries. For Japanese banks, which showed resilience during the global financial crisis and which benefit from strong capital buffers, longer-term project finance and syndicated lending have also played a major role in their overseas expansion.

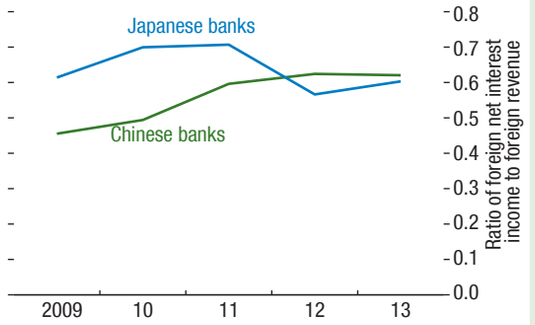
Figure 2.1.1. The Internationalization of Chinese and Japanese Banks



Sources: Banks' annual reports; and IMF staff estimates.

Box 2.1 *(continued)*

Figure 2.1.2. Ratio of Foreign Interest Income to Foreign Revenue for Chinese and Japanese Banks



Sources: Banks' annual reports; and IMF staff estimates.

Japanese banks have also expanded assertively in non-lending activities. Overseas business strategies differ across banks, however. Mizuho Bank, which experienced 240 percent growth in foreign non-interest income in the past three years, emphasizes its syndicated loan business as one of the main sources of fee income. The revenue generated by Mitsubishi's three business lines (foreign exchange, corporate and investment banking, and fees and commissions), grew by 33 percent during the past three years.

Similarly, expansion strategies differ for the leading banks in the two countries. Chinese banks tend to expand their global presence through organic growth by opening foreign offices and branches. The increase in their business coverage mainly occurred in their subsidiaries in Hong Kong SAR.[2] In contrast, Japanese banks have completed major mergers and acquisitions to expand globally. The three Japanese megabanks combined spent more than 1 trillion yen acquiring foreign companies between 2012 and 2014. The acquisition targets range from banks to asset management companies.

[2]For example, of the 623 overseas affiliates of the Bank of China, almost all of those outside of mainland China and Hong Kong SAR are overseas branches and offices. Besides the traditional deposit, loan, and payment business conducted by those branches, all the other banking business abroad is conducted by Bank of China International, which is in Hong Kong SAR.

Funding pattern vulnerabilities

The risks of foreign expansion for banks can come from both the asset and liability sides. Such risks can stem from the concentration of exposure to certain countries and certain industries, or from dependence on unstable funding sources. This section focuses on funding vulnerabilities.

For Japanese banks, the overseas loan-to-deposit ratio is about 1.3, with little variation across banks (Figure 2.1.3). Chinese banks' average overseas loan-to-deposit ratio increased from about 1.5 to more than 2 during the past five years. The rise was primarily driven by the growth of the ratio for the Agricultural Bank of China, the least globalized of the four largest Chinese banks. At the opposite end, Bank of China, which is the most international of the four, has a loan-to-deposit ratio of less than 1. The inverse correlation between Chinese banks' foreign loan-to-deposit ratios and the degree of international activity suggests that the least globalized banks embarked on aggressive strategies to expand overseas.

Another indicator of vulnerability is the ratio of total overseas liabilities to overseas deposits, which measures banks' dependence on funding sources other than local deposits for their operations abroad. The overseas total liabilities-to-deposits ratio for Chinese banks has been rising steadily since 2009, indicating a growing reliance on nontraditional funding. By contrast, the same ratio has been declining for Japanese banks.

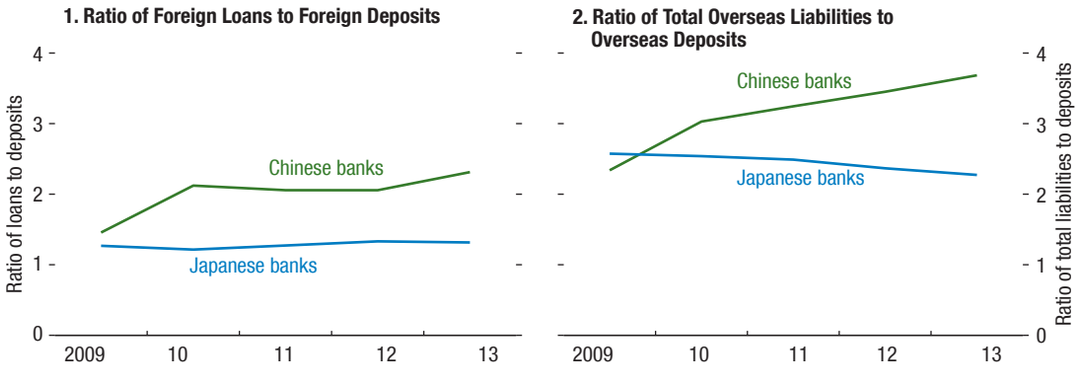
Both Chinese and Japanese banks have loan-to-deposit ratios consistently larger than 1. This shows that despite the increase in deposits collected abroad, banks still fall short of funding for their total external loans and have to rely on external wholesale funding to fill the gap. This growing reliance on wholesale funding could raise potential vulnerabilities from currency and liability mismatches.

Future prospects

Growth opportunities still abound for both Chinese and Japanese banks, as their domestic clients increase their outward expansion. Japanese banks can build on their already well-established market shares in project finance and syndicated loans to take advantage of a rise in infrastructure investment in Asia, whereas Chinese banks will benefit from the further liberalization of financial markets

Box 2.1 *(continued)*

Figure 2.1.3. Funding Vulnerabilities for Chinese and Japanese Banks



Sources: Banks' annual reports; and IMF staff estimates.

in China combined with the internationalization of the renminbi.

Both groups of banks face challenges, however. Constraints to their global expansion include cross-country differences in regulatory and supervisory frameworks, the difficulty of raising local deposits, and the need to rely on external funding. In addition, Chinese banks' relatively simple business model and heavy reliance on domestic customers may also weigh on their ability to expand.

higher banking stress, such as some countries in the euro area, consistently tightened more than other countries.

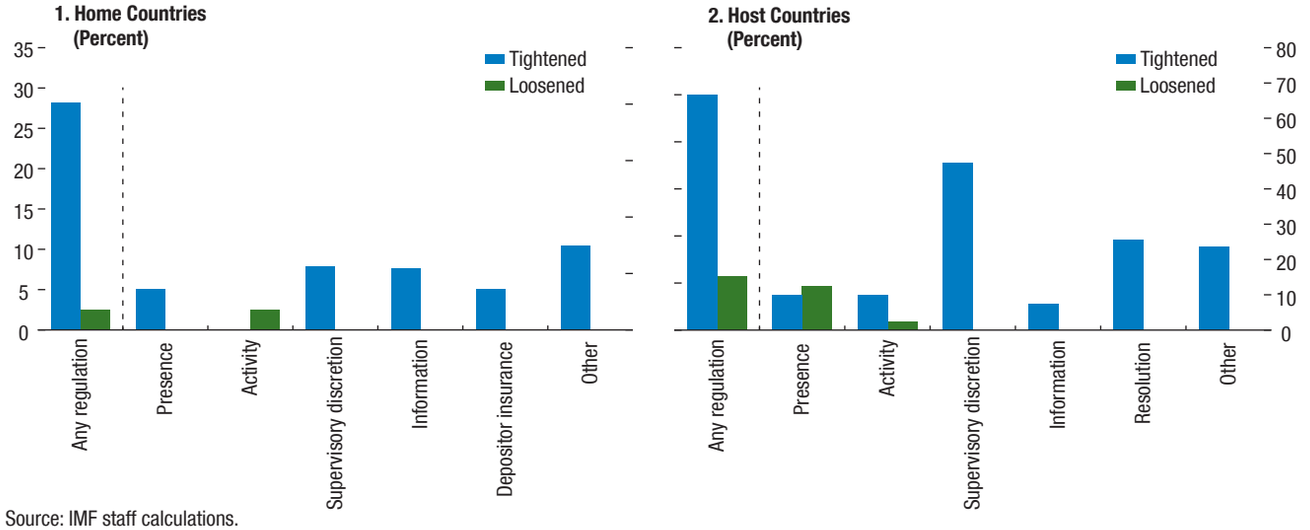
Changes in regulations targeting banks' international operations, as well as more general regulatory changes (such as those on bank capital requirements), can affect foreign banking claims in at least three ways. First and most simply, tighter regulations may reduce foreign bank lending just because bank activities in general are curtailed. Second, regulatory arbitrage may induce a countervailing effect: banks in countries that tighten banking regulations may increase their claims on countries that are less regulated (Houston, Lin, and Ma 2012; Ongena, Popov, and Udell 2013; Bremus and Fratzscher 2014).[10] Third, regulatory changes may bring about a substitution effect between various types of lending because their effects may differ across types of exposures.

[10]The literature finds some evidence of regulatory arbitrage across countries, and Chapter 2 of the October 2014 *Global Financial Stability Report* shows the presence of regulatory arbitrage between banks and the nonbank financial sector.

Econometric Evidence

According to the econometric analysis, regulatory changes can explain a sizable fraction of the decline in cross-border claims on recipient countries. The analysis relates changes in cross-border lending and in lending by foreign affiliates to changes in regulations on international banking operations in both home and host countries. It uses the results of the above-mentioned survey, as well as changes in capital regulations and official supervisory power (Barth, Caprio, and Levine 2013), an indicator of the health of the banking sector in home countries, and other macroeconomic variables, including GDP growth and changes in exchange rates and real policy interest rates. The growth rate of international claims before 2007 is used to control for the precrisis boom (see

Figure 2.8. Share of Countries that Changed Regulations on International Banking Operations between 2006 and 2014



Source: IMF staff calculations.
Note: Shares are calculated from the results of a survey about regulations on banks' international operations. The "any regulation" bar represents the share of countries that changed any regulation related to banks' international operations during 2006–14. The other bars correspond to the shares of countries that have changed any corresponding type of regulation.

Annex 2.1 for details). The results show that roughly half of the drop in cross-border claims (as a percentage of GDP) since the precrisis period (2005–07) can be attributed to regulatory changes. Figure 2.10 examines the sensitivity of the various types of claims to each explanatory variable and the contributions of the various factors to the observed changes in the claims-to-GDP ratio.

Tighter regulations on banks' international operations or capital regulations in home countries are associated with a reduction in lending from those countries (Figure 2.10, panel 1). This effect is intuitive, given that both impose limitations on banks' operations abroad and imply indirect restrictions through, for example, higher risk weights on foreign assets.[11] There is some indication that home countries with more powerful supervisors tend to experience stronger growth in foreign claims, possibly as a result of regulatory arbitrage.[12] The effect of regulatory changes on local claims is not statistically significant.

The effect of regulatory changes in host countries depends on the type of regulation (Figure 2.10, panel 2). Countries that tightened their regulations on banks' international operations received lower volumes of cross-border loans. Changes in capital requirements do not seem to affect total foreign, cross-border, or local claims. However, tighter capital regulations are positively associated with changes in foreign claims on the public sector, which may be explained by a portfolio shift to safer assets to satisfy more stringent capital requirements (see Annex 2.1).

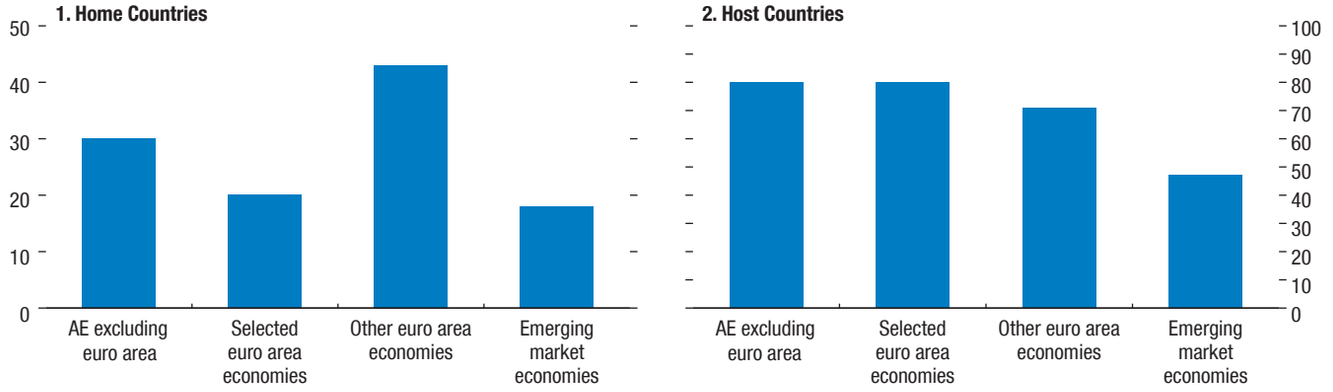
Higher precrisis bank-capital-to-total-assets ratios in the home country (a proxy for the health of the home country banking system) are associated with higher postcrisis growth in foreign claims (Figure 2.10, panel 3).[13] The initial sharp drop in claims (up to 2009) may to a large extent be due to this factor, along with possible expectations of a tightening of regulatory standards. In particular, precrisis capitalization levels of European banks were on average substantially lower than in other countries. This result suggests

[11]Figuet, Humblot, and Lahet (2015) estimate that the Basel III regulatory reforms could lead to a drop of 20 percent in cross-border claim inflows to emerging markets.

[12]Whereas the literature emphasizes the role of regulatory arbitrage, by which banks facing stronger supervisory power at home may increase foreign claims on countries with less supervisory power, the use of consolidated supervision by home supervisors weakens this argument.

[13]This result is consistent with previous studies on syndicated lending that also find that banks with strong balance sheets were better able to maintain lending during the crisis (Kapan and Minoiu 2013).

Figure 2.9. Share of Countries that Tightened Regulations on International Banking Operations between 2006 and 2014, by Region
(Percent)



Source: IMF staff calculations.
Note: AE = advanced economies. Selected euro area economies are those with high borrowing spreads during the 2010–11 sovereign debt crisis and comprise Greece, Ireland, Italy, Portugal, and Spain. Other euro area economies comprise Austria, Belgium, Finland, France, Germany, Luxembourg, and the Netherlands. Countries that tightened regulations are defined as countries with a positive index of changes in regulations on banks' international operations (see Annex 2.1).

that although tighter capital requirements in home countries may initially curtail international banking operations, they can contribute to stabilizing banking flows later on once banks have built capital buffers. Countries with higher precrisis growth rates of foreign claims experienced a larger subsequent contraction in these claims, as foreign banks deleveraged to strengthen their balance sheets. Greater physical distance between home and host countries is associated with lower growth, particularly for local claims.

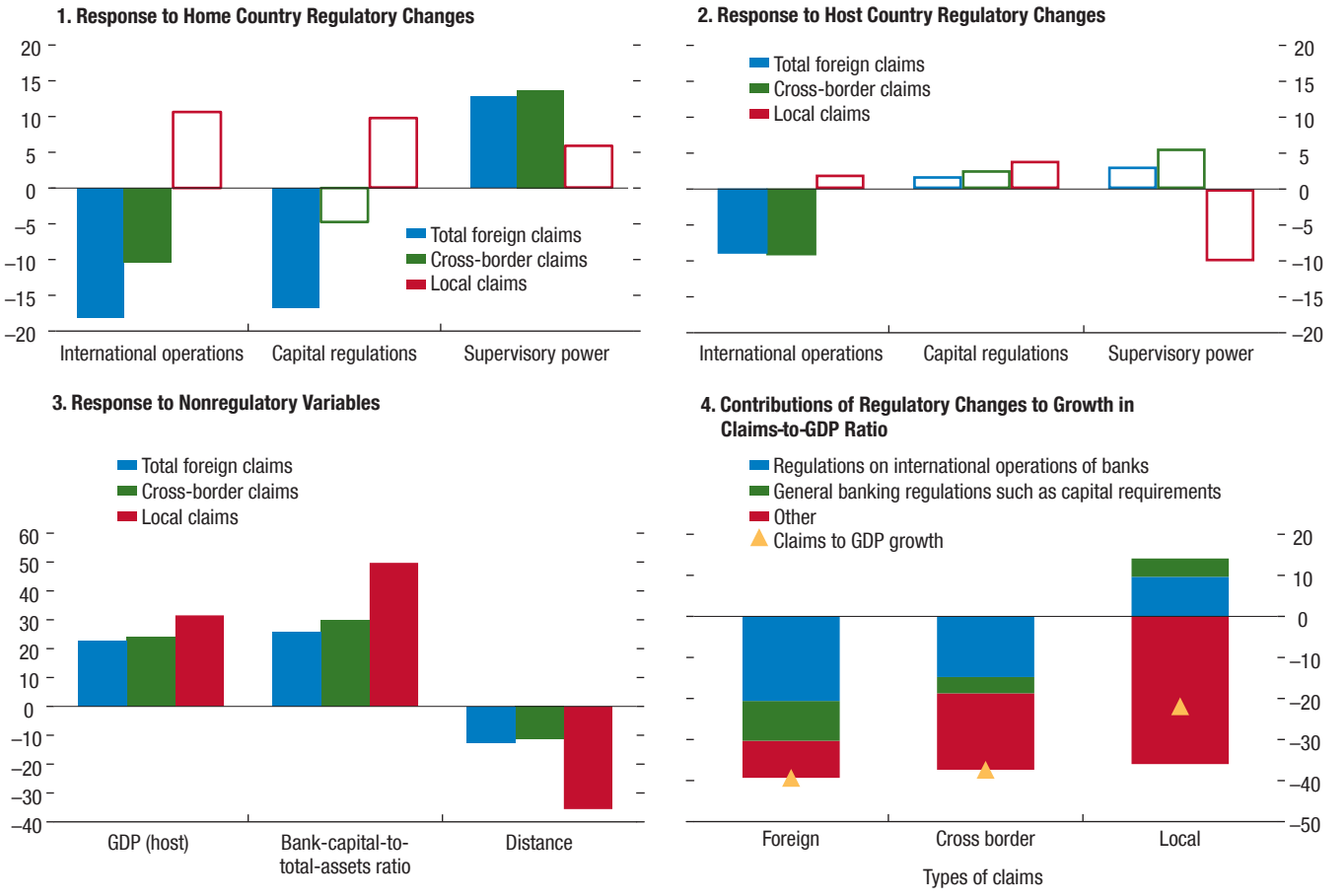
The overall effect of regulatory changes on foreign banking claims is comparable to that of nonregulatory factors (Figure 2.10, panel 4). Among regulatory changes, those directly targeted at the international operations of banks have a larger effect than more general banking regulatory or supervisory changes. All these results still need to be considered with caution. It is possible that the correlation between regulations and foreign claims does not reflect a causal relationship, but may rather be driven by other factors. For instance, the vulnerabilities revealed during the crisis may have caused both bank deleveraging and regulatory reforms in the postcrisis period. This concern is alleviated by adding many control variables, including banks' precrisis capital-to-assets ratios and the precrisis growth rate of international claims, to the regression. Moreover, extensive robustness checks (among others, with instrumental variables) provide additional evidence of the role played by regulatory changes (see Annex 2.1). In particular, the contribution of regulatory changes remains significant even when euro area countries are excluded from the sample or when the euro area is treated as a single country.

Accommodative monetary policies in the wake of the crisis may have slowed the decline in international banking activities while also supporting a shift to portfolio investment. After the global financial crisis, short-term interest rates effectively hit the zero lower bound in many economies, and central banks engaged in unconventional monetary policies aimed at stimulating their economies. Those policies helped reduce uncertainty and market volatility, lowered banks' funding costs, and bolstered their balance sheets, with a potentially positive effect on foreign banking claims. The results indeed suggest that international banking activities would likely have contracted more without such accommodative policies, confirming previous findings in the literature (Bremus and Fratzscher 2014; IMF 2014c).[14]

[14]Empirically examining the effect of unconventional monetary policies on capital flows is challenging, in part because long-term interest rates are endogenous to capital flows (Bernanke 2005). Estimates computed after incorporating long-term interest rates in the regression model broadly confirm the robustness of the results on the effect of regulatory changes while pointing to a significant effect of monetary easing (see Annex 2.1).

Figure 2.10. Effects of Regulations and Other Factors on International Banking Linkages

(Percent)



Source: IMF staff estimates.

Note: Panels 1, 2, and 3 show the effects of a one standard deviation increase in each variable on the growth rate of different types of claims. These are calculated by multiplying the estimated coefficient of the regression and the cross-sectional standard deviation of the corresponding independent variable. Nonshaded bars correspond to coefficients that are not significant at the 10 percent level. Panel 4 decomposes factors contributing to the growth of the claims-to-GDP ratio from 2005–07 to 2011–13 averaged across the observations of the regression. The factor contribution is calculated by multiplying the estimated coefficient by the average of the independent variable. Country samples vary depending on the type of claims. "Regulations on international operations of banks" is the sum of the contributions of international operations regulatory changes in home and host countries. "General banking regulations such as capital requirements" is the sum of the contributions of the other regulation variables. See Annex 2.1 for details.

Effects on Financial Stability

Cross-Border Lending and the Volatility of Capital Flows

Cross-border banking flows dropped more sharply and more durably than other capital flows in reaction to the global financial crisis. Both cross-border banking flows and portfolio flows declined strongly in 2008, but portfolio flows recovered much more quickly and have remained positive on average since early 2009. By contrast, cross-border banking flows have been slightly negative since 2009 (Figure 2.11, panel 1). Yet there is no clear evidence of substitution between the various types of flows at the country level.

All else equal, the reduction in cross-border banking flows can be expected to reduce the sensitivities of total capital inflows to global financial shocks. A comparison of the sensitivity of different types of flows to the Chicago Board Options Exchange Market Volatility Index (VIX) shows that cross-border banking claims are more sensitive to global conditions than are local claims, whose sensitivity to global shocks is close to that of portfolio flows (Figure 2.11, panel 2). This

Box 2.2. The Expansion of Pan-African Banks: Opportunities and Challenges

This box describes the recent expansion of pan-African bank groups (cross-border banks headquartered in Africa), the benefits these groups offer, and the financial stability risks they entail.

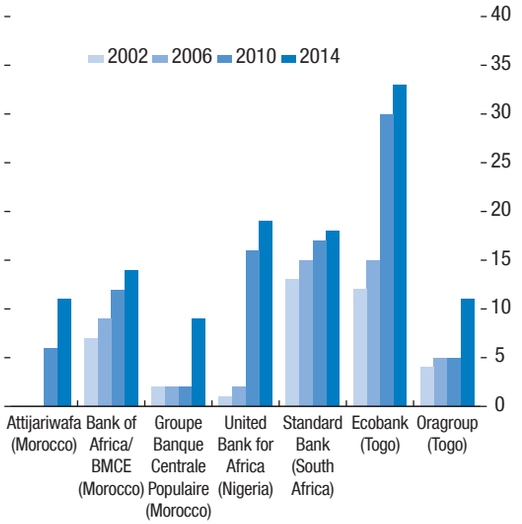
The face of African finance is changing rapidly with the strong expansion of pan-African banks across the continent in recent years. Reflecting a number of converging push and pull factors and aided by improved political and macroeconomic stability and robust economic growth, the number of operations of the seven largest groups has more than doubled since the mid-2000s (Figure 2.2.1). Specific factors contributing to this expansion include increasing trade linkages between African countries, which have induced banks to follow their clients, and the declining role of more traditional players such as European banks.

The growth of pan-African banks offers a number of opportunities and benefits. Anecdotal evidence suggests that the expansion of these banks has improved competition and given rise to economies of scale, especially in host countries with small local markets. Pan-African banks are driving innovation, offering opportunities to enhance financial inclusion, and in some cases contributing to lowering borrowing costs. For example, in the East African Community, Kenyan banks have introduced innovative business models such as agency banking into neighboring countries. Similarly, Moroccan banks' focus on small and medium enterprise development is being exported to francophone West Africa, while Nigerian banks

This box was prepared by Alexandra Peter.

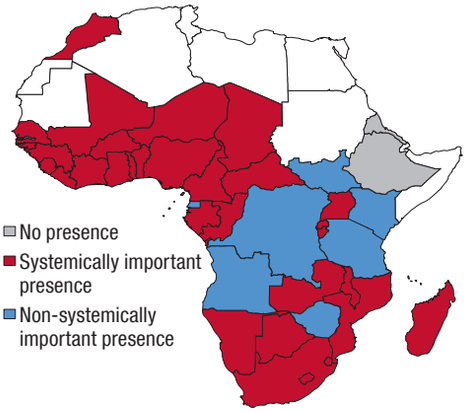
Figure 2.2.1. Major Pan-African Banks: Cross-Border Expansion, 2002–14

(Number of subsidiaries in sub-Saharan Africa; percent)



Source: Bank websites and annual reports.

Figure 2.2.2. Major Pan-African Banks: Systemic Importance by Country, 2013



Sources: Banks' annual reports; Bankscope; IMF Monetary and Financial Statistics; and IMF staff calculations.
Note: The countries highlighted in red are those where any of the seven largest pan-African banks has a systemically important presence defined as a deposit share of more than 10 percent of the banking system's deposits. This includes the home countries of the pan-African banks.

Box 2.2 *(continued)*

are expanding their branch networks across their host countries, including in rural areas. African banks have also become lead arrangers for syndicated loans, filling the gap left by European banks (IMF 2014a). From a home country perspective, the geographical expansion of pan-African banks increases diversification and provides further growth and profit opportunities for banks.

However, as these groups have developed in reach and complexity, significant supervision gaps, governance issues, and questions about cross-border resolution have emerged that could pose risks to national and regional financial stability if unaddressed. With their rapid expansion, the largest pan-African banks have become systemically important in many of their host countries, raising concerns about spillover risks (Figure 2.2.2). Most groups conduct their foreign operations through subsidiaries, which rely on local deposits for funding, somewhat mitigating potential contagion. However, with limited information about intragroup exposures and interconnections within pan-African banks and cross-border cooperation between supervisors just emerging, undetected risks could be mounting. In addition, pan-African groups have become more complex, encompassing nonbank activities that could give rise to additional contagion channels (IMF, forthcoming b).

result confirms previous evidence that net bank flows have consistently been the most volatile type of capital flow (see Chapter 4 of the April 2011 *World Economic Outlook*). It suggests that the observed changes in international banking may yield a reduction in contagion, but potentially may also reduce flows that help countries dampen external and domestic shocks.[15] These issues are examined next.

International Banking Linkages, Adverse Shocks, and Credit

The analysis now turns to the role that foreign banks can play in mitigating or amplifying the effect of adverse local and foreign shocks.[16] This question is tackled from both a macroeconomic (country-level) and microeconomic (bank-level) perspective. The analysis focuses on the effect of international banking linkages on the *changes* in domestic credit growth in response to shocks. Bank credit is one of the main channels of transmission of financial shocks to the real economy and plays a crucial role in the ability of economic agents to withstand negative shocks.

International banking linkages for each country are measured in three ways. The first measure is the ratio of cross-border claims to the total assets of the banking sector in recipient countries. This measure excludes local lending by foreign branches and subsidiaries in both foreign and domestic currencies (and, given the consolidated nature of the data, also excludes intragroup lending). The second measure uses international claims (the sum of cross-border claims and local claims in foreign currency) relative to banking sector assets in recipient countries. Because local claims in foreign currency are more likely to be funded by external borrowing, this measure may better capture the overall dependence of a country on foreign bank lending. The third measure uses the ratio of foreign subsidiaries' and branches' local claims in local currency to total banking assets.

Measuring linkages through cross-border and international claims

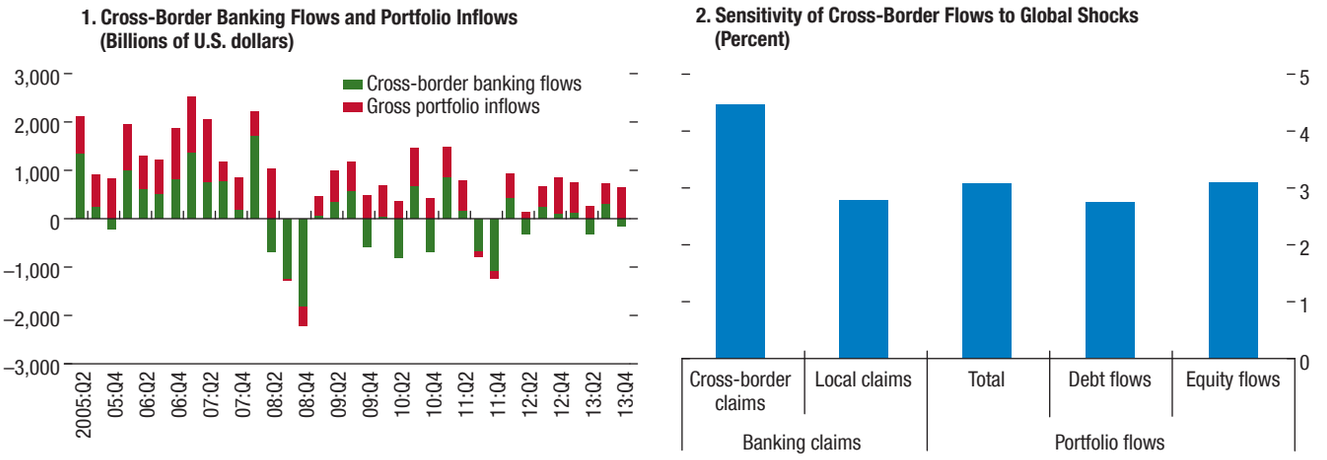
Host countries with higher cross-border or international claims tend to be more exposed to global shocks.[17] In times of global stress, credit growth drops more in these countries (Figure 2.12, panel 1). This finding can be related to the literature pointing to the financial stability risks associated with bank

[15]Recent changes, such as the growing issuances of nonfinancial corporate bonds or changes in the mix of global portfolio investors (see Chapter 2 of the April 2014 *Global Financial Stability Report*) might, however, affect the sensitivity of portfolio flows to future shocks.

[16]Many studies have looked at the role of international banking linkages in the transmission of shocks to host countries (for example, Cetorelli and Goldberg 2011), while ignoring the role those linkages may play in smoothing the effect of domestic shocks. The analysis in this chapter considers both effects, thereby providing a more comprehensive assessment of the stabilizing role of foreign banks. For other effects of banking globalization, in particular the role of foreign bank participation in financial development in developing countries, see Goldberg (2009) and Detragiache, Tressel, and Gupta (2008).

[17]Global stress (shocks) is measured by the VIX.

Figure 2.11. Changes in Capital Flows



Sources: Bank for International Settlements (BIS); IMF, International Financial Statistics; and IMF staff calculations.
Note: Cross-border banking flows are computed as changes in cross-border banking claims from the BIS Consolidated Banking Statistics on an ultimate risk basis. These data are not compiled on a residency basis and therefore are not fully consistent with the flows reported in the balance of payments. For panel 2, all flows are normalized by the average of their absolute values over the sample period. The bars in panel 2 represent the changes in flows following a one-unit increase in the VIX (Chicago Board Options Exchange Market Volatility Index).

wholesale funding (see Berkmen and others 2012). In fact, a substantial portion of precrisis cross-border lending by major banks was financed by tapping wholesale markets. Cross-border lending itself may also reflect cross-border wholesale funding between non-affiliated banks.[18]

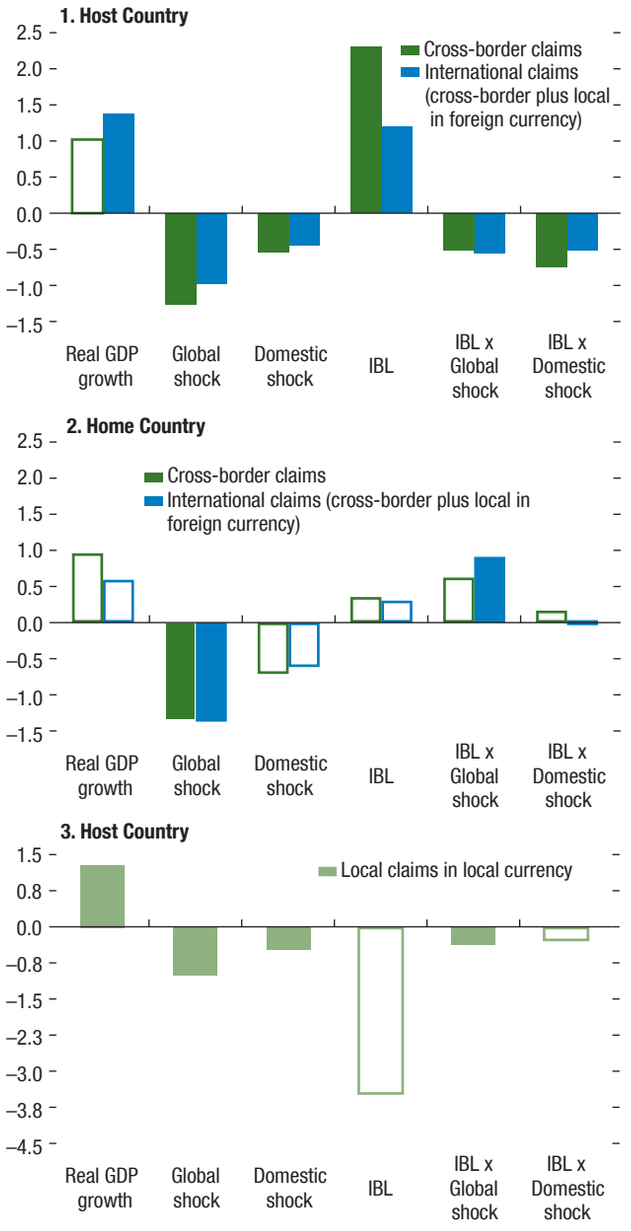
Similarly, host countries do not enjoy a diversification benefit when they are hit by domestic shocks. All else equal, cross-border lending by international banks may be expected to be more resilient around domestic shocks. For example, the balance sheets of global banks will be less affected by economic stress in any given host country. This should enable these banks to curtail lending less than their local peers do. However, the opposite seems true. In the face of higher domestic banking stress, countries with more international banking linkages in the form of cross-border or international claims tend to see a larger, not smaller, contraction in lending.[19] This suggests that cross-border lending does not dampen the impact of domestic shocks.

By contrast, countries that are home to banks with large foreign assets experience some stabilizing benefits. Domestic credit is less affected during times of global stress in countries that are home to banks with large international operations (Figure 2.12, panel 2). This outcome may be related to the fact that banks in these countries have more leeway to adjust their operations worldwide and support the domestic entities—a form of home bias in which international banks are more inclined to maintain credit at home during times of global stress, potentially at the expense of their foreign operations (Giannetti and Laeven 2012). No such result is observed, however, for domestic shocks. One possible reason is that international banks, in the face of troubles at home, would rather maintain or expand their more profitable overseas operations than support domestic credit. The underlying assumption is that a global shock affects global banks' activities in a similar way both at home and abroad, while a domestic shock hurts the profitability of domestic operations relative to foreign ones.

[18]Other than during stress periods, cross-border and international claims are associated with higher domestic credit growth in host countries. This may reflect the role that cross-border lending can play as a complement to domestic lending in relaxing credit constraints, and in contributing to financial deepening in countries with small domestic banking sectors. It may, however, also suggest a contribution of cross-border lending to unsustainable local credit booms (see next section).

[19]Domestic stress (shocks) is measured by the average expected default frequency of the domestic banking sector (weighted by the size of the domestic banks). The average expected default frequency of all listed domestic firms, which represents a broader measure of domestic stress, is used as a robustness check; the main results remain unchanged.

Figure 2.12. Effect of International Banking Linkages on Domestic Credit Growth
(Percent)



Source: IMF staff estimates.
Note: IBL = international banking linkages. The bars show the effects of a one standard deviation increase in each variable on domestic credit growth. These are calculated by multiplying the estimated coefficient of the regression and the standard deviation of the corresponding independent variable. Nonshaded bars correspond to coefficients that are not significant at the 10 percent level. The estimation period spans 2002–13, depending on data availability.

These results do not depend on the severity of domestic or foreign shocks. The analysis finds little evidence that the stabilizing role of global banks may be either impeded or enhanced during extreme shocks or crises.

Measuring linkages through local currency lending by foreign banks

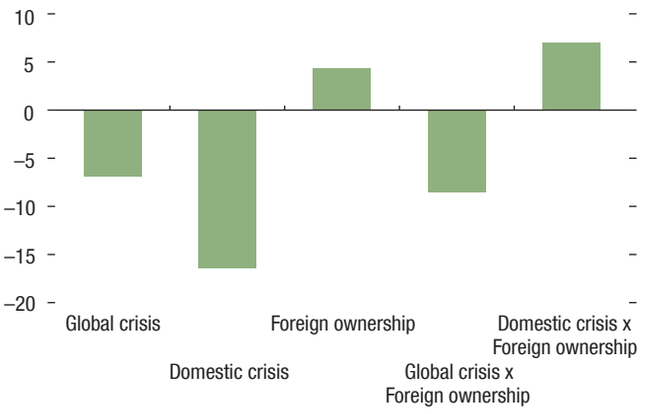
Linkages in the form of higher local currency lending by foreign subsidiaries or branches do not amplify domestic shocks (Figure 2.12, panel 3). Cross-border and international claims do not capture the local activities of foreign branches and subsidiaries well. One reason is that local claims are mostly denominated in local currency and are therefore more likely to be funded by local deposits. Another reason is that on a consolidated basis, cross-border claims cannot account for intragroup funding flows, although these are known to play a stabilizing role during periods of heightened risk (Reinhardt and Riddiough 2014; De Haas and van Lelyveld 2010). Intragroup funding can help support local lending by foreign banks' affiliates. In fact, countries with a high share of local lending in local currency by foreign banks do not experience stronger credit contractions when they are hit by domestic shocks.

A more in-depth look at subsidiaries' lending

An examination of the behavior of individual banks suggests that lending by foreign-owned subsidiaries is in fact more stable during domestic crises. The micro-level analysis uses balance sheet data for a large number of domestic and foreign-owned banks (see Annex 2.2 for details). The regression model compares the growth rate of loans by foreign-owned subsidiaries in a given country with that of domestic banks in periods of stress.[20] The growth rate of lending by foreign-owned subsidiaries is higher than that of lending by domestic banks during domestic banking crises, but lower during global crises (Figure 2.13). These results emphasize the beneficial role played by local lending of foreign-owned subsidiaries during domestic crises. This finding is consistent with the literature reporting that lending by subsidiaries is more stable than direct cross-border lending (Peek and Rosengren 2000; De Haas and van

[20]Branches of foreign banks are excluded from the analysis because of the lack of balance sheet data. Using regulatory data, Hoggarth, Hooley, and Korniyenko (2013) provide an interesting analysis of the behavior of foreign bank branches in the United Kingdom.

Figure 2.13. Lending Growth by Domestic and Foreign-Owned Banks during Crises
(Percent)



Source: IMF staff estimations.
Note: The bars represent the values of the estimated coefficients of the independent variables in a regression of lending growth at the bank level comparing lending by domestic and foreign-owned banks (see Annex 2.2). The estimation period spans 1998–2013, depending on data availability.

Lelyveld 2006; McCauley, McGuire, and von Peter 2012; Schnabl 2012).

Foreign subsidiaries with better-capitalized parent banks and parent banks with more stable funding sources tend to react less procyclically. Higher capitalization of the parent bank is associated with higher lending growth by its subsidiaries during stress periods (Figure 2.14, panel 1; and Annex Table 2.2.3). High dependence of parent banks on nondeposit funding sources is destabilizing during both domestic and global crises (Figure 2.14, panel 2). The results highlight the role played by parents' dependence on nondeposit funding sources in increasing contagion, an intuitive and well-known result in the literature (Cetorelli and Goldberg 2012; Porter and Serra 2011).[21]

A high reliance of subsidiaries on domestic deposits for their funding is also found to help stabilize lending during both domestic and global stress. This result holds for all banks, whether domestically or foreign owned (Figure 2.14, panel 3) and further underscores the importance of banks' liability structures for financial stability (see Chapter 3 of the October 2013 *Global Financial Stability Report*).

[21]A comparison of the credit growth of foreign banks with that of domestic banks in Central, Eastern, and Southeastern Europe showed that the tightening in parent banks' funding conditions explained most of the difference in the credit slowdown in 2008–11 (IMF 2013a).

International Banking Linkages and the Incidence of Crises

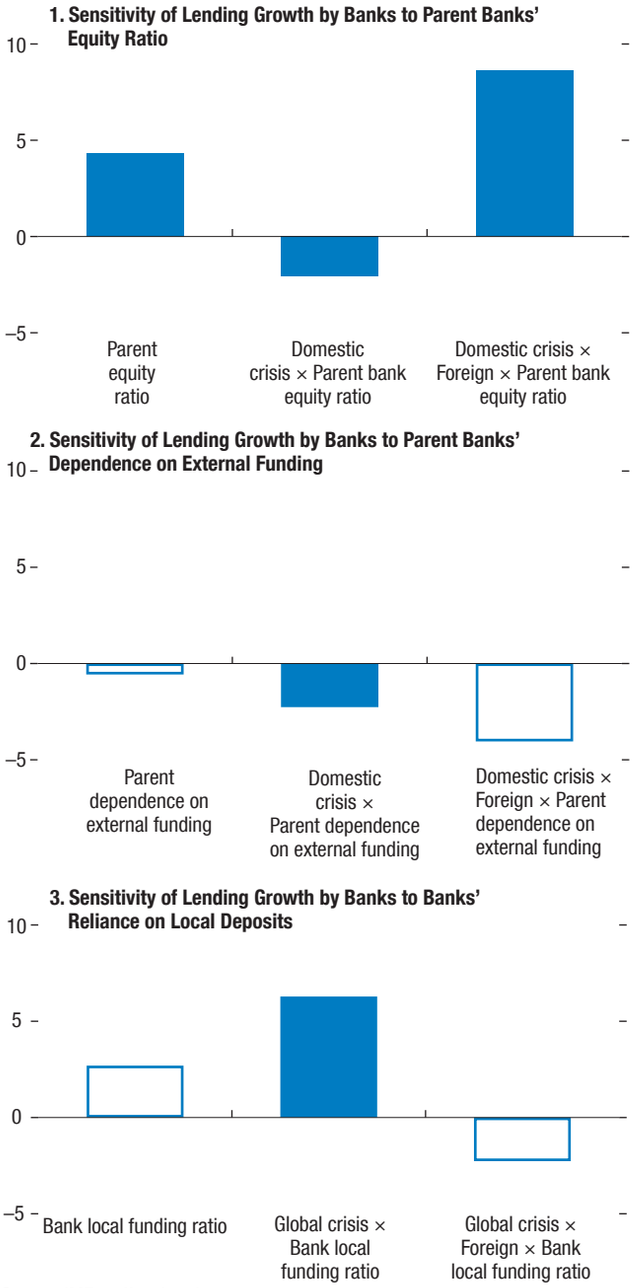
If certain forms of international banking linkages can aggravate the effect of domestic shocks, do they also increase the *incidence* of crises more generally? The previous section found that cross-border banking linkages tend to facilitate the transmission of global shocks and aggravate the effect of domestic ones on host countries but are also associated with higher domestic credit growth on average. Given that rapid credit growth is considered a powerful indicator of systemic risk buildup, this section directly investigates the effect of international banking linkages on the probability of a banking crisis (see Annex 2.3 for more details).

On average, a higher degree of international banking linkages does not seem to be significantly correlated with the probability of domestic banking crises (Table 2.1). This result is not surprising, since the existing literature does not provide a definitive answer. Although Demirgüç-Kunt, Levine, and Min (1998) find that foreign bank presence tends to lower the probability that a country will experience a banking crisis, more recent work by Minoiu and others (forthcoming) suggests a positive relationship between a country's banking interconnectedness and the probability of a banking crisis.

Policy Implications

As evidenced by the regulatory survey results, the challenges of the recent financial crisis prompted a number of countries to take crisis-resolution measures and impose new requirements on banks. The response was global, with the Group of 20 playing a major role in setting up the agenda for financial reforms (Viñals and others 2010). National regulatory reforms followed, although they were not always well coordinated across countries. Structural banking reforms aiming to reduce interconnectedness between intermediaries may have intentionally introduced some degree of fragmentation to the market, including across borders (FSB 2014). Measures frequently

Figure 2.14. Effect of Parent and Subsidiary Characteristics on Subsidiary Lending Growth
(Percent)



Source: IMF staff estimations.
Note: The bars represent the values of the estimated coefficients of the independent variables multiplied by the standard deviation of the parent or subsidiary characteristic of interest in a regression of lending growth at the bank level, comparing lending by domestic and foreign-owned banks (see Annex 2.2). Nonshaded bars correspond to coefficients that are not statistically significant at the 10 percent level. The marginal effect of each parent and subsidiary characteristic on lending growth by foreign subsidiaries during crises corresponds to the sum of the coefficients on the interaction terms Crisis x Characteristic and Crisis x Foreign x Characteristic. The estimation period spans 1998–2013.

used include the separation of specific activities into different legal entities, restrictions on business models, heightened regulatory requirements on a subconsolidated basis, and requirements to operate as subsidiaries instead of branches. These regulatory changes clearly had an effect on the patterns of international banking.

With regard to financial stability, the findings of the empirical analysis in this chapter lend support to a "multinational" banking model rather than a cross-border one (see Table 2.2). In contrast to international banks, which are mainly engaged in cross-border transactions out of their home countries, multinational banks operate locally through subsidiaries or branches (McCauley, McGuire, and von Peter 2012). All else equal, the shift to more local as opposed to cross-border operations results in a decline in the sensitivity of capital flows to global shocks and yields a reduction in contagion. Foreign banks operating locally rather than through cross-border transactions tend to contract credit much less following domestic shocks in host countries. More local claims may also translate into higher effectiveness of macroprudential policies given that local measures are less likely to be circumvented (Viñals and Nier 2014; IMF 2014d).

Governments can enhance the resilience to financial shocks. A higher reliance of *affiliates* on local funding sources increases their resilience to global shocks. At the *parent* level, higher capitalization levels and more stable funding sources positively contribute to financial stability in host countries. The results therefore support recent financial reforms aimed at strengthening banks' capital and liquidity buffers, especially the buffers of global systemically important banks. The results also call for the close monitoring of cross-border and foreign currency lending, given that both tend to compound domestic and global shocks.[22]

However, limiting cross-border lending across the board may jeopardize other benefits and create new risks, most of them not examined here. The analysis finds a positive effect of cross-border lending on domestic credit growth in *host countries* in normal times. Moreover, *home countries* benefit from having cross-border banking claims during times of global stress. However, the chapter does not consider

[22]Lower dependence of banks on external funding, along with stronger supervision, was shown to also reduce the fiscal costs of banking crises (IMF, forthcoming a).

Table 2.1. Effects of International Banking Linkages on the Incidence of Crises

	International Banking Linkages Measured with		
	Cross-Border Claims	International Claims	Local Claims
Real GDP Growth (year-over-year change, lagged)	–0.03	–0.05*	–0.05*
Credit Growth (lagged)	0.08***	0.06***	0.06***
Foreign-Exchange-Reserves-to-GDP Ratio (lagged)	–2.59	–1.96	–1.81
Foreign-Debt-to-GDP Ratio (lagged)	0.39**	0.48***	0.43***
Current-Account-Balance-to-GDP Ratio (lagged)	–0.14***	–0.16***	–0.15***
International Banking Linkages (lagged)	0.16	0.19	–0.14
Observations	1,324	1,840	1,792
Number of Countries	46	46	45
Chi-squared	41.8	47.5	46.5

Source: IMF staff estimates.

Note: IBL = international banking linkages. Banking crises are defined as in Laeven and Valencia (2013). The estimates are derived from a random effects panel probit model. The estimation period spans 2002–13, depending on data availability. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

the positive role cross-border flows can play in the allocation of global savings across countries, and the resulting benefits for investment and growth. Some of these benefits would likely be lost if divergences in the implementation of reforms agreed to at the global level and the ensuing regulatory fragmentation were to lead to a further retrenchment of global banks.[23] In addition, the changes in the provision of cross-border credit could raise new financial stability risks. As international issuances of corporate bonds continue to increase and bank direct cross-border lending declines, the locus of risks is shifting away from banks to nonbanks. Such a shift may complicate surveillance of the global financial system (see Chapter 3 of this *Global Financial Stability Report* and Chapter 2 of the October 2014 *Global Financial Stability Report*).

One policy challenge would therefore be to make the global financial system safer for cross-border lending. Doing so requires a more harmonized institutional and regulatory framework, with more cooperation and coordination among national regulators and supervisors. The analysis highlights the destabilizing effects of cross-border lending during shock episodes; therefore, the efforts should first focus on reducing the risks in times of crisis. In that regard, mutually compatible resolution frameworks could provide a global safety net, preventing the ad hoc imposition of ring-fencing measures.

[23]Furthermore, the chapter does not consider the particular case of banking unions, within which the distinction between cross-border and local claims is less relevant because of full regulatory and supervisory integration and the existence of common safety nets.

In particular, stronger intraregional banking linkages call for enhanced regional cooperation. Regionalization may increase vulnerability to regional crises. Dealing with such crises requires agreement on the resolution of regional banks and the availability of adequate fiscal backstops at the regional level. Box 2.3 provides a description of the progress made in this regard with the European banking union.

International forums have an important role to play in the advancement of regulatory standards and in ensuring their consistent application across countries (see Box 2.4 for a discussion of areas that warrant attention by financial regulators). Progress along these dimensions would reduce the scope for regulatory arbitrage between countries as well as between regulated banks and the shadow banking system.

Conclusion

The reduction in cross-border lending and the move toward more local and locally funded operations, partly fostered by regulatory reforms, should positively affect financial stability in host countries. The analysis in this chapter provides evidence that cross-border banking tends to aggravate adverse domestic and global shocks in host countries. In contrast, local lending by foreign banks is less sensitive to global shocks than are cross-border lending and portfolio inflows in general. Moreover, lending by foreign-owned subsidiaries, especially when their parents are well capitalized and less dependent on nondeposit funding sources, can help stabilize credit growth in the face of adverse domestic

Table 2.2. Main Findings of the Analysis of the Effects of International Banking Linkages on Domestic Credit Growth

	Effect on Domestic Credit Growth by Banks during Periods of	
Measure of International Banking Linkages	Adverse Domestic Shocks	Adverse Global Shocks
Cross-Border Claims	Amplifies the effect of the shock	Amplifies the effect of the shock
Local Lending through Branches and Subsidiaries	Dampens the effect of the shock	Amplifies the effect of the shock
	Effect on Lending Growth by Foreign Subsidiaries during Periods of	
Parent and Subsidiary Characteristics	Domestic Crises	Global Crises
Higher Parent Capitalization and Lower Parent Dependence on Nondeposit Funding	Dampens the effect of the crisis	Dampens the effect of the crisis
Higher Reliance of Subsidiaries on Local Deposits	Dampens the effect of the crisis	Dampens the effect of the crisis

Source: IMF staff.

shocks. Countries that are home to banks with large foreign assets still enjoy some risk diversification benefits from their international exposures.

However, the chapter does not look into the other benefits usually associated with cross-border banking flows. Although the decline in cross-border lending may reduce the international transmission of shocks, it may dampen benefits in other domains, such as financial deepening, the efficient allocation of global savings, and the diversification of financing sources.

Overall, the findings lend support to recent regulatory reforms strengthening the resilience of global banks while calling for further progress on the consistent implementation of regulatory standards and cross-border resolution. Given the trade-offs, an important policy challenge is to make the global financial system safer for cross-border lending. Only with sufficient international cooperation on the regulation and supervision of global banks can the full benefits of banking globalization be realized with no increased risk to financial stability.

Box 2.3. Banking Union in Europe

This box describes the banking union in Europe as a policy response to financial fragmentation in the euro area.

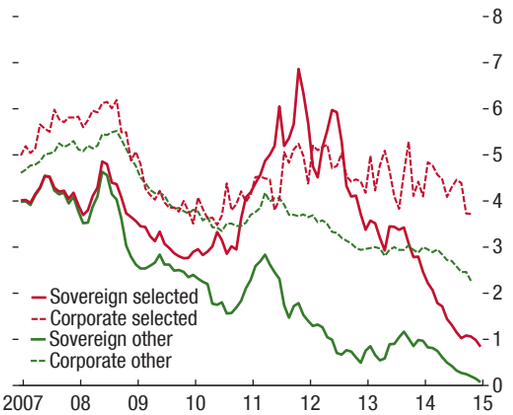
The global financial crisis and its aftermath led to fragmentation of euro area financial markets along national borders, peaking in the summer of 2012. Bank borrowing and lending costs became highly correlated with sovereign yields and both diverged markedly across countries (Figure 2.3.1; Goyal and others 2013). Local banks relied on their sovereigns as backstops in times of stress, linking the financial health of the sovereign and the banking sector: when banking sector conditions deteriorated, the sovereign's fiscal space to backstop shrank, and vice versa. Moreover, in a currency union, individual member states cannot use interest or exchange rates to support banks in response to local macroeconomic conditions.

To short-circuit bank-sovereign linkages and safeguard the functioning of the currency union and single market, policymakers formulated a plan for a banking union in the euro area, in which nationally distinct banking supervision and resolution frameworks would be replaced by a shared and common framework.[1] The banking union goes a step further than European Union–wide initiatives to harmonize banking practice across countries, by establishing centralized mechanisms for these functions.[2]

Like many European institutions, the euro area mechanisms are layered on top of existing national institutions. Under the Single Supervisory Mechanism, which began operation in November 2014, the European Central Bank (ECB) is the overarching supervisory authority, directly supervising 120 significant banks—which together make up almost 85 percent of total euro area bank assets—and overseeing the supervision of the other 3,500 or so less significant banks in the euro area by their respective national competent authorities. Moreover, the ECB can take over the direct supervision of any less significant bank if it deems it necessary to ensure the integrity of euro area supervision or if the bank becomes systemically important.

Similarly, under the Single Resolution Mechanism, the newly established, stand-alone Single Resolution Board oversees the resolution of banks by national resolution authorities and directly handles the resolution of large and cross-border banks. Following European Union–wide practice, resolution may involve a bail-in of up to 8 percent of bank liabilities. Importantly, as of January 2016, the board will also have access to a common, industry-funded backstop called the Single Resolution Fund to facilitate resolution if needed. The eventual size of the industry backstop is planned to be €55 billion by 2024 (about 1 percent of covered deposits in the euro area). Together, these tools should help minimize recourse to taxpayer-financed bailouts. Moreover, as of December 2014, the European

Figure 2.3.1. Sovereign Bond and Corporate Lending Rates in the Euro Area
(Percent; GDP weighted)



Sources: Bloomberg, L.P.; and Haver Analytics.
Note: Sovereign rates are the yields on five-year bonds. Corporate lending rates are for bank loans longer than five years. The rates for Belgium and Portugal reflect all maturities. "Selected countries" are those which experienced high borrowing spreads during the 2010–11 debt sovereign crisis and comprise Ireland, Italy, Portugal, and Spain. "Other countries" are Belgium, France, Germany, and the Netherlands.

This box was prepared by John Bluedorn.

[1]Plans for banking union began in earnest shortly after the European Central Bank's August 2012 announcement of the Outright Monetary Transactions instrument that contained and alleviated the turmoil in euro area financial markets.

[2]The key European Union initiatives include the Single Rulebook, to establish a common bank capital definition and implement Basel III prudential requirements (adopted in June 2013; phased in by 2019); the Bank Recovery and Resolution Directive, establishing common practices for bank resolution at the national level, which minimizes taxpayer support for banks, partly through the "bail-in" of bank creditors in resolution (adopted April 2014; in full force January 2016); and the Deposit Guarantee Scheme Directive, harmonizing rules for national deposit guarantee schemes and ensuring their upfront funding and uniform functioning (adopted April 2014; phased in by 2025).

Box 2.3 *(continued)*

Stability Mechanism may directly recapitalize banks under restructuring, acting as a kind of common fiscal backstop to the banking union. However, the hurdles for its use are very high (for example, bail-in must be exhausted), and the funding available is capped at €60 billion, which could be rapidly depleted in a systemic crisis.

By centralizing and sharing bank supervision and resolution, the banking union will eliminate the distinction between home and host supervisors for euro area banks; enforce a high, common supervisory standard; enable the cross-border flow of bank liquidity; and ensure common and consistent treatment of investors and depositors in cases of bank distress. This centralization should help foster the single market and reduce fragmentation. However, a number of the practicalities and modalities still need to be worked out for the new institutions. Moreover, without an effective common fiscal backstop, the risk that bank-sovereign linkages could reemerge in a systemic crisis remains.

Box 2.4. Global Banks: Regulatory and Supervisory Areas in Need of Attention

This box highlights areas that warrant further attention from policymakers to make regulation and supervision of globally active banks more effective.

Cooperation and coordination

A pragmatic approach is needed to tackle the challenges global banking poses to national policymakers. Mutually shared objectives as well as a stronger cooperation and coordination process among regulators and supervisors are paramount.

- *Build trust through strengthened cooperation and coordination:* The international response to the financial crisis has markedly improved the regulatory framework. However, more attention could be devoted to strengthening supervision (Viñals and others 2010). Building and maintaining trust among supervisors is essential for effective cooperation among more integrated countries, especially during times of crisis. Confidence-building measures include the signing of memoranda of understanding (MoUs) or active participation in regional networks.[1,2] In general, policymakers should strive to remove any legal impediments to cross-border cooperation among supervisory authorities, thus enabling them to share information effectively.[3]
- *Establish a dedicated framework for reforms with a cross-border reach:* The unilateral adoption of measures without international agreement can encourage other countries to take similar unilateral measures, leading to a spiral of regulatory fragmentation. Financial stability might be compromised if national approaches, introduced in the absence of an international standard, confront global banks with competing or contradictory requirements. In the long term, countries should consider moving toward an international system for mutual consultation of reform proposals with considerable cross-border reach. While retaining national autonomy for safeguarding financial stability, such a process could ensure broader application of substituted compliance with foreign regulatory regimes and internalize the effects of extraterritorial measures.[4]

Consistency

The details of the implementation and application of reforms deserve more attention. Inconsistent implementation of international standards across countries may

This box was prepared by Johannes Ehrentraud.

[1]MoUs establish a set of details for cooperation and information exchange with other supervisory authorities. Although such agreements failed to facilitate cooperation during the global financial crisis, their format could be revamped to include specific timelines and escalation procedures (IMF 2014a). For systemically important institutions, the Financial Stability Board (FSB) recommends setting up crisis management groups and institution-specific cross-border cooperation arrangements (FSB 2014).

[2]Examples include the Group of Banking Supervisors from Central and Eastern Europe or the Association of Supervisors of Banks of the Americas.

[3]In some countries, banking secrecy laws prevent authorities from sharing information with others if their counterparty's legal system provides the option of sharing the data with tax authorities.

[4]Substituted compliance describes the circumstances in which authorities permit legal subjects to use compliance with regulations in another jurisdiction as a substitute for compliance with local regulations. Deferring to the regulatory regimes of other countries often involves the determination of equivalence of the other countries' regulatory regimes.

Box 2.4 *(continued)*

cause global banks to book their transactions in jurisdictions with light-touch regulation or more preferential accounting rules.

- *Basel framework:* In 2012, the Basel Committee on Banking Supervision established a Regulatory Consistency Assessment Program to facilitate consistency in the adoption and implementation of Basel standards.[5] Current challenges to ensuring a level playing field include different phase-in requirements and transitional adjustments in banks' regulatory capital calculations, and excessive variability in the calculation of risk-weighted assets in banks using an internal-ratings-based approach. In Europe, the Capital Requirements Regulation and Capital Requirements Directive include a large number of options allowing for national discretion in the application of certain regulatory rules (Lautenschläger 2014). Further efforts are thus required to ensure that national discretion does not undermine the consistency of agreed-upon reforms.[6]
- *Accounting:* Although commissioned by the Group of 20 countries in 2009, convergence efforts by the International Accounting Standards Board and the U.S. Financial Accounting Standards Board have not yet produced a single set of global standards. For banks, one key area of divergence is the standards for credit loss provisioning. Diverging accounting approaches are costly for compliance and hamper comparability in loan loss estimates. They also create an uneven playing field because banks in different parts of the world will be required to hold different loan loss reserves for a given level of loan portfolio riskiness.

Resolution and organizational banking structures

Effective cross-border resolution regimes would allow for more flexibility in the choice of legal structures for banking groups.

- *Advancing cross-border bank resolution:* The Key Attributes, which are the international standard for resolution regimes for financial institutions, are to be implemented in Financial Stability Board member jurisdictions by end-2015. They provide resolution authorities with comprehensive resolution powers. However, a number of considerable challenges remain. In some cases, there may be significant asymmetry of power in interactions between home and smaller host countries where the operations are not material to the institution's overall health. Moreover, national interests may still trump incentives for cooperative cross-border strategies. More work is needed on proposals for total loss-absorbing capacity, greater harmonization of creditor hierarchies, and depositor preference between countries (IMF 2014a).[7]
- *Legal banking structures:* Given a cooperative international environment, banking groups that find it more useful to be organized either as branches or as subsidiaries can be consistent with financial stability outcomes.[8] In some situations, however, imposing subsidiarization might seem preferable from a financial stability perspective but has efficiency costs for banks that would otherwise prefer to organize themselves through a branch structure in light of their business model. Harmonizing cross-border resolution regimes and burden-sharing agreements, along with effective cooperation and information sharing in crisis times, may change authorities' current preference for certain structures with regard to financial stability.

[5]Main elements of the Regulatory Consistency Assessment Program are the implementation and monitoring of Basel standards and consistency assessments carried out on a jurisdictional and thematic basis.

[6]In 2010, the FSB established a framework for encouraging stronger adherence to international standards. The three main elements are (1) FSB members' commitment to implement standards and publish evidence of their adherence, (2) periodic peer reviews for FSB and non-FSB members, and (3) a toolbox with positive and negative measures, including identification of noncooperative jurisdictions (FSB 2010a, 2010b). This framework could be strengthened.

[7]In November 2014, the FSB issued a consultation paper on a common international standard on total loss-absorbing capacity for global systemic banks.

[8]See Fiechter and others (2011) for an exhaustive discussion.

Annex 2.1. Regression Analysis of the Drivers of the Decline in Foreign Banking Claims[24]

This annex describes the data and the regression model used to examine the drivers of the decline in foreign claims and provides more detailed results. Annex Table 2.1.1 lists the questions used to construct the model's regulatory index. Annex Table 2.1.2 provides a summary of data definitions and sources, and Annex Table 2.1.3 gives the coefficient estimates.[25]

Data on Foreign Banking Claims and the Regulatory Index

The dependent variable is the growth rate of foreign banking claims from a home country to a host country. In addition to total foreign claims, subcategories by type of claim and counterparty sector are also used. The data come from the BIS Consolidated Banking Statistics on an ultimate risk basis.[26] Statistical breaks are adjusted following Cerutti (2013). Quarterly claims over the period 2005:Q2–2013:Q3 are annualized and averaged over the precrisis (2005–07) and postcrisis periods (2011–13). The growth rate is computed by dividing the change in claims between the two periods by the average level in the two periods.[27]

The main explanatory variables of interest are the indices of changes in regulations on banks' international operations in home and host countries, based on the results of a survey conducted for the purpose of this chapter. Survey questions are classified into six categories each for home and host countries, as shown in Annex Table 2.1.1. Each country-category pair is assigned a value of 1, 0, or –1 when the number of answers reporting a tightening of regulations is greater than, equal to, or smaller than, respectively, the number of answers reporting a loosening. The final index is calculated as a simple average of the scores for the six categories.

Regression Model

The regression model takes the following form:

$$\Delta claims_{ij} = \alpha + \beta\ home_i + \gamma\ host_j + \delta\ bilateral_{ij} + \varepsilon_{ij},$$

in which $\Delta claims_{ij}$ denotes the growth rate of claims from home country i to host country j. The terms $home_i$ and $host_j$ are vectors of variables specific to home and host countries, respectively. Each of these vectors includes three indices of regulatory changes (one based on the survey results and two based on World Bank data on capital requirements and supervisory power; see Annex Table 2.1.3), the change in the exchange rate against the U.S. dollar,[28] the GDP growth rate, and the real policy interest rate. In addition, $home_i$ includes an indicator of banking sector health in the precrisis period. The term $bilateral_{ij}$ is a vector of bilateral variables, comprising the log of the physical distance between the home and host countries, a common language dummy, two variables capturing the importance of the claims from the home country in the host country and of the claims in a given host country from the home country perspective in the precrisis period, and the growth rate of bilateral international claims in the precrisis period.[29] The coefficients α, β, γ, and δ are parameters or vectors of parameters, and ε_{ij} is the residual.

The results reported in the text are broadly robust to the following specification changes: First, the indices on changes in capital requirements and supervisory power (computed from World Bank data) are excluded, which is an important robustness check given that the indices are not available for some BIS reporting countries, including Japan and the United Kingdom. Second, real long-term interest rates in home and host countries are used instead of real policy interest rates to control for unconventional monetary policy effects. Third, euro

[24]The author of this annex is Hibiki Ichiue.

[25]For more details, see Ichiue and Lambert (forthcoming).

[26]The BIS Consolidated Banking Statistics record the consolidated positions of reporting banks' worldwide offices, excluding interoffice positions. They comprise two subsets, compiled on different bases: an immediate risk basis and an ultimate risk basis. The immediate risk basis data allocate banking claims to the country of residence of the immediate counterparty; the ultimate risk basis data allocate claims to the country in which the final risk lies. The immediate risk basis data offer better coverage of time series and countries. In addition, they distinguish between international claims (sum of cross-border claims and local claims in foreign currency) and local claims in local currency, whereas the ultimate risk basis data provide a breakdown between cross-border claims and total local claims (sum of local claims in both foreign and local currencies). The immediate risk basis data, however, do not reflect risk transfers and have limitations in capturing banks' bilateral risk exposures. These issues are irrelevant when immediate risk basis data are aggregated by country of origin. The analysis described in this annex uses bilateral claims and thus relies on ultimate risk basis data.

[27]The literature often uses log differences to calculate growth rates. However, such a method naturally discards data when claims are zero at the start or end of the period and cannot capture home countries' entry into or exit from host countries, which may actually result from changes in regulations or other factors.

[28]The BIS Consolidated Banking Statistics are reported in U.S. dollars by converting claims in other currencies. Changes in claims from one period to another may then only reflect valuation effects following exchange rate fluctuations with the actual underlying position remaining unchanged (Cerutti 2013).

[29]Precrisis values of the variables of bank health and bilateral importance are used to mitigate endogeneity concerns.

area countries are either excluded from the sample or aggregated and treated as a single country. Fourth, the *International Country Risk Guide* country risk rating is added to the variables for host countries. Fifth, home countries' sovereign rating index or a banking crisis dummy is added to the regression. Finally, the indices for the changes in regulations in home countries are instrumented by the capital regulation index and supervisory power index from the World Bank in 2003 and 2006, to deal with possible endogeneity bias. The choice of instruments is justified by the possibility of regulation contagion as discussed in Demirgüç-Kunt and Detragiache (2002) and Houston, Lin, and Ma (2012).

Annex Table 2.1.3 reports the detailed results for different types of banking claims. The model is also estimated using the difference between the growth rates of different types of claims as the dependent variable. Significant nonzero coefficients confirm that two different types of claims have different sensitivities to some of the explanatory variables. These results are not reported.

Annex Table 2.1.1. Survey on the Regulation of Banks' International Operations

Category	Questions
Home Country Regulations	
Presence	Are domestic banks prohibited from acquiring foreign banks? Do domestic banks need their domestic supervisor's approval to acquire a foreign bank? Are domestic banks prohibited from establishing branches overseas? Do domestic banks need their domestic supervisor's approval to establish a branch overseas? Are domestic banks prohibited from establishing subsidiaries overseas? Do domestic banks need their domestic supervisor's approval to establish a subsidiary overseas? Are the requirements to obtain permission to establish a branch stricter than those applicable to subsidiaries?
Activity	Are domestic banks prohibited from making cross-border loans? Are domestic banks prohibited from purchasing foreign securities? Are there restrictions on the type of activities (for example, corporate and retail lending, residential mortgage, trade finance, long-term infrastructure finance, investment banking) that domestic banks can conduct overseas that do not apply to domestic operations? Are there additional regulatory requirements for domestic banks operating outside their home country beyond what would be required for similar operations conducted domestically?
Depositor Insurance	Are foreign depositors covered by deposit insurance?
Information	Do banking secrecy laws in your country limit your ability to share information about banks' operations and balance sheets with foreign supervisors?
Supervisory Discretion	Can the supervisor limit the range of activities a consolidated group may conduct and/or the locations in which activities can be conducted (including the closing of foreign offices) in specific circumstances (as per Basel Core Principle 12.6)?
Other	Did the authorities introduce other structural measures (such as Volcker reform, Vickers proposals, and others) that could weigh on the decision of some banks to expand internationally?
Host Country Regulations	
Presence	Is foreign ownership of domestically incorporated banks prohibited? Do foreign banks need the host country supervisor's authorization to acquire a domestic bank? What is the maximum percentage of foreign ownership of a domestic bank legally allowed? Are foreign banks prohibited from operating in the form of branches? Are the requirements for establishing a branch stricter for foreign banks than for domestic banks? Are there additional and/or different regulatory requirements for foreign-owned banks versus domestic banks?
Activity	Are there restrictions on the type of activities (for example, corporate and retail lending, residential mortgage, trade finance, long-term infrastructure finance, investment banking) that foreign banks can conduct domestically and that do not apply to domestic banks? Are there restrictions on domestic currency cross-border borrowing by banks? Are there restrictions on foreign currency cross-border borrowing by banks? Are banks required to fund part or all of their domestic operations with local deposits? Are there restrictions on the share of funding a domestically incorporated bank can obtain from a foreign parent? Are there restrictions on lending by domestically incorporated banks to a foreign parent?
Supervisory Discretion	Can the supervisory authorities impose ring-fencing measures in a discretionary way?
Information	Do banking secrecy laws in your country limit your ability to share information about banks' operations and balance sheets with foreign supervisors?
Resolution	Does the resolution authority have resolution powers over local branches of foreign firms and the capacity to use its powers either to support a resolution carried out by a foreign home authority or, in exceptional cases, to take measures on its own initiative (as per Key Attribute 7.3)?
Other	Did the authorities introduce other structural measures (such as Volcker reform, Vickers proposals, and others) that could weigh on the decision of some banks to retrench from your country?

Source: IMF staff.

Annex Table 2.1.2. Definition of the Variables

Variable	Description	Source
Claims	The dependent variable is the growth rate of bilateral claims from the precrisis period (2005–07) to the postcrisis period (2011–13), which is calculated from the change in average claims between the pre- and postcrisis periods. The precrisis growth rate of bilateral international claims, computed between 2002–04 and 2005–07, is used as a control variable.	BIS
International Operations Regulatory Index	An index constructed from answers to survey questions about regulation changes for 2006–14. See the text of this annex for more detail.	IMF
Capital Regulatory Index	Difference between Barth, Caprio, and Levine (2013) indexes in 2006 and 2011.	Barth, Caprio, and Levine (2013)
Official Supervisory Power Index	Difference between Barth, Caprio, and Levine (2013) indexes in 2006 and 2011.	Barth, Caprio, and Levine (2013)
Exchange Rate	Change in the exchange rate against the U.S. dollar between 2005–07 and 2011–13.	IMF, IFS
GDP	Growth rate from 2005–07 to 2011–13.	IMF, WEO
Real Policy Interest Rate	Change in the policy rate (or an alternative interest rate if not available) minus the one-year-ahead expected inflation rate between 2005–07 and 2011–13.	Central banks, Consensus Forecasts
Bank-Capital-to-Total-Assets Ratio	Average of the ratio in 2005, 2006, and 2007.	World Bank
Distance	Log distance between two cities, mostly capitals, in home and host countries. The distance to Hong Kong SAR is proxied by the distance to Taiwan Province of China.	http://privatewww.essex.ac.uk/~ksg/data-5.html
Common Language Dummy	The variable is equal to 1 when the home and host countries use a common language and zero otherwise.	Rose (2004)
Importance of Host in the Claims from Home	Ratio of bilateral claims from a home country to a host country to total claims from the home country to all host countries, averaged over 2005, 2006, and 2007.	BIS
Importance of Home in the Claims on Host	Ratio of bilateral claims from a home country to a host country to total claims from all home countries to the host country, averaged over 2005, 2006, and 2007.	BIS

Source: IMF staff.
Note: BIS = Bank for International Settlements; IFS = *International Financial Statistics;* WEO = *World Economic Outlook*.

Annex Table 2.1.3. Results of Country-Level Regression for the Drivers of the Changes in Foreign Banking Claims

		By Instrument		By Sector		
	Foreign Claims	Cross Border	Local	Nonbank	Banks	Public
Regulatory Index (changes)						
International Operations (home)	–179.60***	–136.95*	131.74	–184.27**	20.88	249.65
International Operations (host)	–41.62**	–42.73**	9.26	28.17	–42.23*	6.91
Capital (home)	–7.09***	–2.02	3.96	–6.67***	0.43	4.14
Capital (host)	0.66	0.97	1.50	2.52	–2.01	7.47***
Supervisory Power (home)	3.88***	3.89***	1.73	2.23*	1.24	10.17***
Supervisory Power (host)	1.08	1.96	–3.51	2.10	0.93	–0.02
Exchange Rates (percent appreciation against US$)						
Home	2.89***	3.01***	–7.23***	0.01	4.21***	–10.26**
Host	0.07	0.20	1.28**	0.07	0.25	0.18
GDP (percent change)						
Home	0.39	0.44	7.07***	0.15	8.87***	1.82***
Host	0.88***	0.93***	1.22***	1.24***	0.12	0.65***
Real Policy Interest Rate (percentage point changes)						
Home	–1.54	0.68	55.21***	–7.60*	61.62**	7.77
Host	–5.00***	–6.27***	–2.58	–8.45***	–5.71**	–1.27
Bank-Capital-to-Total-Assets Ratio (percent in 2005–07)						
Home	10.50***	12.07***	18.52***	13.82***	12.51**	8.82***
Bilateral Geographic and Cultural Variables						
Distance (log, km)	–11.72***	–10.78**	–33.19***	–14.08***	1.76	–9.26*
Common Language Dummy	–3.50	–3.73	–3.66	–13.60	15.01	–1.40
Bilateral Share (percent in 2005–07)						
Host Country's Share of Claims from Home	0.77	0.82	–1.31	1.00	–2.65**	–1.11*
Home Country's Share of Claims on Host	0.86**	–0.10	0.63	0.17	1.40**	0.05
Bilateral Lagged Claims (percent changes from 2002–04 to 2005–07)						
International Claims	–0.18***	–0.17**	–0.36**	–0.19**	0.27**	–0.03
Number of Observations	518	433	328	424	352	417
R^2	0.27	0.27	0.22	0.28	0.26	0.19

Source: IMF staff estimates.

Note: km = kilometer; White's (1980) robust standard errors are used. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Annex 2.2. Analysis of the Role of International Banking Linkages in Mitigating or Amplifying Shocks[30]

This annex summarizes the analysis of the role played by global banks in mitigating or amplifying domestic and global shocks. The analysis uses panel data techniques on country-level and bank-level data to estimate the impact of international banking linkages on credit growth.

Country-level analysis

International banking linkages are measured in three ways, by (1) the ratio of cross-border claims to the total assets of the banking sector, (2) the ratio of international claims to total banking assets, and (3) the ratio of foreign subsidiaries' and branches' local claims in local currency to total banking assets. The second measure includes foreign currency domestic claims of foreign bank affiliates whereas the first one focuses exclusively on cross-border claims.[31] All of these variables are available from the BIS and adjusted for statistical breaks following Cerutti (2013). Other measures, such as the ratio of foreign claims to the nonfinancial sector to total domestic credit to the nonfinancial sector, are used for robustness checks.

Global (foreign) stress is measured by the VIX. Results are similar when an alternative measure is used (such as average credit default swap (CDS) prices of the global systemically important banks identified by the Financial Stability Board). Domestic stress is measured by the average expected default frequency (EDF) of the domestic banking sector (weighted by the size of the domestic banks). The EDF is used instead of CDS prices because the former has much better data coverage—CDS data are only available for the largest banks. Since the EDF can be contaminated by global stress, a measure of domestic stress purged of the effect of global stress (residual of a regression of the EDF on the VIX) is used as a robustness check. The average EDF for all listed firms, a broader measure of domestic shock, is also considered. The results are unchanged. Alternative specifications include a dummy for the global financial crisis (2008–09) and a dummy for domestic banking crises (Laeven and Valencia 2013).

The econometric specification is as follows:

$$\begin{aligned}\Delta bankcredit_{i,t} = {} & \alpha_i + \beta_1 X_{i,t-1} + \beta_2\, domestic\ shock_{i,t} \\ & + \beta_3\, global\ shock_t + \beta_4\, IBL_{i,t-1} \\ & + \gamma_1\, IBL_{i,t-1} \times domestic\ shock_{i,t} \\ & + \gamma_2\, IBL_{i,t-1} \times global\ shock_{i,t} \\ & + \beta_5\, domestic\ crisis_{i,t} \\ & + \beta_6\, global\ crisis_t + \gamma_3\, IBL_{i,t-1} \\ & \times domestic\ shock_{i,t} \times domestic\ crisis_t \\ & + \gamma_4\, IBL_{i,t-1} \times foreign\ shock_{i,t} \\ & \times global\ crisis_t + \varepsilon_{i,t},\end{aligned}$$

in which $\Delta bankcredit_{i,t}$ is the quarterly growth in bank claims to the private sector available from the IMF *International Financial Statistics;* α_i and $X_{i,t-1}$ capture country-level effects with country fixed effects and the real GDP growth rate; $domestic\ shock_{i,t}$ and $global\ shock_t$ are measured by the EDF of the banking sector and the VIX, respectively; and $IBL_{i,t-1}$ is the measure of international banking linkages. The main coefficients of interest are the γ coefficients that capture the interaction between the level of international banking linkages and the sensitivity of credit to domestic and foreign shocks. The baseline model is supplemented by the inclusion of dummies for domestic and global crises ($domestic\ crisis_{i,t}$ and $global\ crisis_t$) and their interactions.

Annex Table 2.2.1 summarizes the results from the panel regressions. Driscoll-Kraay standard errors are used to account for the potential heteroskedasticity and autocorrelation of standard errors. The results are robust to adding one lag of the dependent variable on the right-hand side to account for the persistence of credit growth or the possibility of boom-bust cycles, and to including additional country-level control variables. They also hold for subsamples of advanced economies and emerging markets and when the European countries are excluded from the sample. Finally, the results are robust to the exclusion of Vienna Initiative countries.

The above analysis is from the perspective of countries that are host to foreign banks. Annex Table 2.2.2 summarizes the results of the panel regressions from the perspective of the home country of international banks. For this specification, international banking linkages are

[30]The authors of this annex are Pragyan Deb and Kai Yan.

[31]To be precise, the first measure is not exactly a subset of the second measure because cross-border claims are reported on an ultimate risk basis whereas international claims are compiled on an immediate risk basis. See Annex 2.1.

measured by the ratio of nondomestic claims of banks domiciled in the country to the total domestic banking sector assets of the country. International banking linkages are measured in two ways: (1) ratio of cross-border claims to domestic banking assets and (2) ratio of international claims (including both cross-border claims and local claims of affiliates in foreign currency) to domestic banking assets. Local claims in local currency are less relevant from a home country perspective and are therefore not considered in this analysis.

Bank-Level Analysis of the Stabilization Role of Foreign Banks

The analysis uses balance sheet data for a panel of banks during the period 1998–2013. The data set contains 25,568 domestic- or foreign-owned subsidiaries over 15 years, though the number of active banks for which balance sheet data are available is much smaller and varies from year to year.

The data set is constructed in two steps. First, subsidiary banks are matched with their parent banks using ownership data from 2007 to 2013 from Bankscope's ownership database, which is extended back to 1998 (Porter and Serra 2011). The data set includes commercial banks, savings banks, cooperative banks, and bank holding companies. Adjustments are made to correct for missing or incorrectly identified parents, when possible. Independent banks or banks with no parent are considered to be their own parent. Second, bank parents' and subsidiaries' financial statement data since 1998 are obtained from Bankscope. Balance sheet data are annual, as of year-end, and on a consolidated basis. Unconsolidated balance sheet data are used to control for subsidiaries' characteristics. Country-level data are the same as used in the macro-level analysis.

Observations that show an annual growth rate of loans of more than 100 percent are dropped. These observations are likely to correspond to newly established subsidiaries operating for only a few months in their year of incorporation and represent fewer than 3 percent of the total number of observations.

The econometric specification is the following:

$$\begin{aligned}\Delta loan_{i,j,k,t} = {} & \alpha\, X_{i,t-1} + \rho\, foreign_i + \beta\, bankcrisis_{k,t} \\ & + \theta\, bankcrisis_{k,t} \times foreign_i + \delta\, bankcrisis_{k,t} \\ & \times X_{i,t-1} + \gamma\, bankcrisis_{k,t} \times X_{i,t-1} \times foreign_i \\ & + controls_{j,k,t} + \varepsilon_{i,j,k,t},\end{aligned}$$

in which $foreign_i$ is a dummy variable equal to 1 if the bank is owned by a foreign bank. The variable $bankcrisis_{k,t}$ is now a dummy variable equal to 1 if the host country of the bank is having a banking crisis. In some specifications, $bankcrisis_{k,t}$ is replaced by a global financial crisis dummy, which equals 1 during the global financial crisis (2008–09). The term $X_{i,t-1}$ still denotes the bank-level characteristics of interest. We subtract the mean of $X_{i,t-1}$ from $X_{i,t-1}$ to facilitate the interpretation of the results. The two-way interaction terms can therefore be interpreted as the marginal impact of being in the treatment group (when the dummy is equal to 1) when the bank's characteristics are that of an average bank.

The coefficients ρ, θ, and γ are the focus of the analysis. A statistically significant ρ suggests that the lending behavior of foreign-owned subsidiaries differs on average from that of domestic banks. The coefficient θ measures the stabilization role played by foreign-owned subsidiaries during banking crises. The coefficient γ measures the way in which different characteristics of the parent bank or subsidiaries affect foreign subsidiaries' credit growth during crises. A negative and significant γ suggests that foreign-owned subsidiaries of a banking group with certain characteristics are less likely to support credit growth during financial crises.

The model is estimated with a standard fixed effects panel estimation method, with Driscoll-Kraay standard errors. Annex Table 2.2.3. reports the detailed results.

Annex Table 2.2.1. Credit Growth Panel Regressions from the Perspective of Host Countries of Foreign Banks

	International Banking Linkages Measured with					
	Cross-Border Claims		International Claims		Local Claims	
Real GDP Growth (year-over-year change, lagged)	0.26	0.31	0.35**	0.36**	0.34**	0.35**
Domestic Shock (average EDF)	–2.43*	–2.38	–2.29*	–1.19	–2.81**	–1.6
Global (foreign) Shock (VIX)	–12.99**	–17.19***	–11.19**	–13.35**	–12.00**	–14.03**
International Banking Linkages (lagged)	2.36***	2.10***	1.29**	1.25*	–1.47	–1.72
IBL × Domestic Shock	–4.43***	–4.97***	–3.37***	–3.44***	–0.77	–0.51
IBL × Global Shock	–2.26**	–0.15	–2.34***	–1.48	–0.76*	–1.14*
Domestic Crisis		–1.06		–2.27*		–2.35*
IBL × Domestic Shock × Domestic Crisis		12.22*		2.28		2.2
Global Crisis (2008–09)		1.98		1.78		1.77
IBL × Foreign Shock × Global Crisis		–1.96		–0.83		0.24
Number of Observations	1,486	1,486	2,174	2,174	2,135	2,135
Number of Countries	49	49	49	49	49	49
R^2	0.12	0.13	0.09	0.10	0.09	0.11

Source: IMF staff estimates.

Note: EDF = expected default frequency; IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Volatility Index. The dependent variable is the quarterly growth in bank claims to the private sector. Country fixed effects are included, but not reported. Driscoll-Kraay standard errors are used to take into account potentially heteroscedastic and autocorrelated standard errors. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Annex Table 2.2.2. Credit Growth Panel Regressions from the Perspective of Home Countries of Foreign Banks

	International Banking Linkages Measured with	
	Cross-Border Claims	International Claims
Real GDP Growth (year-over-year change, lagged)	0.25	0.17
Domestic Shock (average EDF)	–2.64	–2.8
Global (foreign) Shock (VIX)	–13.99**	–15.69**
International Banking Linkages (lagged)	2.86	2.11
IBL × Domestic Shock	4.48	–0.05
IBL × Global Shock	19.49	25.39*
Number of Observations	749	1,250
Number of Countries	23	27
R^2	0.12	0.09

Source: IMF staff estimates.

Note: EDF = expected default frequency; IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Implied Volatility index. The dependent variable is the quarterly growth in bank claims to the private sector. Country fixed effects are included, but not reported. Driscoll-Kraay standard errors are used to take into account potentially heteroscedastic and autocorrelated standard errors. *$p < 0.10$; **$p < 0.05$.

Annex Table 2.2.3. Bank-Level Evidence on Foreign Bank Stabilization Role during Crises

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Loan Growth						
Host Country GDP Growth	0.52**	0.41***	0.43***	0.58***	0.35***	0.34***	0.54***
Domestic (host country) Banking Crisis	–16.46***	–20.02***	–19.97***	–21.12***			
Global Crisis	–6.92**				–10.35***	–11.42***	–13.76***
Foreign Ownership Dummy	4.35***	–0.82	–2.36	0.14	6.69*	4.41	3.89**
Domestic Crisis × Foreign	7.05***	3.06	4.00**	2.23*			
Global Crisis × Foreign	–8.59***				–7.22***	–5.54**	–4.85***
Parent Equity Ratio		62.95***			66.45***		
Foreign × Parent Equity Ratio		–38.08			–73.72		
Domestic Crisis × Parent Equity Ratio		–30.21*					
Domestic Crisis × Foreign × Parent Equity Ratio		126.05*					
Global Crisis × Parent Equity Ratio					–38.80		
Global Crisis × Foreign × Parent Equity Ratio					143.25***		
Parent Dependence on Ext. Funding			–0.36			0.61	
Foreign × Parent Dependence on Ext. Funding			–2.02**			3.42***	
Domestic Crisis × Parent Dependence on Ext. Funding			–1.46**				
Domestic Crisis × Foreign × Parent Dependence on Ext. Funding			–2.61				
Global Crisis × Parent Dependence on Ext. Funding						–3.48***	
Global Crisis × Foreign × Parent Dependence on Ext. Funding						–3.07**	
Subsidiary Local Funding Ratio				21.77***			11.18
Foreign × Subsidiary Local Funding Ratio				–8.00**			–8.87
Domestic Crisis × Subsidiary Local Funding Ratio				16.29***			
Domestic Crisis × Foreign × Subsidiary Local Funding Ratio				–0.18			
Global Crisis × Subsidiary Local Funding Ratio							26.08***
Global Crisis × Foreign × Subsidiary Local Funding Ratio							–9.41
Constant	18.35***	15.84***	15.90***	16.28***	16.12***	16.50***	18.37***
Observations	13,167	7,557	7,437	11,022	7,557	7,437	11,022
Number of Banks	2,031	1,491	1,471	1,751	1,491	1,471	1,751
R^2	0.14	0.10	0.10	0.13	0.09	0.09	0.14

Source: IMF staff calculations.

Note: Ext. = external. The dependent variable is the annual growth rate of loans by banks. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Annex 2.3. Analysis of the Effect of International Banking Linkages on the Probability of a Banking Crisis[32]

This annex summarizes the analysis of the effect of banking linkages on the incidence of banking crises using a discrete response model (probit). International banking linkages are measured as in Annex 2.2.

The dependent variable, host country banking crisis, is defined as in Laeven and Valencia (2013). Following the literature, the crisis variable takes the value 1 in the first year of a crisis, is set to missing for the subsequent two years (as banks are impaired in the aftermath of a banking crisis), and is zero in the noncrisis years.[33] The sample period covers the period 2002–13 (2005–13 when international banking linkages are measured with cross-border claims). The probit model takes the following form:

$$P(hostcrisis_{i,t}|\mathrm{X}) = F(\alpha\, X_{i,t-1} + \beta\, IBL_{i,t-1} + \gamma\, global\ shock_t + \delta\, IBL_{i,t-1} \times global\ shock_t + \varepsilon_{i,t}),$$

in which $X_{i,t-1}$ denotes the set of variables used in the benchmark specification. Drawing on the crisis prediction literature, $X_{i,t-1}$ controls for credit growth in the run-up to the crisis, real GDP growth rate, foreign exchange reserves, foreign debt, and the current account balance. These variables are obtained from the IMF's International Financial Statistics database. $IBL_{i,t-1}$ measures the level of international banking linkages in country i. The term $global\ shock_t$ captures global (foreign) stress measured by the VIX. The Greek letters α, β, γ, and δ are parameters or vectors of parameters of the explanatory variables and their interactions, and $\varepsilon_{i,t}$ is the residual.

Annex Table 2.3.1 shows the detailed results from the probit regressions. Similar results are obtained using a logistic (or logit) regression model. Although these regressions include country-level control variables, they do not include country fixed effects. Whereas the inclusion of fixed effects biases the results of the probit regressions but not those of the logit regressions, the logit specification with fixed effects ignores all countries that did not have a crisis during the sample period, leaving a relatively small and potentially non-representative sample of countries. Including or substituting the measure of global stress with a dummy for the global financial crisis does not change the results.

The results are robust to the use of additional explanatory variables such as financial depth (measured by credit-to-GDP ratio and a more inclusive measure developed by IMF [forthcoming c]), government primary deficit, inflation, real effective exchange rate misalignment, and other country-level controls for governance and supervisory powers. In addition, alternate definitions of crises, derived from episodes of slowdown in GDP growth rates and domestic credit, yielded similar results.

[32]The author of this annex is Pragyan Deb.

[33]Minoiu and others (forthcoming) and Gourinchas and Obstfeld (2012) drop four years of observations after the crisis. This chapter uses only two years to account for quarterly frequency of the data and the shorter period under consideration.

Annex Table 2.3.1. Detailed Probit Regression Results

	International Banking Linkages Measured with					
	Cross-Border Claims		International Claims		Local Claims	
Real GDP Growth (year-over-year change, lagged)	–0.03	0.03	–0.05*	–0.01	–0.05*	–0.01
Credit Growth (lagged)	0.08***	0.05***	0.06***	0.04**	0.06***	0.04**
Foreign-Exchange-Reserves-to-GDP Ratio (lagged)	–2.59	–4.89*	–1.96	–3.02	–1.81	–2.94
Foreign-Debt-to-GDP Ratio (lagged)	0.39**	0.36*	0.48***	0.48***	0.43***	0.42**
Current-Account-Balance-to-GDP Ratio (lagged)	–0.14***	–0.15***	–0.16***	–0.17***	–0.15***	–0.17***
International Banking Linkages (lagged)	0.16	0.29	0.19	0.31	–0.14	–0.69
Global (foreign) Shock (VIX)		7.26***		6.36***		5.78***
IBL × Global Shock		–0.86		–0.82		–6.57
Observations	1,324	1,284	1,840	1,800	1,792	1,753
Number of Countries	46	46	46	46	45	45
Chi-squared	41.78	44.60	47.51	59.72	46.51	62.54

Source: IMF staff estimates.

Note: IBL = international banking linkages; VIX = Chicago Board Options Exchange S&P 500 Implied Volatility Index. Banking crises are defined as in Laeven and Valencia (2013). The estimates are derived from a random effects panel probit model. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

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