CHAPTER 1

STABILIZING THE GLOBAL FINANCIAL SYSTEM AND MITIGATING SPILLOVER RISKS

Summary

Systemic risks remain high and the adverse feedback loop between the financial system and the real economy has yet to be arrested, despite the wide range of policy actions and some limited improvement in market functioning. Further effective government action—particularly geared toward cleansing balance sheets and strengthening institutions—will be required to stabilize the global financial system and to provide the foundation for a sustainable economic recovery. The banking system needs additional equity to absorb further writedowns as credit deteriorates, and risks are broadening to encompass nonbank institutions. The crisis has spread to emerging markets with the collapse of international financing, posing challenges to corporates, households, and banks as well as raising sovereign risk. The global policy response, including the IMF's enhanced lending framework, should help to mitigate crisis risks. There remains considerable scope for further public commitments in larger economies, but extensive provision of financing and the transfer of balance sheet risk from the private to the public sector have increased tail risks for certain mature market sovereigns.

Against this backdrop, Chapter 1 first outlines the key financial stability risks that have materialized since the October 2008 *Global Financial Stability Report*. Then, it examines the deleveraging process and its effects on the real economy. The following section assesses the vulnerability of emerging markets to global stress, especially focusing on the refinancing risks facing corporates. The outlook for global credit markets is then evaluated, along with IMF staff estimates of potential global financial writedowns. The stability risks facing financial institutions are assessed and the effectiveness of the policy response evaluated. The chapter concludes with a discussion on sovereign risks.

Box 1.1 summarizes the key financial stability challenges and policy priorities detailed in the chapter.

A. Global Financial Stability Map

The global financial stability map (Figure 1.1) presents an overall assessment of how changes in underlying conditions and risk factors bear on global financial stability in the period ahead.[1]

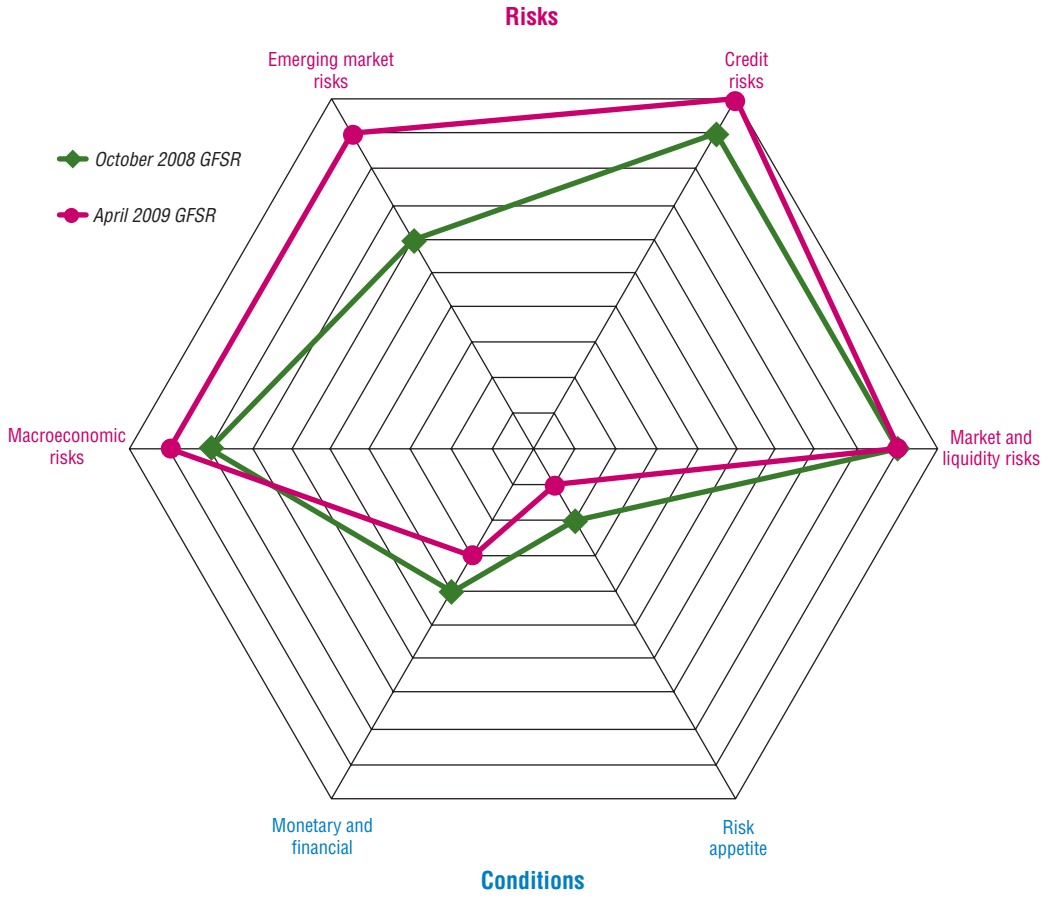
Note: This chapter was written by a team led by Peter Dattels and comprised of Myrvin Anthony, Sergei Antoshin, Amitabh Arora, Elie Canetti, R. Sean Craig, Kristian Hartelius, Geoff Heenan, Gregorio Impavido, Rebecca McCaughrin, Ken Miyajima, Chris Morris, Inci Ötker-Robe, Michael Papaionnou, Mustafa Saiyid, Rupert Thorne, and Ian Tower.

[1]Annex 1.1 details how indicators that compose the rays of the map are measured and interpreted. The map provides a schematic presentation that incorporates a degree of judgment, serving as a starting point for further analysis. The rest of the report elaborates on our overall assessment of global financial stability.

Nearly all the elements of the map point to a degradation of financial stability, with emerging market risks having deteriorated the most since October 2008.

The economic downturn has gathered momentum, resulting in a deterioration in *macroeconomic risks*. The IMF's baseline forecast for global economic growth for 2009 has been adjusted sharply downward to the slowest pace in at least

Figure 1.1. Global Financial Stability Map



Source: IMF staff estimates.
Note: Closer to center signifies less risk, tighter monetary and financial conditions, or reduced risk appetite.

Box 1.1. Near-Term Financial Stability Challenges and Policy Priorities

Global financial stability has deteriorated further, with emerging market risks having risen the most since the October 2008 Global Financial Stability Report. Notwithstanding some improvements in short-term liquidity conditions and the opening of some term funding markets, other measures of instability have deteriorated to record or near-record levels.

The global credit crunch is likely to be deep and long lasting. The process ultimately may lead to a pronounced contraction of credit in the United States and Europe before the recovery begins. IMF analysis suggests that financing constraints have been a large contributor to the widening of credit spreads, making repairing funding markets imperative to help avert a deeper recession.

Credit cycles have turned sharply, with the deterioration moving to higher-rated credits and spreading globally. The deterioration in credit quality has increased our estimates of loan writedowns, which would put further pressure on financial institutions to raise capital and shed assets.

The deleveraging process is curtailing capital flows to emerging markets. On balance, emerging markets could see net private capital outflows in 2009, with slim chances of a recovery in 2010 and 2011. This decline is likely to slow credit growth, impairing corporate refinancing prospects.

Within emerging markets, European economies have been hardest hit, reflecting their large domestic and external imbalances, fueled by rapid credit growth prior to the crisis. Banks operating in emerging markets may face mounting writedowns and require fresh equity, while corporates face large refinancing needs, increasing risks for emerging market sovereigns. While authorities have been proactive in responding to the crisis, policies are being challenged by the scale of resources required.

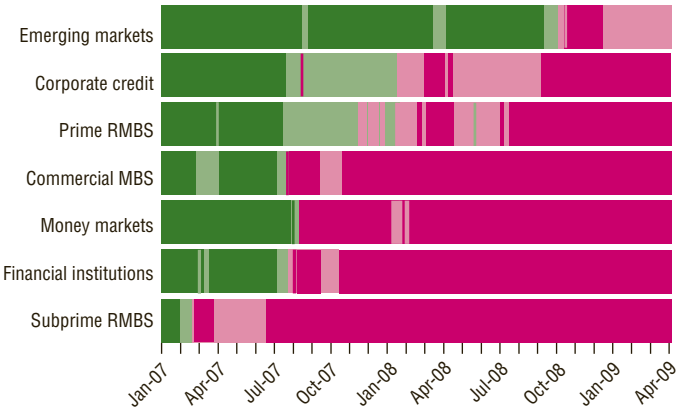
Fiscal burdens are growing as a result of bank rescue plans and macroeconomic stimulus packages. Increased funding needs and illiquid capital markets have exerted pressure on sovereign credit spreads and raised concerns about the market's ability to absorb increased debt issuance and about the crowding out of other borrowers. The United States faces some of the largest potential costs of financial stabilization, as do a number of countries with large banking sectors relative to their economies or concentrated exposures to the property sector or emerging markets (e.g., Austria, Ireland, the Netherlands, Sweden, and the United Kingdom).

Stabilizing the financial system requires further policy actions. The global policy response to date has been unprecedented, but has not prevented the onset of the adverse feedback loop with the real economy. It is thus necessary to undertake further forceful, focused, and effective policy action to stabilize the financial system. In particular, the public sector should ensure viable institutions have sufficient capital when it cannot be raised in the market, accelerate balance sheet cleansing and bank restructuring, and harmonize measures supporting funding markets. Public support measures also need to consider the risk of solvency pressures among other financial institutions (e.g., insurance companies, pension funds).

four decades. The reduction in trade financing has exacerbated the slowdown in global trade, particularly affecting emerging economies. A raft of official measures that transfer risk from private sector financial institutions to the public sector has increased pressures on sovereign balance sheets and credit (see Section E).

Uncertainty about the scale of the downturn and continued stress on the financial system has further increased *credit risks*. The core financial system remains fragile and public confidence low, as the credit deterioration has intensified and spread to higher-quality assets (Figure 1.2). The global financial system is facing a once-in-a-century event, where credit risks have risen to extremely high levels. Activity has improved in credit markets receiving government support, but other sectors remain moribund (see Sec-

Figure 1.2. Heat Map: Developments in Systemic Asset Classes



Source: IMF staff estimates.

Note: The heat map measures both the level and one-month volatility of the spreads, prices, and total returns of each asset class relative to the average during 2004–06 (i.e., wider spreads, lower prices and total returns, and higher volatility). That deviation is expressed in terms of standard deviations. Dark green signifies a standard deviation under 1, light green signifies 1 to 4 standard deviations, light magenta signifies 4 to 7 standard deviations, and dark magenta signifies greater than 7 standard deviations. MBS = mortgage-backed security; RMBS = residential mortgage-backed security.

tion D). Household balance sheets have come under pressure due to mounting job losses, falling net worth, and tight credit conditions. Expected credit writedowns by financials have ballooned, and, with private markets largely unwilling to provide capital to the banking system, the tail risk of more public sector ownership has increased.[2] Estimates for U.S. and European banking systems suggest both are undercapitalized (see Section E).

Our assessment is that *emerging market risks* have heightened the most since the last GFSR, moving out three notches. Cross-border bank lending to emerging markets has begun to contract. Capital market financing is sporadic, and limited to higher-quality borrowers. Emerging market corporates face falling revenues and large financing needs and household balance sheets are under pressure (see Section C). Emerging market banks face liquidity and solvency pressures. Financing conditions could tighten further as a number of mature market banks active in emerging markets may ration credit and sell subsidiaries to preserve capital for their home markets. These pressures are most pronounced in central and eastern Europe, given their higher reliance on cross-border and wholesale funding, weaker balance of payments positions, and higher degree of credit risk. By contrast, in Latin America and Asia, the bigger risks are related to the dramatic collapse in global trade (including trade financing) and domestic activity.

While government guarantees of bank debt have allowed some medium-term funding, *market and liquidity risks* remain elevated. Interbank markets have improved, but are still functioning only at very short maturities (see Section E). *Monetary and financial conditions* have tightened despite global policy easing as credit standards continue to be tightened (albeit at a more moderate pace). In addition, rising nonperforming loans and pressures to delever have weakened

[2]See Chapters 2 and 3 on various measures of systemic risks.

the monetary policy transmission mechanism, constraining the effect of lower policy rates on new lending. *Risk appetite* has diminished as confidence remains depressed and counterparty risks high, adding to the pressures to further unwind positions in riskier assets.

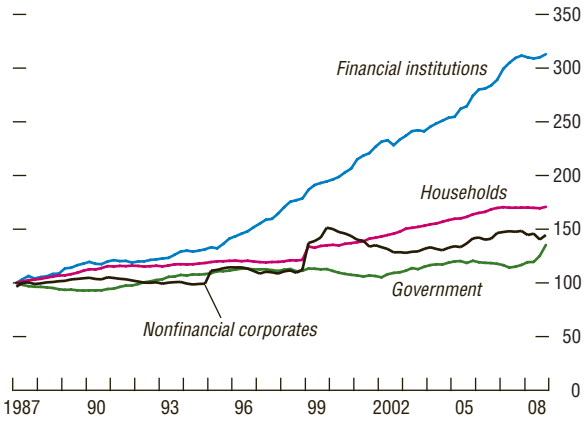
B. Global Deleveraging and Its Consequences

Previous GFSRs have highlighted that the global credit crunch will be deep and long lasting, as deleveraging accelerates in advanced economies and balance sheet adjustments take place over at least the next couple of years. This process has strongly negative global ramifications, raising crisis risks for emerging economies.

History suggests deep deleveraging will need to play out, although policies can lessen the economic consequences.

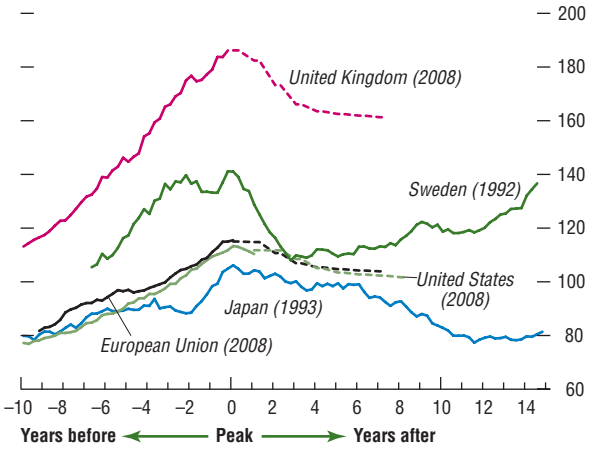
Financial institutions and households, in particular, had built up record levels of debt and are now seeking to reduce leverage (Figure 1.3). Deleveraging is being driven by mounting bank writedowns and the reversal of the intertemporal savings choices made by households and some corporates compared to the previous decade. Deteriorating credit quality has pushed up our estimates of bank writedowns, increasing pressures on banks and other financial institutions to raise capital and shed assets (see Sections D and E). Recent quarters have shown that the assumed moderation in macroeconomic and financial volatility, which had given many confidence to lever up their balance sheets, was a mirage. Leverage increases the probability of bankruptcy if volatility is high, and it is natural for private economic agents to want to lower leverage as they recognize that their earlier volatility assumptions were overly optimistic. Previous GFSRs have shown that various instruments and sectors of the financial system—structured investment vehicles (SIVs), conduits, constant-proportion debt obligations (CPDOs), auction rate securities (ARS), and hedge funds—were

Figure 1.3. Ratio of Debt to GDP Among Selected Advanced Economies
(In percent, GDP-weighted, 1987 = 100)



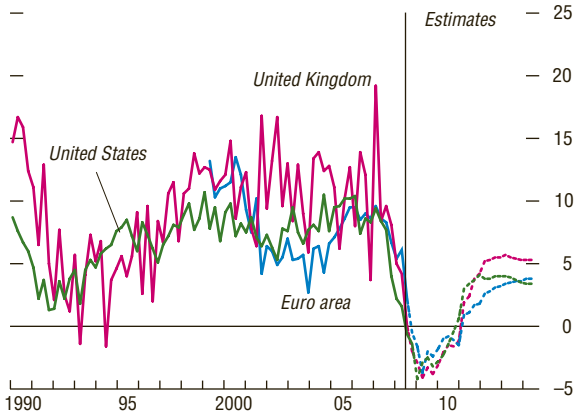
Sources: Bank of Japan; Bureau of Economic Analysis; Federal Reserve; Office of National Statistics; and IMF staff estimates.

Figure 1.4. Bank Credit to the Private Sector
(In percent of nominal GDP)



Sources: National authorities; and IMF staff estimates.
Note: Dashed lines are estimates. Year of credit peak in parentheses.

Figure 1.5. Private Sector Credit Growth
(Borrowing as a percentage of debt outstanding, quarter-on-quarter annualized, seasonally adjusted)



Source: IMF staff estimates.

predicated on high leverage. To the extent that many of these elements of the "shadow banking system" have already collapsed or are in serious difficulty, leverage is naturally declining.

The buildup of leverage that preceded this crisis was substantial, and certainly on a par with other periods in history that have ended in a collapse in credit. Figure 1.4 compares the ratio of bank credit to GDP in the current crisis to that in Japan and Sweden in the run-up to their crises in the early 1990s. Three features are apparent. First, the rise in bank credit in the United Kingdom has been massive, and has been greater in the United States and European Union than in Japan in the years preceding its bubble. Second, the crises in Japan and Sweden both caused the bank-credit-to-GDP ratio to drop by around a quarter from its peak. Third, Sweden achieved its deleveraging rapidly, and then started to rebuild, while deleveraging in Japan continued over more than a decade. The current trajectories for the United States and Europe appear similar to the Japanese path, but policies discussed in Section E can lessen the economic impact and speed the recovery period.

The global credit crunch is likely to be deep and long lasting.

The October 2008 GFSR envisaged that, if there were a substantial inflow of capital to the banking system (then estimated at $675 billion) and some assets were sold to achieve higher capital ratios, credit would decelerate but not contract. That has proved optimistic; equity capital for banking has been very difficult to raise from the private sector, the forces driving deleveraging have strengthened as the depth of the economic downturn has become clear, and credit spreads in many cases remain at historic highs. We estimate U.S. and European private sector credit could contract at a 4 percent quarter-on-quarter annualized rate at its most negative (Figure 1.5), reinforcing the deleveraging process.[3] A major element of the deleverag-

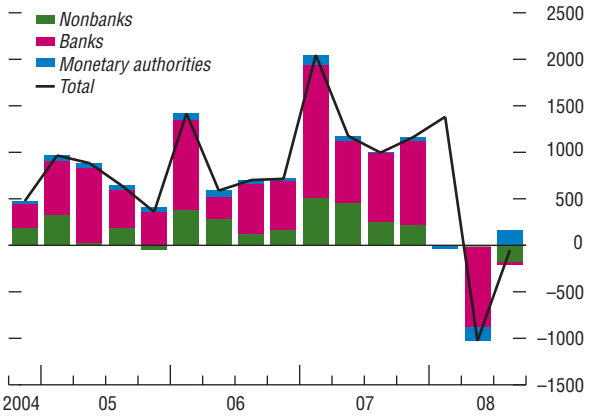
[3]The estimate combines the current *World Economic Outlook* GDP growth assumptions with a number of other

ing process is the sale of bank assets, either to public sector entities or to nonbanks, and the maturing of other assets.[4] This process still has a long way to go, as many illiquid assets have average remaining maturities of three to five years, although the adjustment of bank balance sheets is supported by purchases from government-sponsored asset management corporations, of which $2.6 trillion in the United States and Europe is assumed in this scenario.

Further pressures to deleverage come from heavy past reliance on wholesale funding.

Much of the credit buildup was financed through wholesale funding, which has since diminished. Those markets are unlikely to return to their former size in the foreseeable future. There remains a risk that this could force a more rapid, disorderly deleveraging. Large-scale official funding support has replaced a substantial part of the wholesale market. While in many jurisdictions banks can now issue government-guaranteed longer-term debt, banks' funding gaps remain large. Much of the earlier buildup in wholesale funding had occurred across borders, but the availability of cross-border funding has now contracted sharply (Figure 1.6).[5] As long as banks need to rely on guarantees and short-term liquidity for funding, pressures for balance sheets to shrink will constrain lending (see Section E).

Figure 1.6. Bank for International Settlements Reporting Banks: Cross-Border Liabilities, Exchange-Rate-Adjusted Changes
(In billions of U.S. dollars)



Sources: Bank for International Settlements; and IMF staff estimates.

assumptions (see Annex 1.4 of the October 2008 GFSR) to generate a possible path for the growth of credit. Policy measures being taken globally to support the supply of credit are assumed to soften the credit contraction somewhat. The forecasts conservatively assume credit to the private sector grows or shrinks at the same pace as bank assets. The former is a national accounts concept that focuses on flows from banks based in the country/region to residents of that country/region. Some bank lending is to nonresidents but, likewise, some borrowing by residents is from foreign banks.

[4]Often, the terms banks offer to refinance a loan will make it uneconomic to the borrower. The loan will thus be allowed to mature rather than remain on the balance sheet.

[5]Cross-border liabilities of Bank for International Settlements (BIS) reporting banks fell more than $1 trillion in the second quarter of 2008, but were little changed in the third quarter (adjusted for exchange rate changes).

Figure 1.7. Bank for International Settlements Reporting Countries: Cross-Border Assets as a Proportion of Total Assets
(Annual change in percentage points)

Sources: Bank for International Settlements; and IMF staff estimates.

The retrenchment from foreign markets is outpacing the overall deleveraging process.

The proportion of cross-border assets in banks' total assets fell again in the third quarter of 2008, as cross-border lending is falling at an even faster rate than overall credit (Figure 1.7). Three factors are likely driving the faster pace of cross-border deleveraging. First, increased credit risk concerns accentuate home bias in lending, as some banks perceive themselves less able to manage credit risk from a distance. Second, cross-currency and foreign exchange swap markets are impaired, and there are still some limits on the use of assets denominated in foreign currencies as collateral when accessing central bank facilities.[6] Third, cross-border exposures typically involve a higher regulatory capital charge due to currency or country risk. So shedding these assets is a quick way to improve capital ratios.

These factors and risks are particularly strong in the case of lending to emerging markets, further accelerated as a result of sovereign downgrades in emerging markets. The collapse in cross-border funding has already been a critical element in the intensification of the crisis in several countries. A retreat of total cross-border lending to the levels seen as recently as 2004 would imply a contraction of a further 10 percent, or $3 trillion. Such a contraction would most likely hit emerging markets disproportionately.

Domestic official support programs for banks are accentuating home bias, which may be accelerating the pace of cross-border deleveraging. This applies to support by both mature and emerging market governments, which is often provided on the condition, or the understanding, that lending to the domestic economy be maintained.

[6]This has been relieved somewhat by the expansion in bilateral swap arrangements and other foreign currency liquidity facilities introduced by many central banks.

As a result, capital flows to emerging markets are likely to reverse as foreign direct investment fails to offset bank and portfolio outflows.

Net private flows to emerging markets peaked at 4.5 percent of emerging market GDP in 2007 (Figure 1.8). However, the credit crunch in mature markets will likely cause significant outflows by banks in the coming years, as cross-border lending comes to a halt and a number of parent banks may begin curtailing financing to emerging market subsidiaries. An econometric analysis suggests outflows by banks could reach 5 percent of GDP in many emerging European countries, where cross-border bank inflows soared to unsustainable levels in recent years (see Annex 1.2). Such outflows would not be without precedent. Banking outflows of this magnitude were seen in some countries during the Latin American debt crisis in the early 1980s and again during the Asian financial crisis in 1997–98.

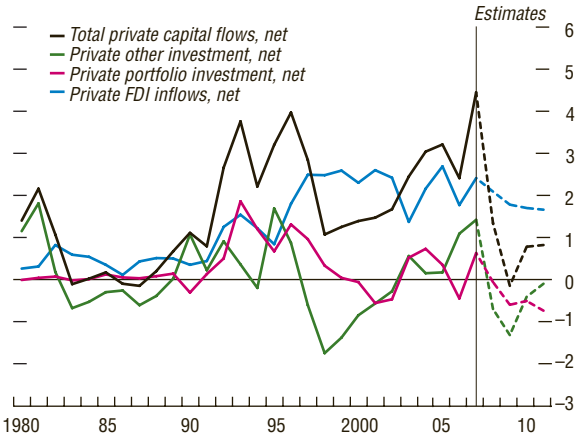
Emerging markets experienced large portfolio outflows at the end of 2008, and outflows are likely to continue over the coming years, given continued pressures for leveraged investors to shed assets, the risk of further redemptions from emerging market funds, and crowding out from government-guaranteed mature market bonds (Figure 1.9). We project annual portfolio outflows of around 1 percent of emerging market GDP over the next few years. Foreign direct investment in emerging markets is set to slow significantly, given diminished appetite from private equity firms, the lack of credit available to finance acquisitions, and sharply deteriorating cyclical growth prospects in emerging markets. On balance, emerging markets will likely see net private capital outflows in 2009, with slim chances of a recovery in 2010 and 2011. Moreover, risks to these projections appear to be to the downside, given how protracted the current global crisis is likely to be.

The global credit crunch has reduced the investor base for emerging market assets.

Emerging market assets under management by hedge funds have dropped by about half

Figure 1.8. Emerging Market Net Private Capital Flows

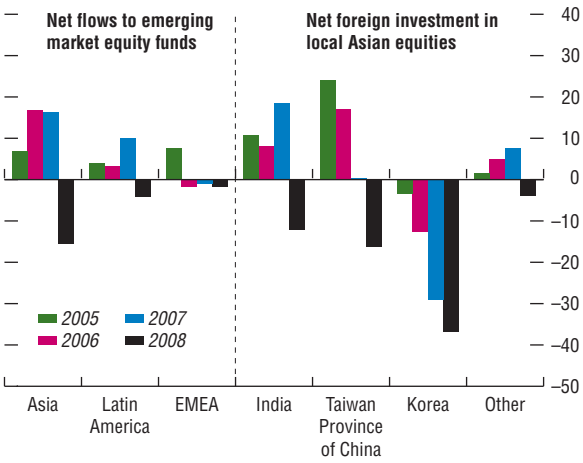
(In percent of GDP)



Source: IMF, World Economic Outlook database.
Note: FDI = foreign direct investment.

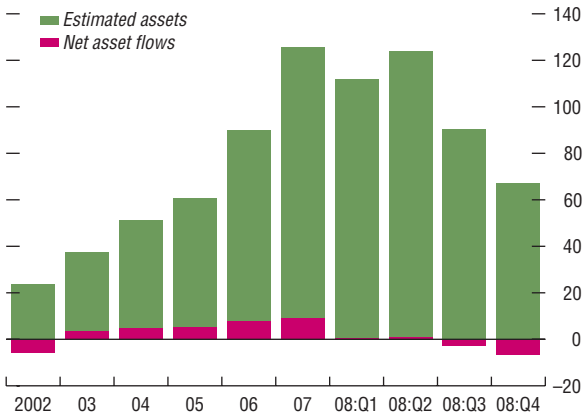
Figure 1.9. Net Foreign Equity Investment in Emerging Economies

(In billions of U.S. dollars)



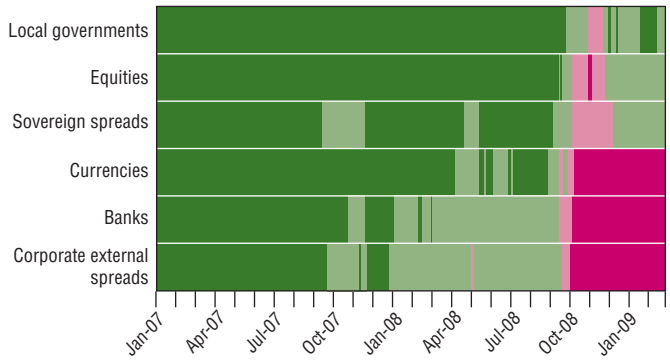
Sources: Bloomberg L.P.; Emerging Portfolio Research; and IMF staff estimates.
Note: "Other" includes Indonesia, the Philippines, Thailand, and Vietnam. EMEA = Emerging Europe, the Middle East, and Africa.

Figure 1.10. Emerging Market Hedge Funds: Estimated Assets and Net Asset Flows
(In billions of U.S. dollars)



Source: Hedge Fund Research.

Figure 1.11. Heat Map: Developments in Emerging Market Systemic Asset Classes



Source: IMF staff estimates.
Note: The heat map measures both the level and one-month volatility of the spreads, prices, and total returns of each asset class relative to the average during 2004–06 (i.e., wider spreads, lower prices and total returns, and higher volatility). That deviation is expressed in terms of standard deviations. Dark green signifies a standard deviation under 1, light green signifies 1–4 standard deviations, light magenta 4–7, and dark magenta greater than 7 standard deviations.

from their peak in early 2008 due to a combination of redemption pressures and negative performance (Figure 1.10). In the fourth quarter of 2008, withdrawals accounted for nearly one-third of the total $23 billion decline in assets under management. Retail investors have also withdrawn, with dedicated emerging market bond and equity funds experiencing substantial outflows, losing several years' worth of inflows in the second half of 2008—a magnitude similar to the outflows seen in 1998.[7] Surveys suggest crossover investors have shifted heavily away from emerging markets into mature market corporate bonds, including government-guaranteed debt, amid a reevaluation of the diversification benefits from emerging markets as theories of "decoupling" proved wrong. Over the longer term, market participants believe emerging markets will retain a core of institutional investors committed to strategic allocations. The reduction in the number of investors, however, combined with the disappearance of some broker-dealers, is likely to impair the liquidity of emerging market assets for several years to come.

C. The Crisis Has Engulfed Emerging Markets

Pressures on emerging markets intensified in September 2008, following the collapse of Lehman Brothers, as counterparty risks rose and as the credit crunch's impact on economic activity became indisputable (Figure 1.11). A large set of interlinked risks has already pushed some emerging markets into crisis, and threatens many more, particularly in emerging central and eastern Europe. The severity of the crisis in emerging markets and the risks of spillovers call for a strong and coordinated response from policymakers at a global level to ensure that adequate liquidity is available. The decision taken at the recent G-20 summit to increase

[7]It took about three years for inflows to return to emerging market dedicated investment funds after the Asian financial crisis in 1997–98.

the resources available to the IMF can serve as an example in this respect. Policies should also be aimed at keeping mature market financial institutions engaged, through close cooperation between home and host authorities. Emerging market policymakers, in turn, need to strengthen their financial systems and policies for the more challenging global economic environment.

Crisis risks in emerging Europe have increased sharply...

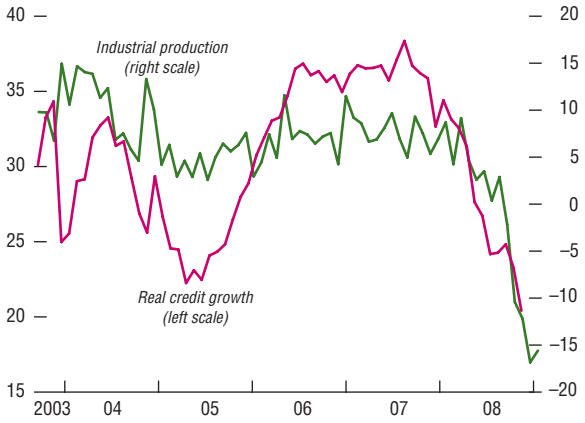
Emerging Europe has been hit hard by global deleveraging. The impact has flowed through the same financial linkages with mature markets that previously allowed the region to build up a high degree of leverage through rapid foreign-financed credit growth (Table 1.1). Cross-border bank funding is now being disrupted as the banking crisis in western Europe intensifies.[8] Growth in credit to the private sector is falling rapidly, intensifying the vicious circle between output declines and deteriorating asset quality (Figure 1.12).

As a result, external debt spreads have risen sharply, stock markets have collapsed, and currencies have come under pressure, especially in those countries with large domestic and external imbalances (Figure 1.13). Households and corporates in a number of countries have built up large foreign exchange exposures in the run-up to the crisis, and further currency depreciation could result in severe loan writedowns across the region, eroding the capital and asset quality of banks, including parents of foreign-owned subsidiaries.[9] In countries with tightly managed exchange rate regimes, the fear of currency and stock market collapse also risks capital flight, such as that experienced in Russia and Ukraine.

[8]Previous editions of the GFSR have highlighted strains in banking systems that relied heavily on financing through international debt markets, such as Kazakhstan and Russia, which were impacted earlier in the crisis.

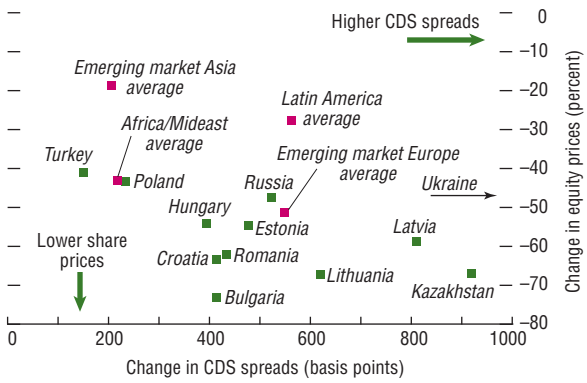
[9]Table 1.1 shows that foreign currency loans (mostly in dollars, euros, and Swiss francs) make up at least half of total loans in the Baltics, Bulgaria, Croatia, Hungary, Romania, Serbia, and Ukraine.

Figure 1.12. Emerging Europe: Real Credit Growth to the Private Sector and Output
(In percent, year-on-year)



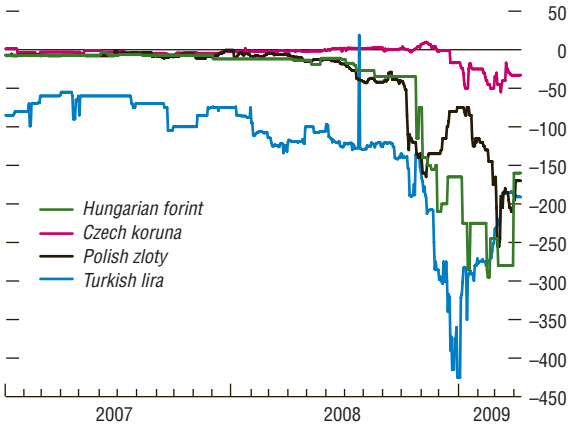
Sources: Bloomberg L.P.; IMF, International Financial Statistics database; and IMF staff estimates.
Note: GDP-weighted average for emerging European countries shown in Table 1.1.

Figure 1.13. Emerging Market Performance of Credit Default Swap (CDS) Spreads and Equity Prices
(August 29, 2008–March 16, 2009)



Sources: Bloomberg L.P.; Datastream; and IMF staff estimates.
Note: Figure uses countries in Table 1.1. State Bank of India for India's CDS spreads. Regional average values are weighted by GDP. For Ukraine, changes in CDS spreads and equity prices are 3,119 bps and –62 percent, respectively.

Figure 1.14. Cross-Currency Basis Swap Spreads
(In basis points, one-year tenors)



Source: Bloomberg L.P.
Note: All basis swaps are quoted against the euro, except the Turkish lira, which is quoted against the U.S. dollar.

...and financial interconnectedness within Europe increases the risk of adverse feedback loops.

Most emerging European countries are highly dependent on western European banks, which own the majority of banking systems in these countries (see Box 1.2). The parents are largely concentrated in just a few countries (Austria, Belgium, Germany, Italy, and Sweden), and in some cases, the claims of the western European banks on emerging Europe are large relative to home country GDP as well (Austria, Belgium, and Sweden).

These interlinkages create feedback loops between emerging and western Europe that could exacerbate the crisis. For instance, the deteriorating financial condition of emerging European subsidiaries affects their parents' liquidity and capital position. This has led to rating downgrades and higher funding costs for the parents, reducing their capacity to maintain funding to the subsidiaries, which further weakens the financial strength of the subsidiaries. Capital injections and wholesale funding guarantees to some parent banks by their home authorities have lessened risks to their subsidiaries, but raise other concerns, such as whether the parent banks will be pushed to divert credit to their home market. Sovereign credit default swap (CDS) spreads and bond yields of home countries with substantial exposures to emerging Europe have risen sharply on concerns about the potential costs of bailing out banks. Subsidiaries with loan-to-deposit ratios close to one (Table 1.1) can rely largely on their own funding sources to maintain lending, but, together with locally owned banks, face difficulties using local currency deposits to fund foreign currency loans owing to the dislocation in foreign exchange and cross-currency swap markets. Liquidity in these markets remains well below its level prior to September 2008, while the swap basis remains very wide for some currencies as global banks have scaled back dollar and euro liquidity (Figure 1.14). The Hungarian and Polish central banks recently introduced foreign exchange swap facilities to supplement private markets,

Table 1.1. Macro and Financial Indicators in Selected Emerging Market Countries

	Current Account Balance[1] *(Percent of GDP)*	External Debt Refinancing Needs in 2009[2] *(Percent of reserves)*	Net External Position vis-à-vis BIS Reporting Banks[3] *(Percent of GDP)*	Average Real Credit Growth over the Last Five Years[4] *(Percent, year-on-year)*	Loan/Deposit[5] *(Ratio)*	Forex Share of Total Loans *(Percent of total loans)*
Europe						
Bulgaria	–12.3	132	–34.9	35.9	1.3	66.9
Croatia	–6.5	136	–44.5	13.1	1.1	62.0
Czech Republic	–2.8	89	–13.1	16.0	0.8	13.6
Estonia	–6.3	346	–68.8	27.3	2.1	85.3
Hungary	–3.9	101	–50.2	14.3	1.4	65.7
Kazakhstan	–6.4	82	–5.1	50.1	1.7	43.6
Latvia	–6.7	331	–57.6	38.4	2.8	89.3
Lithuania	–4.0	204	–41.5	43.2	2.0	64.0
Poland	–4.9	141	–15.4	14.7	1.1	32.6
Romania	–7.5	127	–32.5	47.1	1.3	55.5
Russia	0.2	34	3.1	34.5	1.3	15.3
Serbia	–12.2	. . .	–12.2	26.2	1.2	68.0
Turkey	–1.1	110	–11.9	29.8	0.7	28.9
Ukraine	0.6	117	–10.3	47.5	2.0	59.5
Gulf States						
Kuwait	25.8	109	3.8	19.8	1.1	. . .
Saudi Arabia	–1.8	. . .	22.3	22.2	0.9	8.2
United Arab Emirates	–5.6	. . .	–12.2	. . .	1.2	18.9
Africa						
Egypt	–3.0	14	8.5	0.9	0.6	28.0
Ghana	–10.9	13	–5.0	26.4	0.8	. . .
Nigeria	–9.0	. . .	10.3	34.2	1.1	. . .
South Africa	–5.8	49	4.4	12.8	1.2	. . .
Uganda	–6.2	. . .	. . .	17.7	0.8	. . .
Asia						
China	10.3	14	0.7	11.3	0.8	. . .
India	–2.5	33	–8.9	18.2	0.8	. . .
Indonesia	–0.4	73	–7.5	15.1	0.8	19.8
Korea	2.9	93	–18.9	6.3	1.2	8.5
Malaysia	12.9	23	–8.3	5.2	0.9	. . .
Pakistan	–5.9	28	2.4	13.5	0.7	. . .
Philippines	2.3	39	–2.2	. . .	. . .	. . .
Thailand	0.0	34	1.3	2.6	1.0	. . .
Vietnam	–4.8	8	–7.4	26.4	1.1	21.2
Latin America						
Argentina	2.3	85	2.5	14.6	0.7	15.8
Brazil	–1.8	40	–7.1	15.9	0.8	. . .
Chile	–4.8	119	–7.2	11.6	1.4	. . .
Colombia	–3.9	52	0.5	16.0	2.0	6.3
Mexico	–2.5	64	–2.1	11.7	0.8	11.6
Peru	–3.3	27	–2.2	8.2	0.9	57.5
Venezuela	–0.4	59	19.7	45.8	0.8	<0.5

Sources: Bank for International Settlements (BIS); Bloomberg L.P.; IMF, Direction of Trade Statistics, International Financial Statistics, and World Economic Outlook (WEO) databases; and IMF staff estimates.

Note: The shaded boxes of the table point to areas of potential concern. Cut-off values are as follows: current account balance below –5 percent of GDP; refinancing needs in excess of 100 percent of reserves; net external liabilities to BIS reporting banks above 10 percent of GDP; average real growth of credit to the private sector greater than 30 percent year-on-year; loan-to-deposit ratio exceeding 1; and foreign-currency-denominated loans exceeding 50 percent of total loans.

[1]Projections of the current account balance and GDP for 2009 in dollar terms from the WEO.

[2]Short-term debt at initial maturity at end-2008 plus amortizations on medium- and long-term debt during 2009, estimated by IMF staff. Care should be taken in interpreting the figures, as circumstances among countries differ. For instance, the figures include obligations resulting from lending by foreign parent banks to domestic subsidiary banks, so the stability of the relationship between parents and subsidiaries needs to be taken into account. In addition, some countries have sovereign wealth funds whose assets may not be included in reserves.

[3]Data on external positions of reporting banks vis-à-vis individual countries and all sectors from the BIS, as of September 2008.

[4]Average growth of credit to the private sector, adjusted for inflation.

[5]Credit to the private sector relative to demand, time, saving, and foreign currency deposits.

Box 1.2. Cross-Border Exposures and Financial Interlinkages within Europe

Financial interlinkages within Europe have grown markedly with the rise in foreign ownership of banking systems in central, eastern, and southeastern Europe (CESE). Foreign ownership has brought important benefits to the host countries, including advanced technology and risk management techniques, increased access to cross-border funding, and rapid financial deepening. It has also brought important benefits to home countries in terms of income generation. At the same time, the growing financial links have raised susceptibility to negative spillovers for the hosts, as well as for the home countries.

Bank for International Settlements data show the interlinkages are substantial. Most CESE countries are highly dependent on western European banks, either through direct borrowing by their private nonbank sectors or through local banks. Many countries use large amounts of cross-border funding, in relation both to their GDP and to the size of their banking system assets (see first figure). CESE countries' funding exposures are fairly concentrated, with Austria, Germany, and Italy accounting for the largest share of claims on the region (see table). The Baltics obtain their funding mainly from Sweden. Such concentration of funding sources makes a large number of CESE countries heavily exposed to potential adverse developments in parent banks.

Western European bank credit exposures to CESE are generally not large in terms of the size of their own economies, but there are important exceptions (see second figure). Austria has the largest exposure to CESE. The claims of its banks amount to over 70 percent of its GDP and 26 percent of its banking system assets. Belgian and Swedish bank exposures are also relatively high in terms of their GDP, though much less so in relation to banking system assets. Even where direct credit exposures are well diversified across the CESE region (e.g., in Austria) or economically negligible (e.g., France, Germany, and Italy), potential economic and financial spillovers within CESE and western Europe could increase the impact well beyond those direct exposures.

Cross-border exposures have important implications for regional contagion and the spillover of financial pressures to real economies:

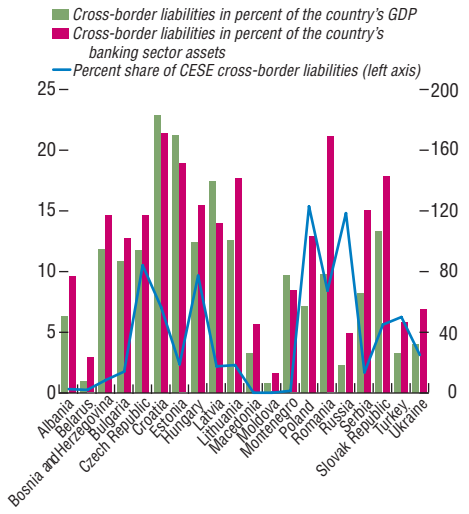
- Financial shocks could be transmitted by the "common lender channel," in which a western European banking sector has a large exposure to a trigger CESE country while being an important source of credit for other countries in the region. A shock affecting the trigger country that pressures banks in the common lender country could thus spill over to other CESE countries.
- CESE banks that are subsidiaries of foreign parents and are heavily dependent on parent funding to support credit growth could face a sudden shortfall of, or costly access to, credit, if the parent bank withdraws its lending to the subsidiary, or charges a much higher interest rate on its funding. While the reputational risk to the parent and the damage to its long-term business plans make this unlikely, Western banks have been facing increasing balance sheet pressure to slow lending and liquidity provision abroad as funding conditions in home countries become more difficult.

Some straightforward conclusions are that:

- The greater the dependence of a CESE country on funds from a regional common lender, the higher is its exposure to problems triggered in the common lender's banks.
- The greater the dependence on a common lender, and the greater the latter's exposure to a trigger country, the higher is the possibility of spillovers.
- The risk of spillovers is highest when the common lender has activities substantially concentrated in the region (e.g., Austria). They are smaller when the common lender's exposure to the CESE is small in terms of its own economic size (e.g., Italy), since exposures to any potential trigger country's problems are economically too small to affect the funds available to others.

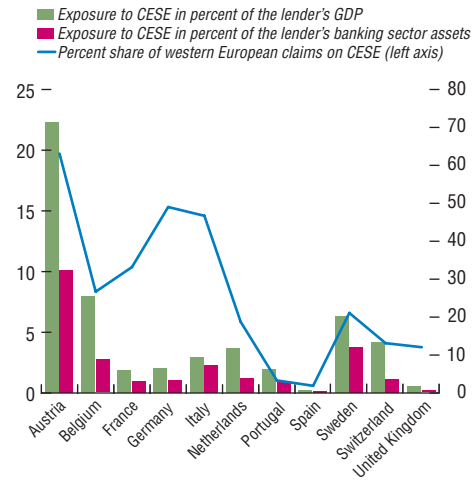
Note: This box was prepared by Inci Ötker-Robe, drawing heavily on Árvai, Driessen, and Ötker-Robe (2009).

Borrower's Funding Exposure



Source: Árvai, Driessen, and Ötker-Robe (2009).
Note: CESE = Central, eastern, and southeastern Europe.

Lender's Exposure to CESE, end-2007



Source: Árvai, Driessen, and Ötker-Robe (2009).
Note: CESE = Central, eastern, and southeastern Europe.

Central, Eastern, and Southeastern Europe Exposure to Western Europe, December 2007

(In percent of total cross-border outstanding obligations)

Borrower **Lender→**	Austria	Belgium	France	Germany	Italy	Netherlands	Portugal	Spain	Sweden	Switzerland	United Kingdom	Other	Total
Albania	46.6	0.0	9.8	0.5	20.1	0.1	. . .	. . .	. . .	0.1	0.1	22.8	100
Belarus	48.8	1.3	3.6	29.7	5.5	4.2	0.7	0.7	0.1	2.4	0.3	2.6	100
Bosnia and Herzegovina	49.9	0.1	0.1	22.5	25.7	0.7	. . .	0.0	0.0	0.3	0.0	0.5	100
Bulgaria	15.0	5.1	6.8	6.0	20.4	1.8	. . .	0.2	0.1	11.3	0.2	33.2	100
Cyprus	7.2	6.9	8.2	22.0	2.6	2.0	0.4	0.1	1.5	11.3	5.9	31.8	100
Czech Republic	29.7	24.3	18.2	5.8	9.9	3.6	0.1	0.4	0.1	0.5	. . .	7.4	100
Estonia	0.8	0.3	0.3	3.2	1.6	0.1	. . .	0.1	78.7	0.1	0.0	14.9	100
Croatia	36.4	0.4	8.2	19.4	32.5	0.2	0.0	0.0	0.0	0.2	0.6	2.1	100
Hungary	24.6	12.0	7.0	23.4	18.4	4.3	0.3	0.8	0.2	0.6	. . .	8.5	100
Latvia	1.9	0.0	0.6	10.4	2.9	0.0	0.0	0.1	58.6	0.1	0.5	24.9	100
Lithuania	0.9	0.2	0.8	8.6	1.7	0.2	0.1	0.0	64.4	0.4	0.1	22.4	100
Macedonia	6.9	0.3	0.2	5.4	1.4	0.2		0.2	. . .	0.6		84.7	100
Moldova	32.5	1.1	. . .	19.5	33.2	4.7	3.2	0.7	. . .	. . .	0.7	4.3	100
Montenegro	34.1	0.5	1.5	37.6	24.5	0.2	. . .	. . .	. . .	0.3	. . .	1.4	100
Poland	6.2	8.0	7.4	18.1	20.5	9.9	4.7	1.6	2.5	2.2	1.1	17.7	100
Romania	33.1	0.7	15.0	15.7	8.3	5.8	0.1	0.1	0.1	5.6	0.2	15.4	100
Russia	8.7	3.7	13.1	19.6	9.0	9.0	0.1	0.8	2.9	8.8	. . .	24.2	100
Serbia	36.3	0.2	5.8	12.8	19.5	0.0	. . .	0.0	0.0	5.7	0.1	19.5	100
Slovak Republic	36.1	15.3	5.8	4.7	23.6	5.8	0.0	0.1	0.1	0.1	. . .	8.4	100
Turkey	1.4	8.7	9.6	11.0	. . .	11.1	0.7	0.3	0.2	5.0	. . .	52.0	100
Ukraine	25.6	1.3	20.1	9.1	5.9	6.4	0.2	0.1	4.0	16.2	1.3	9.9	100
Central, Eastern, and Southeastern Europe	17.8	7.7	10.0	14.4	13.3	6.1	0.9	0.6	6.1	3.8	3.2	16.2	100

Source: Árvai, Driessen, and Ötker-Robe (2009).

Box 1.2 *(concluded)*

This analysis does not represent an assessment of the financial or macroeconomic vulnerability of individual countries. It only gauges a country's susceptibility to spillovers from problems in another country in the region, and helps identify the channels for such potential effects. The actual vulnerability of a country will depend on its macroeconomic fundamentals; the capitalization, liquidity, and general soundness of its banking systems and other key institutions; the maturity structure of its debt; and the nature of the regulations that affect financial relations between home and host institutions.

which has contributed to a narrowing of cross-currency swap spreads.

In Latin America and Asia, the dramatic drop in trade and domestic activity is leading to a collapse in working capital available to corporates.

Cross-border funding risks are somewhat less acute in Asia and Latin America, given that countries in these regions entered the crisis with generally stronger external balances, larger international reserves, and deeper local funding markets (see Table 1.1). Still, Asian and Latin American asset prices have fallen substantially over the past three quarters.

The Asian corporate sector looks likely to be hit hard by extremely large drops in trade volumes. Sharp drops in export revenues are leading some companies to burn through cash reserves rapidly, implying that financing needs will pick up. However, foreign financing is increasingly scarce. Hedge funds that had been a major source of capital for Asia's corporate expansion are now mostly trying to sell their largely illiquid assets, while foreign banks are deleveraging. Banks in Asia and Latin America are less impacted by the crisis than in emerging Europe, as they are mostly still well-capitalized and locally funded with low loan-to-deposit ratios, but are increasingly concerned about the quality of their loan books and are scaling back working capital financing to corporates.[10] A concern is that funding of bigger corporates will squeeze out small and medium-sized enterprises and new entrants.

The abrupt fall in trade volumes in recent months appears to have been worsened by the disruption in the provision of finance for working capital, including trade finance. The cost of trade finance has increased significantly and its modalities have changed, returning from open-account trade financing to more traditional structures (see Box 1.3).[11] Many exporters have restricted the credit they are willing to provide their customers as a result of reduced access to capital and heightened concerns about customer creditworthiness.[12] To address these concerns, the March 2009 G-20 summit committed up to $250 billion to support trade financing through export credit and investment agencies, and through multilateral development banks.

[10]China, where banks have been expanding balance sheets vigorously in response to stimulus measures, serves as a notable exception.

[11]Open-account trade financing is when the shipment occurs before payment is received, so the transaction is effectively financed by the exporter.

[12]Other exporters have been forced to give more generous trade credit terms to customers, such as a lengthening of payment terms. Whether exporters are tightening trade credit terms for customers or being forced to give them more generous terms may reflect which party has more bargaining power in any particular relationship. Either way, the net effect will be a reduction in the supply of such credit, since in the latter case, exporters will be repaid more slowly and may therefore have to restrict credit to other customers.

Credit growth in emerging markets is set to decelerate sharply as capital inflows come to a halt.

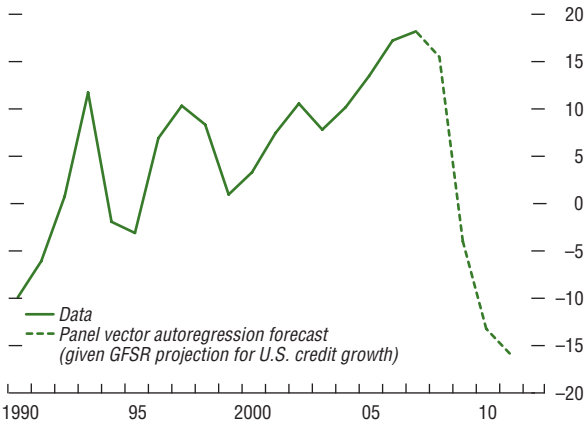
The econometric analysis presented in Annex 1.2 indicates that emerging markets that have been relying on foreign inflows to finance credit booms could see real credit contract by as much as 15 percent a year over the next couple of years, which would be similar to the magnitudes seen in previous episodes of "sudden stops" in emerging markets (Figure 1.15). The global policy response under way, with increased resources to the IMF and other international financial institutions, will help mitigate the drop in credit growth in emerging markets. However, large credit contractions are still likely to materialize in some countries in emerging Europe. Credit growth is set to slow considerably also in Asia and Latin America over the coming years, as banks in these regions are increasingly reluctant to lend with deteriorating economic conditions and rising loan writedowns.

Emerging market corporates are vulnerable to financial distress, as they have high external debt refinancing needs...

Given the run-up in emerging market corporate external debt in recent years, a slowdown in financing will impair the ability of these corporates to meet their debt refinancing needs. IMF estimates suggest refinancing needs (calculated as short-term debt plus amortizations of medium- and long-term debt) faced by emerging markets will grow from an estimated $1.5 trillion in 2008, to $1.6 trillion in 2009, and $1.8 trillion by 2012 (Figure 1.16).[13] The bulk of the increase is projected to come from corporates (including financial institutions). The requirements of emerging Europe are large not only in absolute terms—estimated corporate refinancing needs in 2009 amount to $124 bil-

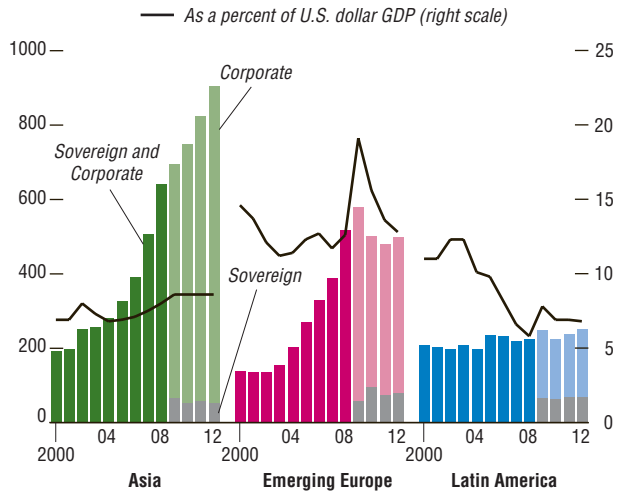
[13]These totals include refinancing needs in the Middle East and Africa, which are not shown in Figure 1.16. The time profile through 2012 assumes that a sudden stop does not occur, with refinancing needs in each year including around $1.2 trillion of short-term liabilities such as trade credits, intercompany loans, and nonresident deposits.

Figure 1.15. Emerging Market Real Credit Growth
(In percent, year-on-year, average in panel)



Sources: IMF, World Economic Outlook database; and IMF staff estimates.

Figure 1.16. External Debt Refinancing Needs
(In billions of U.S. dollars)



Sources: Bloomberg L.P.; IMF, International Financial Statistics and World Economic Outlook databases; and IMF staff estimates.
Note: Amortization of medium- and long-term debt on the year and short-term debt outstanding at the end of previous year. Corporate debt includes financials.

Box 1.3. Effects of the Global Financial Crisis on Trade Finance: The Case of Sub-Saharan Africa

The global financial crisis has affected the cost, volumes, and modalities of trade finance. Reports from most regions indicate trade finance has become more expensive, volumes have been hit, and banks have moved away from funded open-account facilities, which had become most common in recent years, to more traditional forms of trade finance as counterparty risk rose rapidly. It has also become increasingly difficult to obtain trade finance insurance: trade insurers, like monolines, have had excessive amounts of troubled assets on their balance sheets, are now forced to deleverage, and, therefore, have cut back on their activities dramatically.

As elsewhere, trade finance in sub-Saharan Africa has become significantly more expensive, usually involves shorter maturities, and has contracted in scale, although in this stage of the global crisis declining volumes also reflect a drop in global demand. Spreads have reportedly increased from 100 to 150 bps to around 400 bps over LIBOR as country risk and counterparty concerns intensify, with much higher spreads reported in some cases.

Higher trade finance costs stem not only from higher spreads on borrowing and fees, but also from delays in payments and deliveries, foreign exchange shortages, and cash constraints. In *Nigeria*, importers are increasingly being asked by banks to pay in foreign exchange (obtained from the central bank against proof of imports) at the time when letters of credit are being opened, which pushes them to rely on more expensive funding in local currency and constrains their working cash balances. *Ghanaian* banks are charging more to facilitate import transactions (as are corresponding banks abroad) and see a significant shift toward the use of pre-paid letters of credit as foreign exchange shortages in the domestic market intensify. Alternatively, they charge for documentary collections (a fee-for-service option that does not bear a bank guarantee risk) and collateral management arrangements.

Trade finance has been increasingly routed through either the largest well-established local banks (with long-term relationships with correspondent international banks) or via local subsidiaries of international banks. International banks now often either do not roll over or cancel funded overdraft facilities without warning. The situation may be particularly difficult in some low-income countries, where even large domestic banks may have limited international reputation.[1] And disruption may intensify as the macroeconomic shocks unfold.[2] As a rule now, international banks do not confirm clients' letters of credit unless they are prepaid, or have cash or other tangible collateral. They focus on longstanding relationships with known large local banks and have stopped doing business with second-tier banks, which are forced to seek access to trade finance through first-tier competitors.[3]

Note: This box reports on discussions with banks, corporates, regulators, and government officials in a number of sub-Saharan countries, and was prepared by Effie Psalida.

[1]International Finance Corporation staff have noted that even large domestic banks, with limited nostro balances to provide collateral, are encountering sizable difficulties in maintaining trade finance arrangements.

[2]Information on trade finance is normally proprietary between corporate customer and bank, between the two correspondent banks, or directly between corporates: data compilation is difficult and most evidence is anecdotal or impressionistic.

[3]A large South African bank, which intermediates much trade financing in sub-Saharan Africa, argues that foreign exchange is becoming harder to access in the region, that some larger banks have in recent months missed payment due dates, and that the bank itself is now extending trade credit in sub-Saharan Africa only on a case-by-case basis (evaluating both corporate and bank involved).

lion in Russia, $80 billion in Poland, and $62 billion in Turkey—but also in relation to official reserves, highlighting the region's vulnerability to a continued seizing up of capital flows to emerging markets (see Table 1.1). As a share of GDP in each region, the estimated refinancing needs in 2009 amount to 9 percent in Asia, 19 percent in emerging Europe, and 8 percent

in Latin America. Although substantial, corporate refinancing needs are less alarming in relation to official reserves and GDP in Asia and Latin America, and corporate debt spreads have not increased as dramatically as in emerging Europe (Figure 1.17).

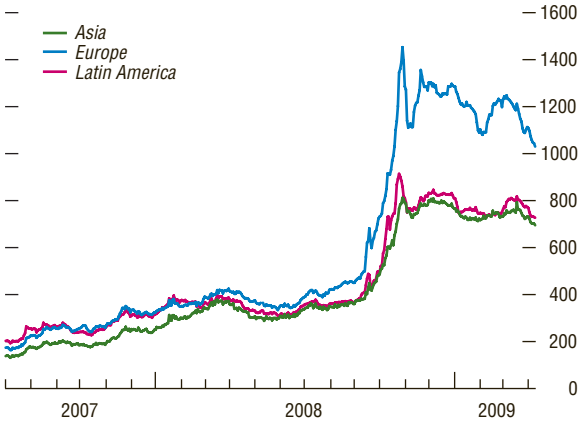
Currency depreciations are exacerbating the refinancing risk for corporates with high external indebtedness. In addition, corporates in a number of countries (such as Brazil, Indonesia, Korea, Mexico, and Poland) have suffered significant losses on currency derivative strategies that they took in anticipation of continued appreciation of domestic currencies that have, in fact, since depreciated sharply.

...that will be difficult to meet.

In light of the substantial challenges that emerging market corporates face, mature-market investment managers are loath to allocate resources toward the corporate debt market. Emerging market corporates had not yet become an established asset class prior to the crisis, with relatively few funds benchmarked to the main emerging market corporate indices. Now, most corporate bond funds have been suspended, with only a pool of fairly illiquid assets remaining under management. The overhang of illiquid assets, combined with the general retrenchment from emerging market assets, will make it difficult to regenerate an investor base for emerging market corporates that could underpin a revival of primary markets.

Domestic financing is not likely to be a sufficient substitute. In emerging Europe, corporate external refinancing needs for 2009 are especially large relative to the size of domestic credit markets. There are hardly any markets for domestic corporate bonds in emerging Europe, and external private refinancing needs amount to more than 50 percent of domestic bank credit to the private sector on average in the region. In Asia and Latin America, local funding may be able to mitigate the drop-off in foreign inflows to a greater extent, given that corporate external refinancing needs are in general smaller relative to domestic bank credit, and that local

Figure 1.17. Emerging Market External Corporate Bond Spreads
(In basis points over treasuries)



Source: JPMorgan Chase & Co.

corporate bond markets are more developed than in emerging Europe.[14] However, small and medium-sized corporates in Asia and Latin America are still likely to run into difficulties rolling over their debt.

Emerging market banks face mounting writedowns and require fresh equity as economic conditions deteriorate rapidly.

Estimates of the potential scale of writedowns on loans and securities at emerging market banks have been rising sharply in recent months. Writedowns in emerging market banking systems (including in the subsidiaries of foreign parent banks), could reach $800 billion or around 7 percent of assets (Table 1.2). While some systems have large capital buffers that could absorb writedowns of this scale, many emerging market banks (particularly in emerging Europe) will require fresh capital, possibly totaling $300 billion.[15] Much of this will have to be financed by the official sector, as there is little prospect of a timely resurgence of private investor interest in these institutions. But some governments will themselves be hard pressed to provide capital to the banks operating in their countries, as their fiscal positions are stretched by the economic downturn and the need for stimulus spending. Foreign banks with subsidiaries in emerging market countries are facing mounting credit writedowns at home and will find it difficult to make up the capital shortfalls of their subsidiaries. Thus, it is likely that many emerging market banks will face challenges in repairing capital deficiencies.

Emerging market sovereigns will suffer spillovers from banking and corporate distress.

Concern about the consequences for public finances of stimulus plans and bailout packages is raising market premia for sovereign risk. Our sovereign bond spreads model indicates that emerging market spreads have risen as a result of continued stress in core mature financial markets and deteriorating emerging market fundamentals (Figure 1.18).[16] Given the likely length and depth of the credit crunch in core markets, there is a risk that spreads will remain elevated throughout 2009 and 2010. In addition, rating agencies have downgraded sovereign debt ratings or outlooks in many emerging European countries, attributed in part to the cost of financial support packages.

Concerns about domestic banking conditions have also caused more volatile conditions for public sector debt, including some protracted interruptions in financing for emerging European sovereigns. Government issuers have had to shorten maturities as investors retreat from risk, increasing refinancing risks.

Hedging behavior has contributed another channel for spillovers from corporate and banking sector distress to sovereigns. In many cases, investors are hedging against risks on what are now illiquid holdings of emerging market corporate bonds by buying protection on sovereigns in CDS markets. This appears to have contributed to a rise in sovereign CDS spreads, above and beyond concerns about sovereign credit quality.

IMF analysis shows the extent to which CDS spreads have priced in concerns about spillovers

Table 1.2. Potential Writedowns and Capital Needs for Emerging Market Banks by Region

(In billions of U.S. dollars)

Region	Total Assets	Potential Writedowns	Potential Capital Buffer	Potential Capital Needs
Asia (excluding China)	4,668	270	148	122
Europe/Middle East/Africa	3,959	345	203	142
Of which: Eastern Europe	2,056	185	83	102
Latin America	2,957	181	144	37
Total	11,584	796	495	301

Source: IMF staff estimates.

[14]External corporate refinancing needs are equivalent to about 10 percent of domestic bank credit to the private sector in China, India, and Brazil.

[15]These figures exclude China.

[16]See Box 1.5 of the April 2006 GFSR for details about the model.

to emerging market sovereigns from mature market banks (see Annex 1.3). Market estimates of risks for emerging market sovereigns and the mature market banks exposed to them increased in tandem up to September 2008. However, in the fourth quarter of last year, risks in emerging market sovereigns moved significantly higher than in mature market banks, as the latter received support from their own governments. The analysis shows that the risk of distress for emerging market sovereigns in the case of default by a parent bank has increased substantially in recent months across all regions (Figure 1.19).

Emerging market sovereigns may also face spillover risks from increased mature market issuance of government and government-guaranteed debt, which may crowd out emerging market sovereign borrowers to some extent (see Section F).

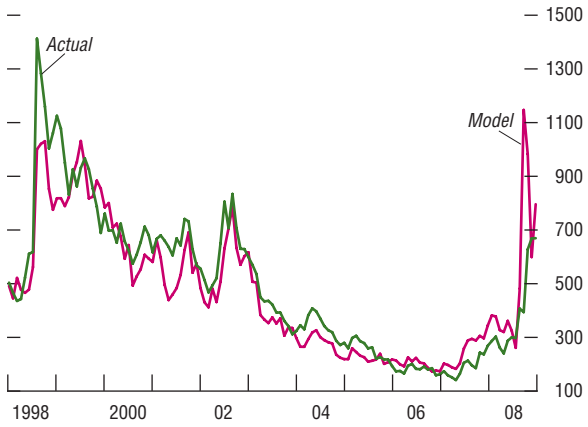
Emerging economies face unique policy challenges given the scale of resources required.

Emerging economies have introduced a range of policies to deal with the challenges of global deleveraging and risk aversion, but the scale of interventions needed in markets and banking systems will likely strain already limited resources.

Like their mature market counterparts, emerging market central banks have expanded liquidity provision to their banking systems, often by reducing relatively high reserve and liquid asset requirements and reversing the direction of open market operations in order to inject, rather than absorb, liquidity. However, the effect has been limited given that domestic interbank markets were often not a significant source of bank funding.

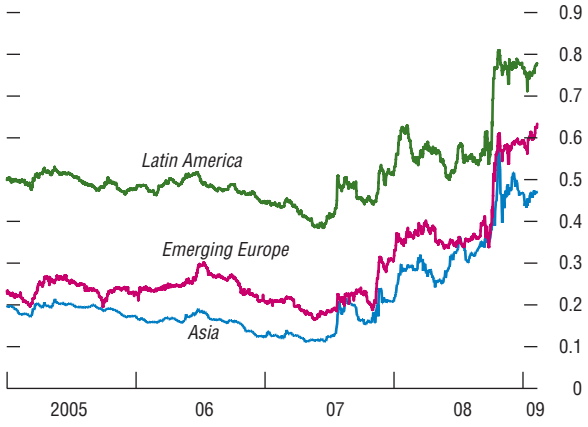
Many countries have introduced or expanded deposit insurance schemes to shore up confidence in local banks. The capacity to provide a credible deposit insurance safety net has sometimes been limited, particularly where the deposit base was highly dollarized. Some countries with additional resources have been able to extend guarantees to other bank liabilities.

Figure 1.18. Aggregate Emerging Markets Bond Index Global Spread
(In basis points)



Sources: JPMorgan Chase & Co.; and IMF staff estimates.

Figure 1.19. Distress Dependence between Emerging Market Sovereigns and Advanced Country Banks
(Average conditional probabilities for the region)



Source: IMF staff estimates.
Note: Probability of emerging market sovereign default in the event of default by a mature market bank exposed to the region.

Central banks have addressed the collapse in cross-border bank funding by providing dollars to local banks through swaps or outright sales of foreign currency. A few have been able to arrange swap lines with advanced economy central banks. In some cases, countries have imposed capital controls or measures to limit conversion of domestic currency to foreign exchange.

Some countries have directly supported credit for the corporate sector, including trade finance. This has been particularly important where local banks, facing their own pressures to deleverage, have been hard pressed to substitute for the drop in foreign financing.

Addressing the potential financing shortfalls facing emerging markets will require a significant coordinated response from the international community...

The international community will need to provide a large amount of resources and avoid measures that exacerbate existing deleveraging pressures on emerging markets. The decision by the G-20 to substantially increase the resources of the IMF and provide other forms of finance to emerging markets is an important step. The recent reforms of the IMF's lending facilities, introducing a Flexible Credit Line and streamlining conditionality, will provide support to emerging markets in the face of the global crisis (Box 1.4). However, additional short-term liquidity support from major advanced economy central banks to emerging market central banks may be needed on a case-by-case basis to address immediate refinancing pressures. This will be particularly important in emerging Europe, where major banks active in the region have rolled over existing funding, but may curb new funding.

Substantial longer-term resources would help emerging market countries shore up their financial systems, replenish reserves that are being rapidly depleted to finance measures to alleviate the crisis, and ease macroeconomic adjustment. In this context, the pledge of up to 24.5 billion euros in 2009 and 2010 by the European Bank for Reconstruction and Development, the European Investment Bank, and the World Bank to support banking sectors and bank lending to enterprises in emerging Europe, and the decision by the European Union to increase crisis support to non-euro members, mark welcome initiatives. With the passage of time, the provision of such support will increasingly need to be conditioned on the adoption of a broader set of corrective policies.

...and from national policymakers. Policies for Europe will have to take into account the particular importance of cooperation given the especially close linkages between mature and emerging Europe.

Given the speed and intensity of the crisis, policy actions have at times not been sufficiently coordinated either globally, or between mature and emerging countries within regions. The various channels for spillovers in both directions imply that systemic and comprehensive approaches are needed. Indeed, one of the important lessons that policymakers, including those at the IMF, drew from the Asian crisis is the dangers inherent in pursuing a one-country-at-a-time approach, although policies should also take care to recognize relevant differences between countries.

Financial support measures for parent banks in mature markets should take into account the risk of introducing home bias that may stifle the timely resumption of banking inflows to emerging markets. Similarly, advanced country bank deposit guarantees may have caused deposit outflows from emerging market banks where local authorities do not have sufficient resources to match the mature market guarantees. These problems may be especially acute in emerging Europe, where links between mature market parent banks and emerging market subsidiaries are particularly strong. International financial support packages to emerging market countries may need to include elements that can offset such effects by providing financing for policy measures that can support continued capital inflows and funding of local banks by the private sector.

Joint action should be taken to clean up bank balance sheets and ensure that banking groups are addressed in a coherent and durable manner. Regional stress tests involving both parent

and subsidiaries could help establish the level of impairment to assets and capital needs.

The absence of clear rules for cross-border crisis management and burden-sharing raises uncertainty about the costs the host country will bear, including the recapitalization needs of foreign-owned subsidiaries. There is also a need for clear rules on cross-border crisis prevention and mechanisms for the unwinding of public policy intervention. In the longer term, more harmonized prudential regulations and supervisory practices may enhance the effectiveness of

Box 1.4. Enhanced IMF Lending Capabilities and Implications for Emerging Markets

In response to the global credit crisis, the IMF overhauled its lending framework and expanded its resources.[1] Reforms were aimed at bolstering contingent lending instruments for crisis prevention, facilitating larger and more frontloaded financing and further streamlining conditionality. Markets have responded favorably to the reforms. This box discusses the key elements of the reforms and their implications for emerging markets.

In late March, the IMF overhauled its lending framework, with the intent of better tailoring IMF facilities to the varying needs of member countries. This reform included the creation of the Flexible Credit Line (FCL), the modernization of conditionality, and the simplification of (nonconcessional) lending terms. To bolster the IMF's lending capacity, the G-20 group of leading economies agreed to triple the resources available to the IMF to $750 billion. These measures are intended to provide reassurance that the IMF has the tools and resources needed, in turn restoring confidence to emerging markets. In addition, the G-20 agreed to support a general allocation of the IMF's Special Drawing Rights (SDRs) equivalent to $250 billion, in an effort to boost global liquidity.

The FCL is geared toward making conditions for access to IMF resources more flexible for countries with very strong fundamentals and policies. The key design feature of the FCL is the reliance on an ex ante screening process of qualification rather than the traditional ex post program conditions.[2] The FCL is expected to perform a catalytic role by providing assurances to investors that resources would be available if needed and therefore helping ensure the country's continued access to international capital markets.

Other key elements of the overhaul of the IMF's lending toolkit included increased flexibility of high-access precautionary Stand-by Arrangements to ensure all members have access to effective insurance instruments; streamlined conditionality by discontinuing the use of structural performance criteria; the elimination of seldom-used facilities; and the simplification of repayment terms of nonconcessional loans. The IMF is also working on an overhaul of its concessional lending facilities.

To meet the additional demand for capital, the G-20 pledged up to $1.1 trillion, including (i) commitment to immediately increase bilateral financing to the IMF from members by $250 billion, subsequently incorporated into an expanded and more flexible New Arrangements to Borrow, increased by up to $500 billion;[3] (ii) a $250 billion equivalent increase in SDRs to supplement existing official reserves of member countries;[4] (iii) $100 billion in additional funds

Note: The main author of this box is Rebecca McCaughrin.

[1]See detailed material on the reforms at www.imf.org/external/np/sec/pn/2009/pn0940.htm.

[2]The qualification criteria include a sustainable external position, a capital account position dominated by private flows, a track record of sovereign access to international capital markets at favorable terms, a relatively comfortable reserve position, sound public finances, low and stable inflation, a solvent banking system, effective financial sector supervision, and data transparency and integrity.

[3]Bilateral credit lines have already been committed by Japan ($100 billion), Europe ($100 billion), Norway ($4.5 billion), Canada ($10 billion), and Switzerland ($10 billion).

[4]The G-20-supported SDR allocation would raise the stock of SDRs nearly nine-fold to $282 billion at current exchange rates. Given that allocations are proportional to quotas, emerging markets will receive

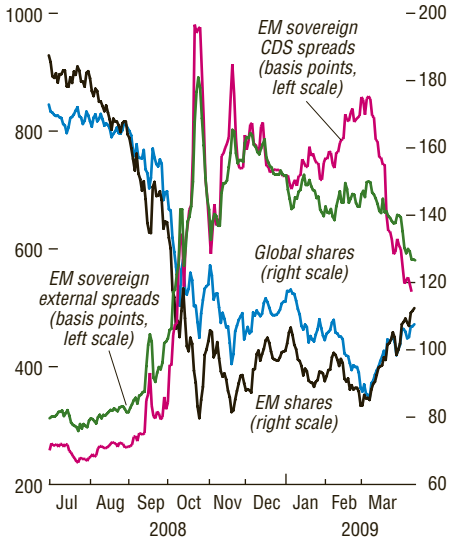
Box 1.4 *(concluded)*

provided by multilateral development banks; and (iv) $250 billion in trade credit provided by the World Bank and national export credit agencies.

The overhaul of the IMF's lending toolkit and the expansion of international financial institutions' resources are key elements of the global policy response, and its stabilizing effect has already been evidenced. By increasing access to external financing at favorable terms, risks of heightened balance of payment pressures have been reduced. To date, an FCL arrangement has been requested by Colombia (with access of $10.4 billion or 900 percent of quota), and approved for Mexico (with access of $47 billion or 1,000 percent of quota) and Poland ($20.5 billion or 1,000 percent of quota). Since the approval of the IMF's reforms, external credit and credit default swap spreads on emerging market sovereigns have tightened about 80 basis points, while comparable corporate credit spreads have tightened 40 basis points, though both remain near mid-October 2008 levels (see first figure). Emerging market shares rebounded, outperforming mature market stocks. Cross-currency swaps also narrowed in several countries, reflecting an easing in foreign currency funding constraints. Emerging European assets—where refinancing concerns are most acute—especially benefited (see second figure). Default probabilities receded, while currency, equity, and debt markets outperformed assets in other regions. Economies outside the region that applied for FCL funding or were perceived as benefiting from potentially higher access to official financing experienced gains across a range of core local assets. Several sovereign and quasi-sovereign borrowers have taken advantage of the improving financing environment to issue debt, while others are planning new issues. Nonetheless, risk appetite remains lukewarm—as demonstrated by still tepid flows into emerging market assets—and funding and credit markets remain severely strained.

about $80 billion, which will directly augment their reserves, and which can be exchanged for reserve currencies.

Sovereign Risk Premia and Share Prices

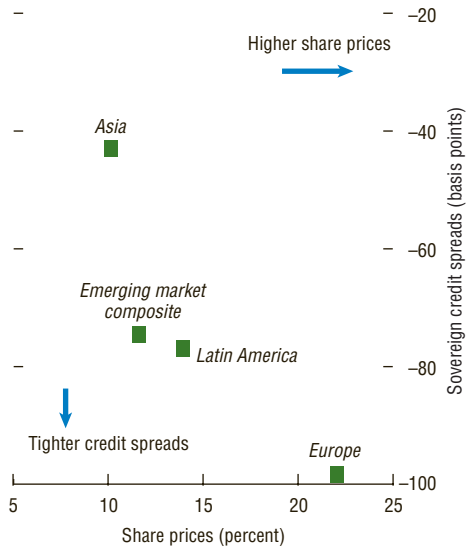


Sources: Bloomberg L.P.; JPMorgan Chase & Co.; and Morgan Stanley.

Note: Share prices represent MSCI indices in dollar terms, March 31, 2009 = 100. CDS = credit default swaps; EM = emerging market.

Emerging Market Regional Asset Performance

(Change March 31 – April 10, 2009)



Sources: JPMorgan Chase & Co.; Morgan Stanley; and IMF staff estimates.

supervision and regulation of cross-border banks, and reduce regulatory arbitrage. Joint supervisory analysis and inspections of systemically important banks should take into consideration the interconnectedness of risks and test for spillover risks that amplify the overall risk exposures of banks active in the region.[17]

Policymakers should also prepare for corporate and household distress, which will imply a need to plan for orderly debt restructurings in some cases.

Steps also need to be taken to prepare for wide-ranging corporate and household balance sheet stress. Some combination of public sector support and targeted corporate restructuring will likely be necessary in many countries.[18] In countries such as Kazakhstan, Russia, and Ukraine, the systemic importance of some of the corporates and the size of their funding gaps suggest the need for a comprehensive approach that would help ensure that any large-scale restructurings take place in an orderly manner, including with consensual private sector involvement. There will likely be a need for national authorities to coordinate on debt restructuring, given the importance of cross-border exposures.

Household debt restructuring may be necessary where households took on foreign-exchange-denominated liabilities, notably mortgages. In such cases, the authorities will need to assess whether the problem is large enough to require a generalized solution. Government-sponsored debt relief programs, perhaps with some form of risk- or loss-sharing between the government and banks (and possibly combined with bank recapitalization), may be needed to reduce the costs to the economy of widespread defaults, including costs associated with mortgage foreclosures, which could add further downward pressure on house prices and widen the problem.[19]

[17]See Chapter 2 for methods to measure interconnectedness of risks and systemic linkages.

[18]Annex 1.4 outlines principles involved in such restructuring drawn from country crisis experience.

[19]Such programs could include some elements of principal reduction, lowering of interest rates, or extension of loan terms. In some cases, it could include redenomination of mortgages into domestic currency loans, though consideration would then need to be given to the impact of what are likely to be higher domestic interest rates on the debtor's ability to pay. Bank regulators may also need to give consideration to special provisioning treatment for restructured loans.

D. The Deteriorating Outlook for Household and Corporate Defaults in Mature Markets and Implications for the Financial System

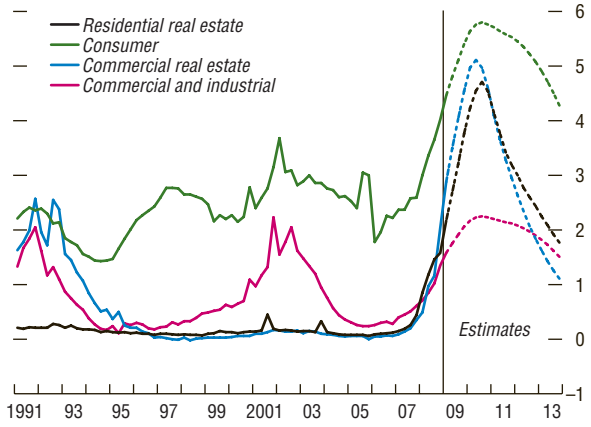
Real estate, consumer, and corporate cycles have turned in a global synchronized fashion...

Credit cycles have turned sharply across asset classes and geographical areas, with the deterioration moving to higher-rated corporate credits and other assets that had previously escaped the worst of the problems. Previous GFSRs have documented the rise in delinquencies across a range of credit markets and provided scenarios for projected charge-off rates on credit. An update of that analysis using the latest *World Economic Outlook* forecasts of a deeper and more protracted recession, larger declines in house prices, and a longer period of tight lending conditions results in a higher projected rate of credit deterioration compared to the last GFSR (Figure 1.20).[20]

Residential mortgage credit performance has continued to weaken in the United States and in Europe. Home prices in major advanced economies have already fallen roughly 10 percent from their peaks on average, with the sharpest declines in the United States (27 percent) and

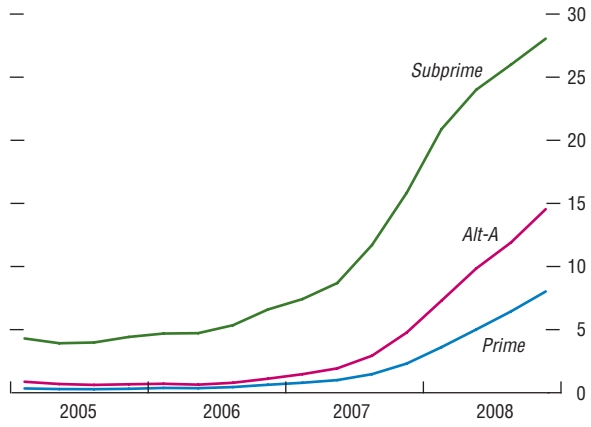
[20]Under our baseline case, where U.S. GDP bottoms out at –3.3 percent year-on-year in 2009:Q3, lending conditions cease tightening around the end of 2010, and home prices fall a further 18 percent from now until end-2010, charge-off rates on U.S. residential real estate loans peak at roughly 4.7 percent, consumer and commercial real estate loans at 5.3 percent, consumer loans at 5.8 percent, and commercial and industrial loans at 2.2 percent. Under an adverse (deflationary) scenario, where GDP bottoms out at –6.5 percent in 2010, normalization of lending conditions is postponed by 1.5 years, home prices drop by an additional 35 percent by 2012, and charge-off rates on residential real estate loans peak at roughly 9 percent, commercial real estate loans at 11 percent, consumer loans at 7.5 percent, and commercial and industrial loans at 3 percent.

Figure 1.20. U.S. Loan Charge-Off Rates: Baseline
(In percent)



Sources: Federal Reserve; and IMF staff estimates.

Figure 1.21. Delinquency Rate of U.S. Residential Mortgage Loans
(In percent of total loans, 90+ days)



Source: Bloomberg L.P.

the United Kingdom (21 percent). Futures markets are pointing to substantial further declines. In the United States, delinquency and foreclosure rates have continued to rise on both prime and nonprime loans (Figure 1.21) and foreclosure moratoriums and other work-out efforts have failed to reverse the deterioration. In some cases, public interventions, including large-scale purchases of mortgage-backed securities (MBS), have helped reduce primary and secondary mortgage rates and contain or narrow spreads.[21] Nevertheless, issuance of MBS has continued to decline, with U.S. and European originations down 40 percent year-to-date from already depressed levels during the same period last year.[22]

Commercial mortgages are following the same pattern as residential mortgages. Until recently, the outlook for commercial mortgages had appeared slightly brighter, as occupancy rates remained high, and contractual arrangements looked more robust. However, this apparent resilience has disappeared—commercial real estate prices have already dropped 21 percent since the peak in the United States, 35 percent in the United Kingdom, and are starting to edge lower elsewhere in Europe. Commercial real estate loan performance has begun to deteriorate in the United States and the United Kingdom. Delinquencies have started to rise, and will doubtless accelerate as the economic cycle deteriorates further. U.S., U.K., and euro area commercial mortgage-backed security (CMBS) spreads have widened on average over 1,800 basis points, 800 basis points, and 800 basis points, respectively, since the last GFSR,

[21]For instance, U.S. 30-year conforming MBS spreads have narrowed roughly 100 basis points since the peak.

[22]For prime mortgages, rates have fallen and credit terms have eased, so lower issuance reflects either lower demand (e.g., consumers are unwilling or unable to refinance or take out new mortgages) or rationed lending. In the nonprime segment, rates have edged up, and securitization markets are still closed, suggesting that supply may still be the constraining factor. In both cases, longer loan processing, credit verification, and home appraisal times may be slowing the translation of mortgage applications into loans.

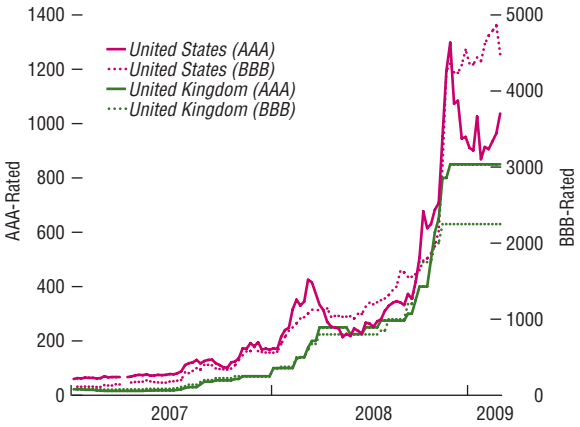
though with significant differentiation across the capital structure (Figure 1.22). The supply of commercial mortgages remains weak, with interest rates high. U.S. and European CMBS securitizations both collapsed 90 percent last year, and have been nearly nonexistent so far this year.[23]

...taking a toll on balance sheets.

Economic stress is also putting pressure on household balance sheets and debt servicing, in turn triggering deterioration in consumer credit markets. At the start of the crisis, U.S. households borrowed more heavily on credit cards and other forms of consumer credit as other credit channels began to close. That trend has since ceased, and consumer credit in Europe has also started to contract, as the financial condition of consumers has weakened sharply. This is illustrated by rising delinquencies, bankruptcies, and charge-off rates, while spreads have widened across most consumer credit sectors since the last GFSR (Figure 1.23).[24] Rates remain high and securitization anemic, suggesting that supply-side constraints predominate.[25] Since the peak, U.S. nonmortgage ABS issuance has fallen by more than 80 percent. European issuance, meanwhile,

Figure 1.22. Spreads on Commercial Mortgage-Backed Securities

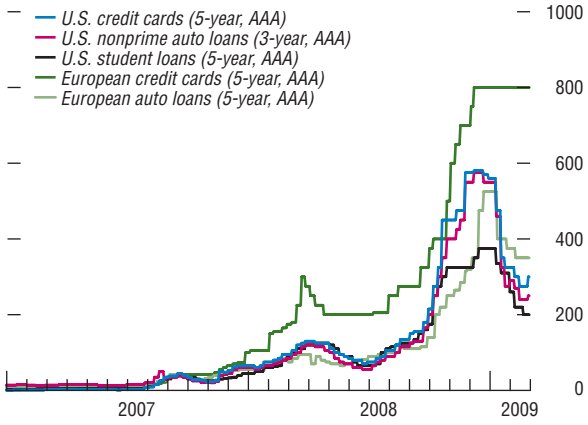
(In basis points, 10-year tenor, spread to government securities)



Sources: Merrill Lynch; and Morgan Stanley.

Figure 1.23. Spreads on Consumer Credit Asset-Backed Securities

(In basis points, spread to swaps)



Sources: JPMorgan Chase & Co.; Markit; and Morgan Stanley.

[23]In part, this reflects difficulties hedging loans. The CMBX, an index of credit defaults swaps linked to CMBS and commonly used as a hedging instrument, remains volatile and continues to diverge from the cash market. This makes it difficult to hedge prior to the execution of CMBS deals. In the United Kingdom, banks are reluctant to lend, as they are still digesting earlier heavy lending to property companies that are now experiencing severe difficulties. Moreover, with the drop-off in consumer demand, a number of retailers and manufacturers are under pressure, with banks frequently holding commercial real estate collateral against the credits.

[24]There has been some retracement since the announcement of the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF) program, which provides financing on a nonrecourse basis to holders of high-rated ABS backed by newly and recently originated loans. Highly-rated CMBS, which are also eligible under the program, have seen a similar improvement.

[25]Falling volumes of credit with lower interest rates suggest lower demand is the main driver (a leftward shift of the *demand* curve), but lower volumes with *higher* interest rates (as here) suggests credit supply is the driver (a leftward shift of the *supply* curve). It is the latter that we characterize as a credit crunch.

has continued to be supported by retained securitizations.[26] In some countries, public programs are offering alternative funding sources, access to liquidity, and favorable capital treatment, but these have yet to revive securitization volumes.

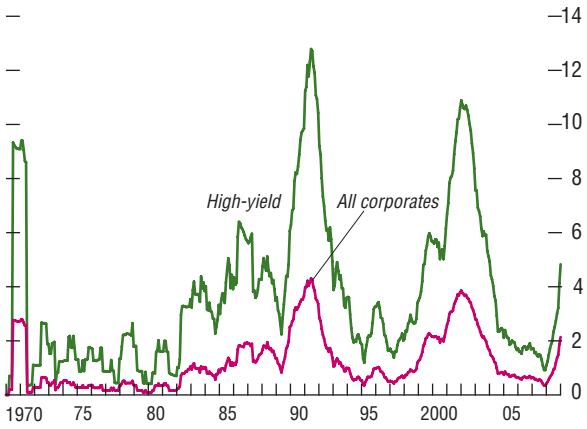
The corporate credit cycle is turning.

Nonfinancial corporates entered the crisis with strong liquidity positions, relatively low leverage, and generally sound balance sheets. However, corporate credit quality has deteriorated rapidly amid the weakening economic backdrop, tight lending conditions, and increased funding costs. Leading indicators, such as purchasing manager indices and new industrial orders, suggest the outlook for corporate cash flows is grim, and corporate bankruptcies are set to rise. Bankruptcy filings are rising in the United States and the United Kingdom, and conditions for debtor-in-possession (DIP) financing have tightened sharply.[27]

Globally, corporate default rates have risen to 2.1 percent (and 4.8 percent on high-yield debt, in particular), and are set to rise further (Figure 1.24).[28] Various forward-looking credit indicators, such as downgrade-to-upgrade ratios, the proportion of borrowers on negative outlook, the proportion of lower-grade, high-yield issuers, and the share of distressed debt, have increased dramatically in recent months. In addition, borrowers are breaching covenants in their loans more frequently, and recovery rates on defaulted bonds continue to slide (Figure 1.25).

As bank credit remains tight, corporates have been forced to turn to capital markets as an alternative, but at higher costs. Global corporate bond markets have seen a flurry of activity since the beginning of the year—nonfinancial corporate issuance has risen 68 percent year-to-date relative to the same period in 2008. Activity has favored

Figure 1.24. Global Corporate Default Rates
(In percent)



Source: Moody's.

[26]Retained securitizations refers to securitizations that are generated because they are eligible as collateral for obtaining liquidity from the central bank.

[27]DIP financing is used by companies to cover their operating expenses during a restructuring process.

[28]Private sector forecasts project U.S. speculative default rates will exceed levels seen in past recessions.

large, liquid, high-quality borrowers in sectors considered less vulnerable to the recession, and has been mostly geared toward refinancing existing debt.[29] New deals have been issued at considerably higher spreads than a year ago as investors have been worried about a deterioration in credit quality and possible future crowding out by sovereign and government-guaranteed debt. Corporates—even high-quality issuers—have been willing to pay punitive rates in order to replace bank financing or to hoard cash. Many still have untapped prenegotiated credit lines, but have preferred to keep those as a back-up in case bank lending remains scarce (and to improve their negotiating position vis-à-vis banks).

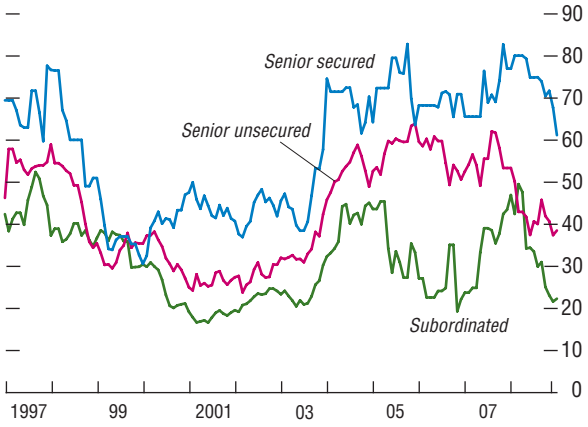
In secondary markets, a large share of global corporate debt is now trading at distressed levels (Figure 1.26). Some 70 percent of the high-yield market and 12 percent of high-grade debt is currently trading at spreads above 1,000 basis points. At such elevated spreads, the cost of funding exceeds many borrowers' hurdle rate or return on capital, threatening their viability. The rise in spreads has surprised many observers. Box 1.5, which seeks to disentangle the factors driving spreads, finds that the increase is being driven not just by worsening corporate profitability expectations and economic uncertainty, but also by financing constraints. Indeed, the analysis shows that financing constraints (as measured by total liabilities of issuers and London Interbank Offered Rate (LIBOR)–overnight index swap (OIS) spreads) have been the single greatest contributor to the widening in investment-grade spreads, particularly during the most recent period. This makes the repair of funding markets imperative to help avert an even deeper recession (see Section E).[30]

[29]The spike in activity, in part, reflects a backlog of deals from late last year, but also may represent opportunistic capital-raising to frontload 2009 financing needs as issuers take advantage of better liquidity conditions rather than wait to refinance closer to redemption dates.

[30]Box 1.5 provides a rule of thumb that narrowing LIBOR-OIS spreads by half a percent reduces the cost of borrowing for U.S. investment-grade firms by a full percentage point.

Figure 1.25. Average Recovery Rates on Defaulted U.S. Bonds

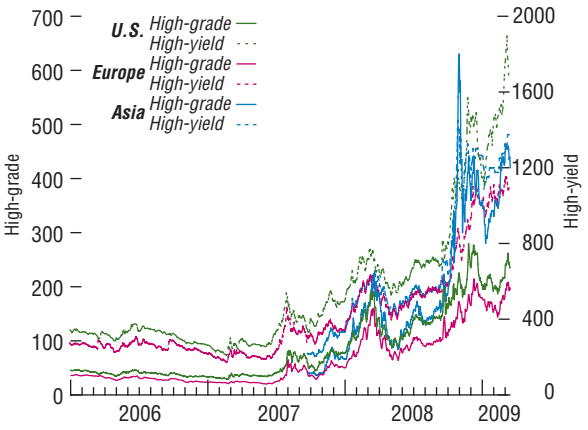
(In percent, trailing 12 months)



Source: Moody's.

Figure 1.26. Corporate Credit Default Swap Spreads

(In basis points)



Sources: JPMorgan Chase & Co.

Even though corporate debt outstanding is not unusually high by historical standards, refinancing that debt as it matures may yet pose serious challenges if spreads remain wide.[31] Cash flows at large U.S. and European companies are still generally ample to cover their interest payments, but this is less true for lower-quality and smaller corporates. High-yield borrowers are expected to need to refinance nearly 50 percent more debt this year than last year, and financing pressures will increase in 2011 and beyond as substantial amounts of debt issued during the leveraged buyout boom of 2005–07 matures.

Credit deterioration is feeding back to higher writedowns across all sectors.

As a result of continued pressures in credit markets, global financial institutions and other holders could face larger potential writedowns, according to our estimates (Table 1.3). Looking at the range of assets originated in the United States over the same cumulative period (2007–10) as in prior GFSRs, expected write-downs have risen to some $2.7 trillion, up from the $2.2 trillion estimated at our interim update in January 2009, and from the $1.4 trillion estimated in October 2008.[32] The rise represents the credit deterioration that the worsening economic cycle is creating (Figure 1.27). Considering a much wider set of outstanding loans and securities to include European-originated loans and related securities as well as Japanese-originated assets (totaling some $58 trillion compared to earlier estimates based on $27 trillion of U.S.-originated loans and securities) provides a broader, albeit more uncertain, assessment of potential write-downs of some $4.1 trillion.[33] While banks are expected to bear about two-thirds of the write-downs, other financial institutions including pension funds and insurance companies also have significant credit exposures.[34] Among other market participants, hedge funds have suffered losses related to both mark-to-market declines and forced asset liquidations due to redemptions.

E. Stability Risks and the Effectiveness of the Policy Response

Stability has proven elusive to attain.

The prior sections underscore that confidence in the international financial system remains fractured and systemic risks elevated. Policy actions have prevented an even deeper crisis, but the limited market improvement to date has been insufficient to prevent the onset of the adverse feedback loop with the real economy. Despite some recent tentative signs of improvement, bank equity prices, and to a lesser extent, senior debt prices, have continued to decline as writedowns mount and long-term earnings prospects remain uncertain. The impairment of financial institutions and core funding markets is curtailing credit to corporates, which have themselves also faced cash-flow pressures from the deteriorating economy. This section discusses stability risks to core financial institutions and assesses the effectiveness of policy measures in repairing financial sector balance sheets and reopening credit markets. The main message is that stabilizing the financial system remains a key priority and, although progress is being made, further policy efforts will be required.

Loss recognition is incomplete and capital is insufficient under a recession scenario.

Under the scenario of global recession and continuing credit pressures, we project banks

[31]Corporate debt-to-GDP ratios in the United States, United Kingdom, and Japan are below or only slightly above historical peaks, whereas financial sector and household leverage ratios are well above record levels.

[32]Higher losses on U.S.-originated assets than in previous estimates reflect higher projected charge-off rates, as loan performance has deteriorated faster than previously expected, and higher market-implied losses on CMBS, consumer ABS, and to a lesser extent, lower-quality residential MBS.

[33]For further details on the methodology for deriving loss estimates, see Annex 1.5.

[34]U.S. pension funds alone may incur writedowns of at least $200 billion on their credit exposures, over and above their equity valuation losses.

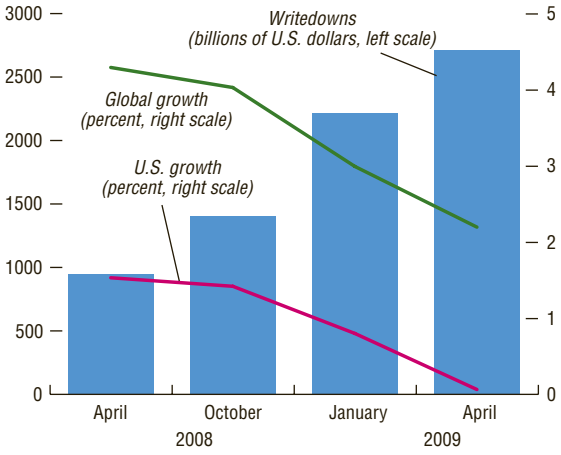
could incur roughly $2.8 trillion in credit-related writedowns over 2007–10 (see Table 1.3), of which about one-third have already occurred. Credit deterioration could substantially deepen for European banks in particular, including through their exposure to emerging Europe (see Section C). The size of the losses may ultimately turn out lower to the extent that forceful and well targeted actions by authorities manage to restore confidence and establish a more virtuous cycle, giving support to credit markets. Authorities in several countries have already made substantial efforts to strengthen bank balance sheets and limit some of the downside risks faced by banks. Banks worldwide have raised about $900 billion in capital to date (half of which has come from public sources), but additional equity is still needed to cushion potential writedowns and to restore investor confidence.

Mounting writedowns are depleting equity, increasing investor concerns about the size of capital cushions protecting bank solvency.

Since the start of the crisis, market capitalization of global banks has fallen by more than half from $3.6 trillion to $1.6 trillion, while the value of preferred shares and subordinated debt has also fallen sharply, underscoring concerns about the size and quality of capital cushions (Figure 1.28). Banks are increasingly being judged by markets on a contingent set of cash flows they could receive. Table 1.4 provides an illustration of banks' equity needs under a number of assumptions about the future environment for banking, including earnings streams and capital adequacy measures asserted by the market. Accordingly, there is considerable uncertainty surrounding these approximate top-down scenarios.[35] Moreover, the assessment of the needed recapitalization for specific banks should be done on the basis of the actual

[35]For the purpose of analyzing bank equity requirements, in addition to exposure to euro area and U.K. originated credit reflected in Table 1.3, bank exposure to credit originated in Denmark, Iceland, Norway, Sweden, and Switzerland was considered. Analysis of equity requirements in Table 1.4 has not included Japanese banks.

Figure 1.27. Estimates of Economic Growth and Financial Sector Writedowns

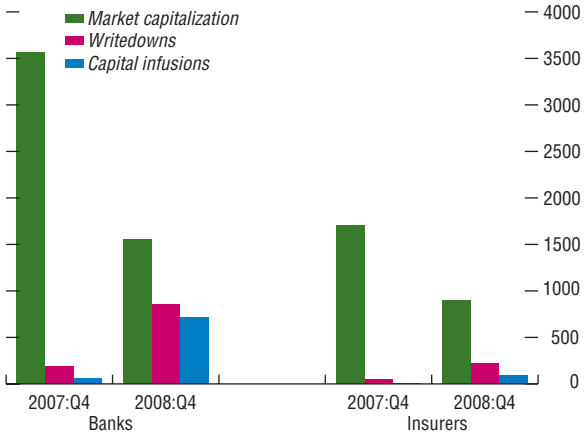


Source: IMF, *Global Financial Stability Report*, *World Economic Outlook*, various issues.

Note: Estimates of potential writedowns for 2007–10 on U.S. originated assets as reported in the GFSR and GFSR quarterly updates. GDP growth (year-on-year) is average for 2007–10.

Figure 1.28. U.S. and European Bank and Insurance Company Market Capitalization, Writedowns, and Capital Infusions

(In billions of U.S. dollars, end of period)



Source: Bloomberg L.P.

Box 1.5. Modeling Corporate Bond Spreads: A Capital Flows Framework

This box seeks to explain the widening in U.S. investment-grade corporate bond spreads, based on a combination of business cycle variables, volatility, and financial strains in the corporate, banking, other financial, and household sectors. The analysis suggests that financing constraints have played a pronounced role in driving spreads wider during the current period. As such, alleviating the pressures on funding markets is critical to improving the cost of financing for corporates. A 50 basis point reduction in the London Interbank Offered Rate (LIBOR)–overnight index swap (OIS) spread would translate into a roughly 100 basis point decline in corporate spreads.

This box attempts to model corporate bond spreads based on a cash-flows approach to explain the underlying key drivers. The equilibrium spreads are ultimately determined by cash flows or internal funds available to bond issuers and bond buyers. The analysis identifies factors affecting the cash flows from operating, investing, and financing activities across the major classes of bond issuers and bond holders. The drivers are intended to represent expected profitability, uncertainty, and liquidity constraints. The model displays linkages among financial strains in major sectors of the economy, asset returns, financial and economic risks, macroeconomic activity, and losses in the system.

Previous studies of corporate spreads have found it difficult to explain the sharp increase in spreads during the recent crisis. The conventional approach is to regress spreads on a broad range of macroeconomic and financial variables. Large residuals arising from these models are attributed to an unexplained component driven by illiquidity premia. In this box, spreads are modeled by explicitly accounting for illiquidity premia and funding strains.

Note: This box was prepared by Sergei Antoshin. Throughout this box, the data for the United States are used, but the analysis could be applied to Europe, for which the corresponding data are readily available.

The Capital Flows Approach

The analysis first introduces a new framework based on net cash flows for bond issuers and bond holders. Corporate spreads are modeled based on the supply-demand equilibrium conditions.

Three crucial sectors are identified from the supply side: nonfinancial corporates, commercial banks, and asset-backed securities (ABS) issuers, which are responsible for 33 percent, 7 percent, and 33 percent, respectively, of all corporate bond liabilities in the United States. The demand side is represented by households, commercial banks, life insurance companies, and mutual funds, which hold 16 percent, 8 percent, 17 percent, and 9 percent, respectively, of all corporate bonds.

The analysis models corporate spreads based on cash flows. Cash flows define the willingness of suppliers to issue bonds, and buyers to purchase bonds, and are generated and dispersed by three types of activities: operating, investing, and financing. For any given set of economic and financial conditions, each type of activity contributes to the decision of a supplier to sell, or a buyer to purchase, a bond, thus helping to determine the equilibrium price (spread over the risk-free rate).

For each sector and by type of activity, the analysis identifies the factors driving cash flows (see table). *Operating* cash flows are affected by either indicators of revenue, such as industrial production growth, or failure or loss rates, such as charge-offs for bank loans (see bottom figure). Cash flows from *investing* activities of bond issuers are driven by expected profitability proxied by GDP but hampered by uncertainty represented by the VIX. Cash flows from *financing* activities are affected by refinancing needs, represented by leverage, and cost of capital and funding, such as the cost of equity

for corporates and the LIBOR-OIS spreads for banks. Variables that are highly correlated with others, such as personal income that is closely related to GDP, are omitted.

Estimation

A separate model is developed for each of the three types of cash flows, each of which provides a good fit. The estimation is carried out over 1990–2008, with a quarterly frequency.

Operating cash-flows model:

$$S(t) = 6.028 - 0.282*D(t) - 0.060*CapU(t)$$
$$t \quad 5.4 \quad -2.7 \quad -4.3$$
$$- 0.013*EQ(t) + 0.005*D(t)*ABS(t), \quad (1)$$
$$-4.6 \quad 13.9$$

where *S(t)* is the U.S. investment-grade corporate spread (in percent), *D(t)* is the dummy 0,1 to identify the period when ABS spreads become available (in 2006:Q1).

Investing cash-flows model:

$$S(t) = 0.352 - 0.116*GDP(t) - 0.119*D1(t)*GDP(t)$$
$$t \quad 2.2 \quad -4.1 \quad -2.4$$
$$+0.051*VIX(t) + 0.040*D1(t)*VIX(t), \quad (2)$$
$$7.2 \quad 6.1$$

where *D1(t)* is the dummy 0,1 to characterize the increased sensitivity of spreads to fundamentals during the last cycle (six years).

Financing cash-flows model:

$$S(t) = 0.982 + 0.028*TL(t) - 0.022*EQ(t)$$
$$t \quad 11.3 \quad 3.1 \quad -8.7$$
$$+ 0.018*D2(t)*LOS(t) - 0.034*D2(t)*FL(t). \quad (3)$$
$$14.4 \quad -1.7$$

Combined model:

Bringing these together gives the following combined cash-flows model that incorporates business cycle variables, a measure of volatility, equity prices, and indicators of financing constraints:

$$S(t) = 7.999 - 0.094*CapU(t) + 0.035*VIX(t)$$
$$t \quad 6.3 \quad -5.9 \quad 8.2$$
$$- 0.014*EQ(t) + 0.043*TL(t) + 0.617*CDOR(t)$$
$$-5.9 \quad 4.5 \quad 4.5$$
$$- 0.028*HP(t) - 0.042*FL(t) \quad (4)$$
$$-6.0 \quad -3.3.$$

The model provides a very good fit (top figure) and the values of the coefficients indicate that the relationships are economically meaningful.

The combined model explains 93 percent of the variation in spreads, of which 57 percent is explained by the interaction of the factors, 7 percent is explained uniquely by capacity utilization, 10 percent uniquely by the VIX, 2 percent uniquely by equity prices, and 17 percent uniquely by the combination of the financing constraints

List of Variables

	Type of Activity		
Type of Issuer/Holder	Operating	Investing	Financing
Bond Issuers			
Nonfinancial corporates	CapU (IP)	GDP, VIX	TL, EQ
Commercial banks	CH	GDP, VIX	TL, EQ, LOS (CDOR)
Asset-backed securities (ABS) issuers	ABS		
Bond Holders			
Households	UR	GDP, VIX	HP
Commercial banks	CH	DR, VIX	TL, EQ, LOS (CDOR)
Life insurance companies and mutual funds	EQ	DR, VIX	FL

Note: CapU = capacity utilization rate (percent); IP = industrial production, yearly growth (percent); CH = charge-off rate for bank loans (percent); ABS = the ABS spread (bps); UR = unemployment rate (percent); EQ = equity prices, yearly growth (percent); GDP = gross domestic product, yearly growth (percent); VIX = the implied CBOE volatility index (percent); DR = the corporate default rate (percent); TL = total liabilities of bond issuers, yearly growth (percent); LOS = the LIBOR-OIS spread (bps); CDOR(t) is the spread between the one-month commercial deposit and the Fed funds rate (bps); HP = residential house prices, yearly growth (percent); FL = mutual funds' net flows (percent of total assets).

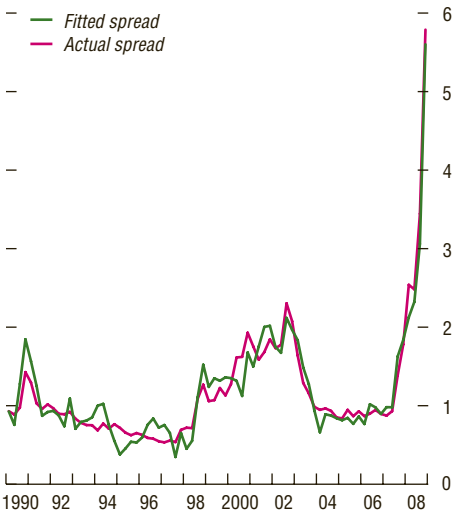
Box 1.5 *(concluded)*

indicators, particularly house price declines and growth in total liabilities of bond issuers.

Implications

The capital flows framework developed in this analysis allows one to capture explicitly the effects of stress in various economic sectors on corporate spreads. The analysis suggests that corporate spreads can be largely explained by the fundamentals and risks related to both uncertainty and financing constraints. Policy implications should be drawn with caution, since, as with any regression analysis, the equations display measures of correlation rather than causality. For example, if the LIBOR-OIS spread were to decline by 50 basis points—possibly as a result of some policy action—it would be associated with a roughly 100 basis point decline in corporate spreads. This provides some perspective on the scale of challenges and potential benefits for policymakers contemplating intervention in the market for corporate finance.

Actual and Fitted Spreads
(In percent)



Cash-Flow Drivers for Bond Holders and Bond Issues

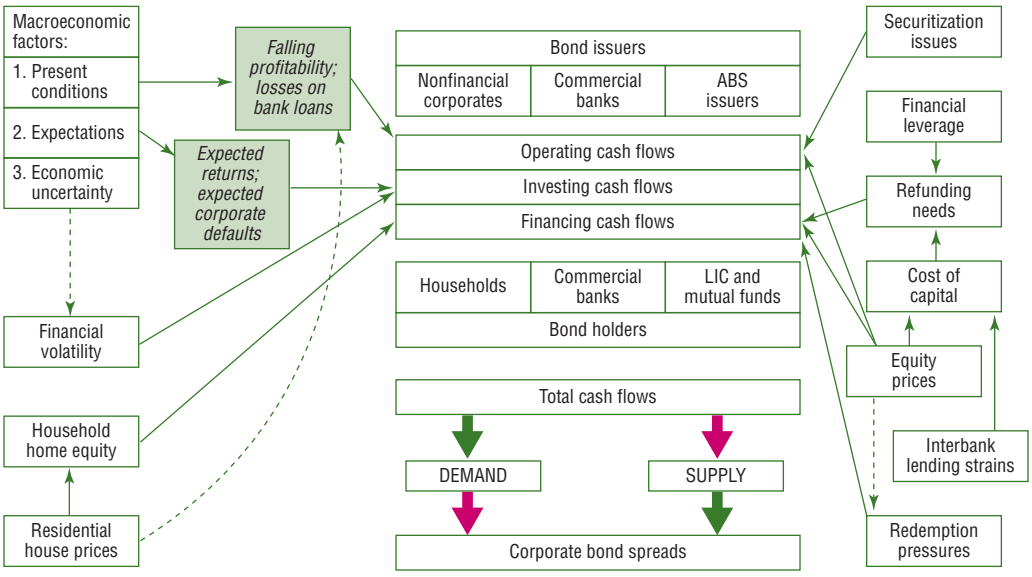


Table 1.3. Estimates of Financial Sector Potential Writedowns (2007–10) by Geographic Origin of Assets as of April 2009

(In billions of U.S. dollars)

Origin of Asset	Outstanding	Estimated Writedowns					Implied Cumulative Loss Rate (Percent)
		October 2008 GFSR	April 2009 GFSR	Banks[1]	Insurers	Other[2]	
United States							
Loans							
Residential mortgage	5,117	170	431	206	22	204	8.4
Commercial mortgage	1,913	90	187	116	9	62	9.8
Consumer	1,914	45	272	169	14	89	14.2
Corporate	1,895	120	98	61	5	32	5.2
Municipal	2,669	. . .	80	50	4	26	3.0
Total for loans	13,507	425	1,068	601	53	414	7.9
Securities							
Residential mortgage	6,940	580	990	604	99	287	14.3
Commercial mortgage	640	160	223	136	22	65	34.8
Consumer	677	. . .	96	59	10	28	14.2
Corporate	4,790	240	335	204	33	97	7.0
Total for securities	13,047	980	1,644	1,002	164	477	12.6
Total for loans and securities	26,554	1,405	2,712	1,604	218	890	10.2
Europe[3]							
Loans							
Residential mortgage	4,632	. . .	192	119	10	63	4.1
Commercial mortgage	2,137	. . .	105	65	5	34	4.9
Consumer	2,467	. . .	175	109	9	58	7.1
Corporate	11,523	. . .	416	258	21	137	3.6
Total for loans	20,759	. . .	888	551	44	292	4.3
Securities							
Residential mortgage	1,390	. . .	195	119	19	56	14.0
Commercial mortgage	181	. . .	31	19	3	9	17.4
Consumer	250	. . .	18	11	2	5	7.1
Corporate	1,227	. . .	61	37	6	18	5.0
Total for securities	3,048	. . .	305	186	31	89	10.0
Total for loans and securities	23,807	. . .	1,193	737	75	381	5.0
Japan							
Loans							
Consumer loans	3,230	. . .	65	58	3	3	2.0
Corporate loans	3,339	. . .	67	60	3	3	2.0
Total for loans	6,569	. . .	131	118	7	7	2.0
Securities							
Corporate	789	. . .	17	11	2	5	2.2
Total for loans and securities	7,358	. . .	149	129	8	12	2.0
Total for all loans	40,835	. . .	2,087	1,271	104	712	5.1
Total for all securities	16,884	. . .	1,966	1,199	197	570	11.6
Total for all loans and securities	57,719	. . .	4,054	2,470	301	1,283	7.0
Expected writedowns of mature market banks on emerging market assets	. . .	. . .	. . .	340	. . .	. . .	. . .
Total potential writedowns for mature market banks	. . .	. . .	. . .	2,810	. . .	. . .	. . .

Sources: Bank for International Settlements; European Securitization Forum; Federal Reserve, *Flow of Funds* (2008:Q3); national central banks; and IMF staff estimates.

Note: See Annex 1.5 for details on writedown estimation methodology.

[1]For banks in advanced countries, potential writedowns by origin of assets. For an estimate of writedowns by domicile of banks, see Table 1.15.

[2]Included in this category are estimated losses for U.S. government-sponsored enterprises of approximately $250 billion, as well as expected writedowns for hedge funds, pensions, and other nonbank financial institutions.

[3]Europe includes the euro area and the United Kingdom.

Table 1.4. Bank Equity Requirement Analysis

(In billions of dollars, unless shown)

	United States[1]	Euro Area	United Kingdom	Other Mature Europe[2]
Estimated Capital Positions at end-2008				
Total reported writedowns to end-2008	510	154	110	70
Capital raised to end-2008	391	243	110	48
Tier 1/RWA ratios at end-2008 *(percent)*	10.4	7.3	9.2	7.3
TCE/TA end–2008 *(percent)*	3.7	2.5	2.1	2.3
Scenario Bringing Forward Writedowns				
Expected Writedowns 2009-10 (1)	550	750	200	125
Writedown-adjusted Tier 1/RWA ratio *(percent)*	6.7	1.1	4.7	1.7
Writedown-adjusted TCE/TA *(percent)*	0.1	–0.2	0.4	0.5
Allowance for Expected Earnings				
Expected net retained earnings 2009 and 2010 (2) (after taxes and dividends)	300	600	175	100
Net drain on equity (retained earnings) 2009 and 2010 (3) = (1) – (2)	250	150	25	25
Equity Requirements				
Equity needed to reduce leverage to 25 times[3]	275	375	125	100
Equity needed to reduce leverage to 17 times[4]	500	725	250	225

Source: IMF staff estimates.

Note: Tier 1 = Tier 1 capital; RWA = risk-weighted assets; TA = tangible assets; TCE = tangible common equity.

[1]Excludes government-sponsored enterprises, which are expected to receive equity injections from the government of up to $250 billion to help support writedowns.

[2]Denmark, Iceland, Norway, Sweden, Switzerland.

[3]The approximate leverage assumed in the GFSR deleveraging scenario (a 4 percent TCE/TA ratio).

[4]The approximate leverage of U.S. banks in the mid-1990s (a 6 percent TCE/TA ratio), prior to the buildup in leverage in the banking system that contributed to the crisis.

portfolio, prevailing capitalization, and expected revenues. In addition, the illustrations aggregate across banking systems and therefore do not show the substantial variation between banks within those systems. With those important caveats, if banks were to bring forward to today loss provisions for the next two years, before expected earnings, U.S. and European banks in aggregate would have tangible equity close to zero (Table 1.4).[36,37] This suggests equity cushions may need to be bolstered to sustain market confidence through the cycle.

The focus on the quality of bank capital has also intensified. Broader measures of capital, such as Tier 1, are seen by investors as offering insufficient protection and are therefore currently viewed as a less reliable basis for investor valuation and counterparty assessment. Instead, markets have increasingly focused on tangible common equity (TCE) and attach less weight to other components of regulatory capital, such as Tier 2 capital, hybrid securities, preferred shares, deferred tax assets, and the value of intangible assets on the balance sheet. Furthermore, with expected writedowns mounting, common equity is being depleted, reducing its share in total capital relative to other components with weaker loss-absorbing characteristics. In cases of banks with still-sufficient Tier 1 capital, converting preferred equity—both public and private—into common equity would rebalance the capital structure by increasing loss-absorbing capital.[38] More broadly,

[36]This analysis responds to the request at the March 14, 2009 meeting of G-20 finance ministers and central bank governors for the IMF to assess the actions required to support lending and growth. The analysis is necessarily aggregate and stylized, and is not intended to substitute for detailed analysis of the needs of specific institutions or portfolios.

[37]Bringing forward the expected writedowns for loans approximates a mark-to-market for the loan book.

[38]Preferred stock has the advantage over common equity of setting a contractual rate of return (at a rate that can be set to incentivize a bank to repay it when it regains market access). In practice, preferred stock

decisive and up-front policy implementation could alleviate the above scenario by bolstering confidence in banks and reducing credit strains, ultimately reducing the amount of public equity needed if private markets reopen. As confidence in valuation of assets improves, bank capital structures are seen to have been strengthened, and the economic outlook becomes less uncertain, market focus may return to the broader measures of capital adequacy. The use of TCE as a measure of capital adequacy in our scenarios should thus not be interpreted as a judgment regarding the appropriateness of this measure going forward, but rather as recognition of its present predominance in market assessments.

The long-term viability of institutions needs to be reevaluated to assess both prospects for further writedowns and potential capital needs. To provide a gauge for equity needs, the first calculation in Table 1.4 assumes that leverage, measured as TCE over tangible assets (TA), is reduced to 25 times (4 percent TCE/TA), consistent with the deleveraging scenario and toward levels that existed prior to the crisis.[39] Even to reach these levels, capital injections would need to be some $275 billion for U.S. banks, about $375 billion for euro area banks, about $125 billion for U.K. banks, and about $100 billion for banks in the rest of mature Europe. The second calculation illustrates the potential impact of a return of leverage to levels of the mid-1990s (around 6 percent TCE/TA). To achieve this more demanding level would require about $500 billion for U.S. banks, about $725 billion for euro area banks, about $250 billion for U.K. banks, and about $225 billion for the banks in the rest of mature Europe. These rough estimates suggest that in addition to offsetting losses, the additional need for capital derives from the stringent leverage and capital requirements markets are now demanding, based on the uncertainty surrounding asset valuations and the quality of capital. The authorities in several countries have introduced schemes that "ring-fence" certain troubled assets on bank balance sheets, and allow for risk-sharing between the bank and the government against further declines in the prices of these assets. This can hopefully remove some of the tail risk of large further declines in the prices of those assets, and thus help restore investor confidence in bank balance sheets. In some cases, it may play a useful complementary role alongside recapitalization and limit the additional capital required.

Near term, bank earnings offer only a partial cushion to writedowns.

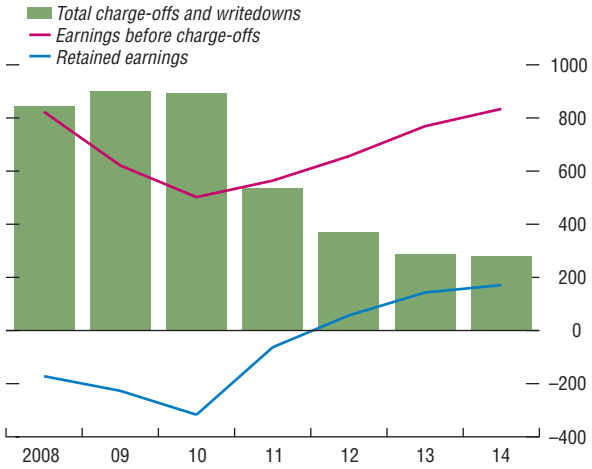
Applying the model described in Section D, lower operating earnings going forward will reduce the cushion against further credit writedowns on capital. Under the stylized scenario, banks' pre-provision earnings are forecast to drop by between a third and a half (Figure 1.29). This is less than the 50 percent drop experienced by U.S. banks during the Great Depression, but in line with the experience of Japanese banks during the 1990s.[40]

issued to governments may have different eventual loss-absorbing characteristics relative to preferred stock issued to the private sector, as the government may be ready to convert their holdings into equity to absorb losses if needed. Nevertheless, until that happens, markets may still be concerned about the policy risk; straightforward injections of common equity would be a simpler way of building confidence.

[39]TCE is calculated as total equity, less preferred shares and intangible assets; TA are total assets less intangible assets. The 4 percent and 6 percent scenarios illustrated are levels often seen by market participants as denoting a well-capitalized bank. Regulators and supervisors are often ready to see capital ratios decline during an economic downturn and be rebuilt as growth and profitability rebound.

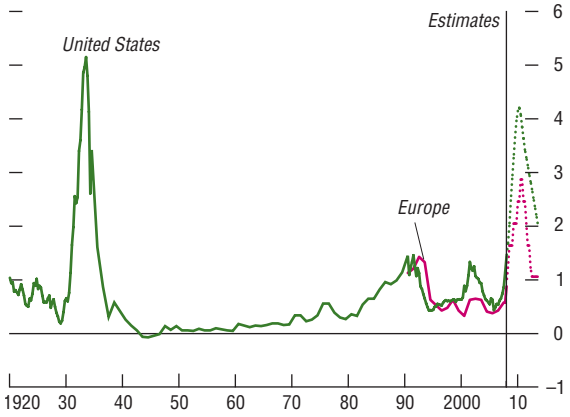
[40]The period over which the drop in revenues takes place is shortened to two years (from the four years it took in Japan), in part to reflect the more sudden global growth collapse. During Sweden's banking crisis, the revenue decline was around 20 percent in one year only. Oyama and Shiratori (2001) find that Japanese banks' overall margins were broadly stable during the 1990s as deregulation of deposit rates narrowed the spread between deposit rates and market interest rates, but banks widened lending spreads to riskier customers. During the current cycle, Western banks' margins are expected to be squeezed as they pay more to attract deposits, but with more limited scope to raise lending margins to customers as loan demand is weak.

Figure 1.29. U.S. and European (including U.K.) Bank Earnings and Writedowns
(In billions of U.S. dollars)



Source: IMF staff estimates.

Figure 1.30. Commercial Bank Loan Charge-Offs
(In percent of total loans)



Source: IMF staff estimates.

Charge-offs are forecast to peak at 4.2 percent in the United States, 3.4 percent in the United Kingdom, and 2.8 percent in the euro area (Figure 1.30). In each case, these are levels that are well above those experienced during the 1991–92 recession, though below those estimated to have been experienced in the United States during the Great Depression.

The resulting decline in net profit is expected to be severe, but not unprecedented. Under the scenario, banks would post losses in all three regions during 2008–10, make flat returns in 2010 and return to profitability subsequently, albeit at modest levels (due to less use of leverage, lower fee income from securitization, and heavier regulatory burdens). This is broadly consistent with the period of time it took banks to return to profitability during the Great Depression and in Sweden in the early 1990s (although the writedowns are less severe than either of those more extreme cases). Dividends and taxes are assumed to play a minor role in determining the future path of capital. Under the scenario, dividend payout ratios decline to 20 percent of pre-tax earnings (from 60 percent) in the period to 2010—partly reflecting greater government involvement in dividend policy—but then rebound to 40 percent at the end of the period. Deferred tax assets built up during the loss periods are all expected to be used promptly as banks return to profitability. In addition, the procyclicality of Basel II risk weightings is likely to mean risk-weighted assets (RWA) rise at a faster pace than total assets, as a decline in asset quality contributes to reduced credit ratings.[41] As a base case, we assume RWA grow 8 to 10 percent

[41]The Basel II regime requires the risk weights applied to assets in order to calculate capital requirements to be adjusted as assessments of creditworthiness and market volatility change. Banks may use credit assessments either by rating agencies or by themselves. In practice, creditworthiness assessments weaken and market volatility rises during economic downturns. This raises the RWA measure, and hence the capital requirement. Our assessment of an 8 to 10 percent annual rise is based on discussions with supervisory and bank contacts.

faster than total assets through 2011, but less rapidly thereafter.

The public sector should ensure viable banks are sufficiently capitalized to restore market confidence.

Experience with addressing banking system crises suggests that the public sector should ensure viable institutions have sufficient capital when it cannot be raised in the market and to do so through a single up-front operation.[42] Market participants are less confident to transact and invest where they see the risk of further, as yet unspecified, major policy interventions.

A decision to use official resources to supply capital should not be taken lightly. In addition to taking due account of the cost to taxpayers, care should be exercised as fiscal balances are already under pressure around the world. Steps should be taken to encourage private sector participation in recapitalization to the extent possible under current market conditions. However, further bold steps are needed at this point to restore market confidence, including committing the necessary government funds, even where this may mean taking temporary majority or full government control of financial institutions.

Potential new providers of capital and funding are currently deterred by uncertainty over banks' balance sheet health and the macroeconomic outlook, as well as by uncertainty over the treatment of their claims in the event of further government support. Thus, governments need to design capital injection programs that protect potential new investors from policy risk, both through the convincing size of the capital injection and through the seniority provided to new investments, which may require new legal protection for the investors in some countries. Government support could pose risks to fiscal sustainability in more indebted countries that need to be taken into account in deciding the extent of overcapitalization.

Addressing troubled assets remains a priority.

Authorities have used a variety of policies to address banks' troubled assets. In so doing, they hope to mitigate the adverse feedback loop by reducing the pressure on banks to pare lending in order to delever. As well, they aim to reduce the risk premiums that investors and counterparties continue to place on banks as a result of the uncertainty about the scale of eventual writedowns stemming from troubled, often opaque, assets.

Policy measures taken so far in this domain have had only a limited effect in improving market confidence. Policies have assisted in offsetting, ring-fencing or providing additional clarity about troubled assets, but have generally not been sufficient in magnitude and have not been applied comprehensively. Table 1.5 summarizes specific measures and their effectiveness.

The recent U.S. Treasury announcement of the Public-Private Investment Program (PPIP) is an important development in this context. While the details are still being worked out, the initiative would give an impetus to price discovery and secondary trading in distressed mortgage/credit securities. This should provide greater clarity on the value of such securities on bank balance sheets. The PPIP provides incentives to encourage investor purchases of troubled assets through the provision of leverage while capping private sector investors' losses at their original equity investment. By increasing the price that investors are prepared to bid for assets, it should facilitate sales by banks. However, it appears less likely to successfully bridge the gap between the price that investors are willing to pay and the price that banks are willing to accept for loans (which banks mostly hold at book value) than for securities (which banks mostly hold at fair value). It therefore remains to be seen whether the program, which provides

[42]Hoshi and Kashyap (2008) document how serial recapitalizations of the Japanese banking system in the late 1990s and early 2000s were too small and failed to close the "capital gap." Their definition of the capital gap includes elements of deferred tax assets that are unlikely to be used, and an estimate of the under-provisioning for loan losses. In the calculations presented in the stress test in this section, neither adjustment is seen as necessary for mature market banks, although it will be important to continue to monitor how realistic loan provisions are, and the usability of deferred tax assets.

Table 1.5. Policy Measures and Effectiveness

Measure	Policy Objective	Effectiveness
Inclusion of illiquid assets as eligible collateral in central bank operations.	Ease funding of illiquid assets.	Successful in providing short-term funding; but concerns remain about certainty of long-term funding and about solvency.
Enhanced disclosure of troubled asset valuations and risks. Movement of some assets from trading book for valuation on accrual basis.	Reduce uncertainty and unnecessary volatility in illiquid asset valuations.	Volatility in reported balance sheets reduced by move to banking book. But market confidence in asset valuations remains low, and concerns have spread to a much wider range of assets as the economy worsens.
Central bank or other official sector purchases of illiquid loans and securitizations.	Provide official funding to lending markets where private sector demand dries up.	Effective in supporting high-quality, short-term lending markets, notably commercial paper. The first phase of the U.S. Troubled Assets Relief Program abandoned plans to buy structured assets from the market; the Public-Private Investment Program will instead seek to purchase assets through a public-private partnership.
Official sector "solvency guarantees" of portfolios of assets, covering assets that are troubled or vulnerable to the economic downturn.	Cap banks' losses on troubled assets.	The United Kingdom has launched such a program. U.S. operations for Citibank and Bank of America have eased some of the immediate pressures on the banks, but now are being supplemented with other measures to address troubled assets and stress-test the capital adequacy of major U.S. banks.
"Bad bank," with capped exposure for the bank transferring the assets, and the remainder of the risk with the official sector.	Remove troubled assets from banks' balance sheets and cap losses.	Most suitable where a bank's main problem concerns a given set of troubled assets. More successful than other measures in cleansing banks' balance sheets (e.g., for UBS in Switzerland and Irish banks) but can be costly.

Source: IMF staff estimates.

funding initially to finance up to $500 billion of asset purchases, will make a significant dent in the total size of troubled assets on banks' balance sheets. The findings of the U.S. regulators' stress tests, including the assessment of impairments of loans and actions needed by banks to achieve satisfactory capital buffers, may prove an important element in banks' incentives to participate in the program.

The "bad bank" approach has the advantage of being relatively transparent and leaving the "good bank" with a clean balance sheet. However, as the table illustrates, different approaches can work depending on country circumstances. The most important priority is to choose an appropriate approach, fund it adequately, and implement it clearly. With some national initiatives recently reinvigorated, measures to address troubled assets are accelerating, including private-public investor partnerships. As these gain traction, they have the capacity to significantly improve the outlook for banking systems and the global economy.

Bank funding markets will continue to need support.

There has been some modest thawing in borrowers' ability to access capital markets since the October 2008 GFSR (Table 1.6), but securitization markets remain impaired and interbank and cross-currency swap markets remain stressed.

Securitized loans have declined by $1.6 trillion in the United States since 2006, and by $534 billion in Europe (although securitizations retained on banks' own balance sheets for use as central bank collateral have remained high) (Figure 1.31). Given the previous importance of securitization in bank funding, impairment of

the securitization process will continue to limit access to credit.

Although LIBOR-OIS spreads have receded somewhat, they remain elevated compared to the pre-crisis period, and term funding is still available only on a small scale owing to liquidity hoarding and continuing concerns about counterparty credit risk. Some banks continue to shun term interbank markets entirely, instead depositing surplus liquidity with central banks. Until balance sheet concerns are eliminated through effective banking system measures, central banks are likely to remain major suppliers of term funding.

Authorities have responded by introducing new liquidity facilities, asset purchase schemes, and guarantees for bank debt issuance to prevent fire sales of assets and bank failures (Table 1.7). The measures announced so far provide up to $8.9 trillion of financing, but this amounts to less than one-third of the ongoing wholesale financing needs of banks. Government guarantees are new and still mostly undrawn, so most actual financing support has come through new central bank liquidity provision of $2 trillion. Banks have rapidly built up guaranteed issuance since the facilities were introduced in late 2008, totaling $460 billion in 10 countries through January—$130 billion in the United States alone.

Despite these efforts, private bank funding markets are mostly closed—banks rely on central banks and the government (for guaranteed unsecuritized funding), raising the question of how large this financing might conceivably need to be. For an order-of-magnitude estimate, we project the maximum refinancing gap for the 22 largest global banks that would arise if no private wholesale funding were available.[43] The gap rises from $20.7 trillion in late 2008 to $25.6 trillion in late 2011, despite bank assets remaining roughly constant on average over the period and customer deposits growing in parallel with nominal GDP (Figure 1.32).[44] The rise reflects

Table 1.6. Tentative Easing in Credit Conditions
(End of period)

	2007:Q1	2008:Q4	March 2009
United States			
Three-month LIBOR-OIS spread (basis points)	8	123	99
Commercial paper issuance (billions of U.S. dollars)	2,005	1,612	1,422
Lending survey (percent tightening)	11	70	61
Investment-grade corporate OAS (basis points)	90	604	545
Agency-backed MBS OAS (basis points)	68	120	80
Euro Area			
Three-month LIBOR-OIS spread (basis points)	6	160	82
Commercial paper issuance (billions of U.S. dollars)	756	647	687
Lending survey (percent tightening)	0	65	64
Investment-grade corporate OAS (basis points)	47	397	413
United Kingdom			
Three-month LIBOR-OIS spread (basis points)	11	165	120
Commercial paper issuance (billions of U.S. dollars)	132	158	167
Lending survey (percent tightening)	2	–28	8
Investment-grade corporate OAS (basis points)	78	492	570
Japan			
Three-month LIBOR-OIS spread (basis points)	16	73	49
Commercial paper issuance (billions of U.S. dollars)	164	825	348
Lending survey (diffusion index)	9	43	13
Investment-grade corporate OAS (basis points)	20	86	104

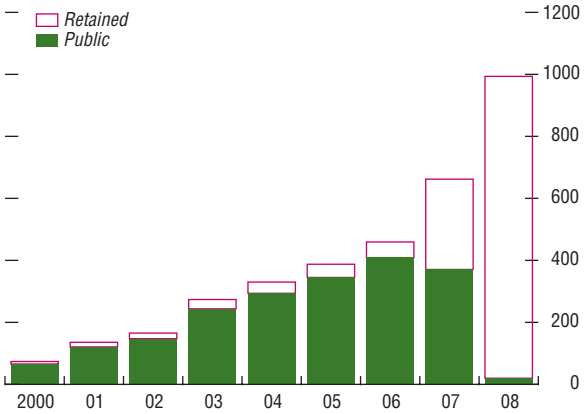
Sources: Bloomberg L.P.; Merrill Lynch; national central banks; and IMF staff estimates.

Note: For lending surveys, a positive/negative balance indicates that lenders reported credit availability to be higher/lower than over the previous three-month period MBS = mortgage-backed security. OAS = option-adjusted spread; OIS = overnight index swap.

[43]The refinancing gap is short-term wholesale funding plus maturing long-term debt. It excludes customer deposits and equity. It grows as long-term debt matures and is assumed to be refinanced as short-term wholesale funding. The banks are drawn from seven countries: the United States (5); France (4); the United Kingdom (4); Germany (2); Italy (2); Switzerland (2); and the Netherlands (1). Publicly owned banks are excluded.

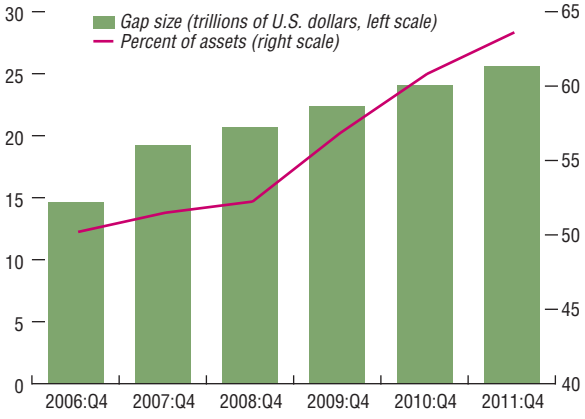
[44]The financing gap scenario uses the same assumptions as other scenarios in the chapter. It incorporates the same paths for bank asset growth, credit growth and bank recapitalization used in Figure 1.4 and Table 1.5, but adds the assumption that deposits grow at nominal GDP. Data

Figure 1.31. European Securitization Gross Issuance
(In billions of U.S. dollars)



Sources: Citigroup; and European Securitization Forum.
Note: Retained securitization refers to securitizations that are generated because they are eligible as collateral for repo financing from the central bank.

Figure 1.32. Refinancing Gap of Global Banks



Source: IMF staff estimates.

the large volume of existing long-term debt that will mature and need to be refinanced.

Refining measures together with addressing capital needs and the troubled asset overhang should ease strains.

Deleveraging involves reducing excessive reliance on wholesale funding. This, together with capital injections and addressing troubled assets, will reduce funding strains and improve market functioning. In the interim, however, measures supporting funding could be further refined and be made more efficient. In particular:

- Access to foreign currency funding could be further improved to ensure that banks can fund their holdings of foreign currency assets in the interbank and cross-currency swap markets. Thus far, official funding facilities have been largely in domestic currency, with only a few central banks also providing U.S. dollar or other foreign currency funding.
- Government guarantee schemes need to be consistent with each other in structure and clearly implemented (see next section). In some cases, the lack of clarity of government schemes has slowed bank efforts to secure funding and dampened investor interest.
- The implementation of unconventional monetary policy will be needed to support financial intermediation, reduce risk premiums, and reopen securitization markets (Box 1.6).
- Policymakers need to develop an exit strategy to enable public financing to be withdrawn once conditions are conducive to a recovery of private markets. For example, while below-market pricing and relaxed terms of official facilities may be necessary to improve market functioning under current conditions, they will eventually need to be reassessed to ensure borrowers have the incentive to return to private markets.

on the volume of bank debt maturing each year is taken from Bloomberg.

Insurance companies and pension funds are coming under increasing strain as asset prices fall.

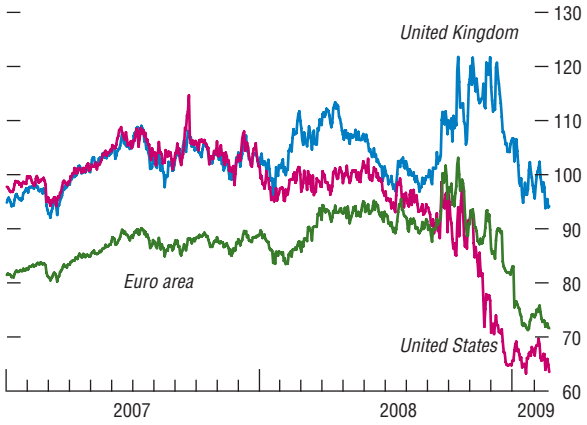
A wide range of nonbank financial institutions has come under strain during the crisis as asset prices have fallen (Figure 1.33). Life insurance companies and reinsurers have suffered substantial falls in shareholder equity since mid-2007, leading to rating downgrades and rises in CDS spreads that endanger their business models (Figure 1.34). In aggregate, by 2008:Q3, the book value of shareholder equity had fallen by 15 to 20 percent since the beginning of the crisis, and will have fallen considerably further since then. Market estimates of value have fallen much more sharply, with the S&P 500 subindex for life and health insurers by mid-March down over 70 percent since the crisis began. Rating agencies, which attempt to assess insurers' balance sheets on a mark-to-market basis, are threatening further downgrades. These actions place pressure on insurers to delever and lower risk.

Like banks, writedowns at insurance companies and pension funds have pushed solvency measures to low levels.[45] Solvency buffers may not prove sufficient. Several factors, similar to those that have weighed on banks' capital adequacy, have also affected insurers and pension funds. For instance, (1) solvency, accounting, and valuation policies have been procyclical; (2) increased asset correlation has reduced the benefits of diversification; (3) declines in risk-free interest rates (used to discount future liabilities) have pushed up the net present value of liabilities; and (4) increased volatility in asset prices has pushed up the expected cost to insurers of guarantees of minimum returns or minimum policy values that they have given to clients.

Pension funds and life insurers do not face the same short-term liquidity pressures as banks, but they still present financial stability concerns. The longer-term nature of their liabilities has pre-

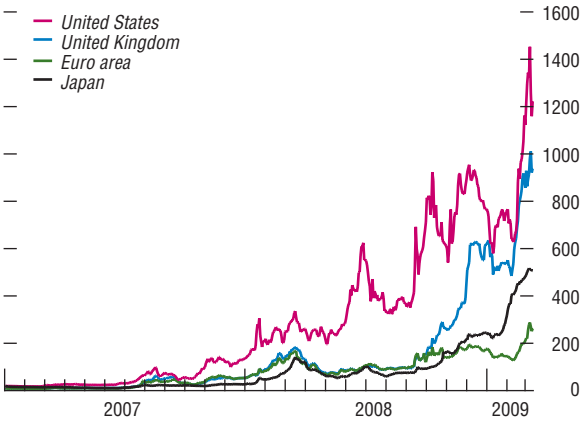
[45]Hewitt Associates has estimated that, by February 2009, the solvency ratios for accounting purposes of pension funds for major U.S. companies had decreased to 65 percent of liabilities, for major euro area companies to 72 percent, and remained around 95 percent for major U.K. companies.

Figure 1.33. Pension Funds of Large U.S. and European Companies: Estimated Funding Levels
(In percent)



Source: Hewitt Associates.
Note: The funding level for accounting purposes, as a percentage of the net present value of liabilities. The calculations project forward the last publicly reported levels by using movements in market prices and interest rates since then. The U.S., euro area, and U.K. companies comprise the constituent firms of the S&P 500, Eurostoxx 50, and FTSE 350 indices.

Figure 1.34. Insurance Sector Credit Default Swap Spreads
(In basis points)



Source: Datastream.

Table 1.7. Bank Wholesale Financing and Public Funding Support
(In billions of U.S. dollars)

	Wholesale Funding in 2008:Q2	Central Bank Liquidity (Crisis Balance Sheet Growth)	Government Asset Purchases Commitment	Government Guarantee Commitment
United States				
Money market	1,908	980	1,850	1,830
Longer term	2,908			
Euro Area				
Money market	12,015	820	225	1,400
Longer term	8,877			
United Kingdom				
Money market	3,869	150	450	1,250
Longer term	1,349			
Total	**30,926**	**1,950**	**2,525**	**4,480**

Sources: Bankscope; national central banks; and IMF staff estimates.

Note: Guarantees only includes those with announced limits (not open-ended guarantees) and U.K. and U.S. guarantees of Bank of America, Citigroup, Lloyds, and RBS.

vented forced asset sales, and leverage is relatively low (in the case of insurers and some defined benefit pension funds) to nonexistent (in the case of most defined contribution and corporate pension funds). However, even in the absence of liquidity strains, solvency pressures can lead to rapid asset sales in order to reduce risk—as was the case in 2001–03 when stock market falls led to massive equity liquidations. As such, potential links between insurance companies and pension funds and financial stability need to be considered in designing public support measures. Moreover, since life insurance companies, reinsurers, and pension funds are often holders of substantial amounts of senior debt of banks, they are directly affected by the treatment of investors in banking support operations.

Policies should aim to reduce the risk of solvency pressures exacerbating the deleveraging process.

Efforts by insurance companies and pension funds to rebuild solvency are likely to add to the market pressures arising from the need of banks to rebuild capital and reduce leverage. Insurers and pension funds need to be given additional time to rebuild solvency levels to appropriate levels, without jeopardizing the condition of the institutions or the claims of the policyholders or fund members. Some countries have already lengthened the periods over which funding levels for liabilities need to be rebuilt. The need for this in the future could be reduced by measures to encourage the buildup of more adequate buffers in good times that take account of asset risk over the economic cycle and the volatility of mark-to-market measures. A framework also needs to be put in place to wind down systemically important insurance companies when they become insolvent.

F. Costs of Official Support, Potential Spillovers, and Policy Risks

The costs of backstopping banking systems are adding to fiscal burdens...

Government support operations are proving essential to addressing the crisis, and experience suggests that early and substantial government intervention to deal with crises helps to contain their long-term costs, both to the government and to the economy. Nevertheless, the short- and medium-term costs to governments of supporting banking systems are adding considerably to fiscal burdens and contingent liabilities. These costs are combining with those from macroeconomic stimulus packages to add to the more general cyclical fiscal pressures from the recession. Although the eventual costs of the support operations announced to date are

Box 1.6. Recent Unconventional Measures of Selected Major Central Banks

Since the start of the current crisis, major central banks have taken a variety of "unconventional" measures. Ordinarily, most major central banks are concerned with steering a short-term interest rate to attain macroeconomic objectives. However, financial stress has greatly impeded the standard interest rate and balance sheet channels of monetary policy.[1] Consequently, central banks have introduced new tools to lower market interest rates across the yield curve and stimulate credit creation in order to support economic activity. The table summarizes examples of such measures undertaken by major central banks.

Early in the current crisis, many advanced country central banks extended conventional *liquidity easing* measures aimed at particular financial markets. Initially, these efforts involved loosening the terms and availability of central bank facilities already in place, such as standing lending windows. Thereafter, access to central bank lending was enhanced by extending the tenor of financing, widening the range of counterparty financial institutions, and swapping liquid government securities on the books of central banks for illiquid assets held by banks. Importantly, central banks have widened collateral eligibility to ensure that collateral availability does not constrain liquidity provision. In the United States, collateral normally available only at the discount window was made available for open market operations. In the United Kingdom, additional securities, including some well-rated asset-backed securities and covered bonds, were accepted in the three-month repo operation. The European Central Bank already had a broad eligibility list and thus did not need to make substantial changes. Several central banks also undertook foreign exchange swaps or loans with other central banks to alleviate severe shortages of foreign exchange. In most respects, these liquidity easing measures are in line with the standard central bank lender-of-last-resort function, although their range and magnitude are well above traditional levels.

As the impact of the crisis on credit markets became clear, several central banks introduced *credit easing* measures aimed at alleviating stresses in credit markets deemed to play a key role in supporting economic activity. Many of these measures finance purchases by investors in important securities markets, such as mortgages and commercial paper. In a few cases, central banks are directly providing financing to final corporate borrowers. Central banks have generally preannounced upper limits on credit easing facilities rather than target levels, and these upper limits have themselves been adjusted in line with changing conditions. These measures have an important quasi-fiscal element and are thus usually done in close coordination with the government.

The advent of zero or near-zero policy interest rates of large advanced country central banks has blocked the interest rate channel and led to *quantitative easing*. This typically involves central bank purchases of government or government-guaranteed securities from banks or other institutions. Quantitative easing increases reserve money and the size of the central bank balance sheet with a view to the macroeconomic objective of boosting the access of households and businesses to credit by lowering the longer-term yield curve and helping improve the liquidity of balance sheets.

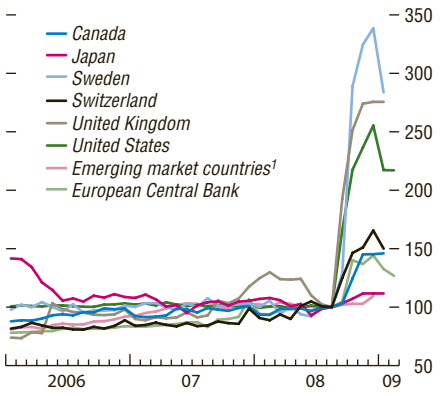
Unconventional measures have led to increases, some very large, in the sizes of the balance sheets of advanced country central banks (see figure). The balance sheet impact of the measures reflects whether or not the policy interest rate has dropped to zero or near zero, as well as the aggressiveness of easing and the nature of the financial system. In particular, quantitative easing involving government securities tends to be more important in bank-centered systems (Japan and the United Kingdom), whereas credit easing with private securities

Note: This box was prepared by Mark Stone, Alexandre Chailloux, Seiichi Shimizu, and Simon Gray.

[1]See Chapter 2 of the October 2008 *Global Financial Stability Report* (IMF, 2008b).

Box 1.6 *(continued)*

Real Central Bank Assets of Selected Countries,January 2006-Latest
(August 2008 = 100)



Source: IMF, International Financial Statistics database.
[1]Median for 27 medium-size and large emerging market countries.

generally plays a larger role in market-centered systems (the United States)

Gauging the effectiveness of unconventional measures is difficult because transmission to the economy is complex and opaque. The success of most unconventional measures hinges not just on the design and magnitude of the measures themselves, but also on the willingness and ability of creditors to lend and of borrowers to borrow. Further, unconventional measures overlap; for example, a liquidity easing measure aimed at a particular class of financial institutions may (if unsterilized) lead to an increase in reserve money, thus giving the measure the flavor of quantitative easing. The liquidity easing measures were followed by a general reduction in funding costs for banks and by signs of an abatement in funding pressures, especially during times of seasonal tightness (quarter-end). Some of the early credit easing measures seemed to have helped alleviate pressures in commercial paper, mortgage, and corporate bond markets, and in a few cases access to these facilities is running down.

The important challenges and risks posed by unconventional measures have attracted considerable attention:

- Unconventional measures may inadvertently *allocate credit to inefficient markets at the expense of efficient markets*, constraining financial sector restructuring in the short run, and impairing future economic growth.
- The gradual replacement of high-quality and liquid assets with illiquid claims on central bank balance sheets *reduces operational flexibility* and thereby may constrain future monetary management.
- The quasi-fiscal nature of some unconventional measures blurs the distinction between monetary and fiscal policies and, together with pressure to continue to provide financing, could potentially *compromise central bank independence.*
- The *inflation potential* of a swelling of reserve money has led inflation expectations to tick up in response to some announcements of unconventional measures by central banks.

Ongoing and detailed communication can help to reduce the risks. Central banks and fiscal agents engaging in quasi-fiscal measures should publicly explain the objectives, expected effects, and potential fiscal implications of unconventional policy tools. Careful statement of central bank views on the macroeconomic outlook will facilitate the eventual resumption of positive policy interest rates and absorption of liquidity.

A comprehensive exit strategy is also crucial. The strategy should encompass the resuscitation of financial markets displaced by unconventional measures, as well as the resumption of fully market-based monetary operations. Importantly, a plan will be needed to wind down liquidity and credit easing measures, which can include a tightening of funding conditions, traditional mopping up operations, and adjustment of the reserve requirement framework. In some cases, amendments to central bank legislative frameworks may be needed to provide the necessary instruments. Ideally, an exit strategy should be part of the initial design of unconventional measures.

Beginning in September 2008, many emerging market countries began to take measures to

ease foreign exchange and domestic currency liquidity conditions, but unconventional measures may not play as important a role for them as for the advanced countries. The liquidity easing measures—reinforced in some cases by foreign exchange liquidity provided by reserve currency central banks—seemed to have had some success in alleviating short-term liquidity pressures. However, the size of emerging market country central bank balance sheets has not increased by anywhere near the same magnitude as those of their advanced country counterparts (see figure). This probably reflects the tighter constraints on liquidity easing measures faced by emerging market countries, including external vulnerability, shallower financial markets, conflicts between macroeconomic and systemic stability objectives, and less firm central bank independence. These constraints compel most emerging market countries to keep positive real interest rates to compensate for the risk of exchange rate depreciation and capital outflows, precluding the quantitative easing measures associated with near-zero policy interest rates, and limiting the size of central bank balance sheet increases.

Selected Recent Central Bank Measures

Measure	Purpose	Central Bank
Standard Operation, Technical Changes		
Expansion of eligible collateral, counterparties, and terms for regular operations	Facilitate provision of central bank reserves to money markets when there is insufficient availability of standard collateral	Most central banks in advanced countries and some emerging economies
Unlimited liquidity provision in market operations	Facilitate provision of central bank reserves to money markets, particularly when forecasting the demand for liquidity becomes unreliable	European Central Bank, Bank of Japan
Liquidity Easing		
Lending government securities in exchange for illiquid securities	Assist repo and other collateralized transactions	Federal Reserve, Bank of England
Currency swap arrangements between central banks, and between central banks and commercial banks	Facilitate foreign currency provision to banking sector, globally, in the face of segmentation of foreign exchange markets	Federal Reserve with 14 central banks, Swiss National Bank with European Central Bank, and some emerging economies in range of currencies
Foreign currency provision in domestic markets	Provide foreign currency funding for nonbanks especially trade credit	Some emerging economies (e.g., Brazil)
Credit Easing		
Outright purchase of private sector securities	Support mortgage and housing markets and restore securitization market issuance	Federal Reserve, Bank of England, Bank of Japan
Direct liquidity provision to borrowers and investors	Facilitate the extension of credit to households and business	Federal Reserve, Bank of Japan
Quantitative Easing		
Outright purchase of government or government-guaranteed securities	Provide long-term funds and/or lower long-term yield curve	Federal Reserve, Bank of England, Bank of Japan, and some emerging economies

Source: Central bank websites and press reports.

highly uncertain and will not be known for several years, we can make estimates today of their expected order of magnitude. They include three elements: the net costs of direct support to banks; expected eventual costs of guarantees; and costs, net of recoveries, of central bank liquidity provision.[46]

[46]The expected costs to the public exchequer of guarantees are estimated in two ways. First, historical

The calculation indicates that financial stabilization costs will add substantially to public debt in many countries (Table 1.8).[47] The United States, United Kingdom, and Ireland face some of the largest potential costs of financial stabilization given the scale of mortgage defaults. Financial stabilization costs are also expected to exceed 7 percent of GDP for certain countries that do not necessarily have significant domestic mortgage problems. These countries either have large banking assets relative to GDP (Netherlands, Ireland) and/or significant exposure to emerging Europe (Austria, Sweden).[48]

Table 1.8. Public Debt and Stabilization Costs
(In percent of GDP)

	Gross Government Debt			
	2008	2010	2008–10 *(Percent change)*	Financial Stabilization Costs[1]
Canada	64	77	20.3	4.4
France	67	80	19.4	1.8
Germany	67	87	29.9	3.1
Italy	106	121	14.2	0.9
Japan	196	227	15.8	1.7
United Kingdom	52	73	40.4	9.1
United States	71	98	38.0	12.7

Sources: Debt-to-GDP estimates are from the IMF, *World Economic Outlook*, April 2009. Financial stabilization costs are estimates by the IMF Fiscal Affairs Department in "Companion Paper—The State of Public Finances: Outlook and Medium-Term Policies after the 2008 Crisis," March 6, 2009 (IMF, 2009a).

[1]Based on support measures announced through mid-February. This is the net cost, which is gross support minus recovery over the next five years. The recovery rates differ by type of support, with higher recovery expected from guarantees and central bank liquidity support than from direct support.

...putting pressure on sovereign credits...

The potential costs of support operations as well as the general deterioration in fiscal balances are pressuring sovereign bond and CDS spreads.[49] Two factors appear important in explaining the movement in CDS spreads.

First, spreads are wider for *smaller economies* than for larger ones (Table 1.9). Larger economies have deeper and more liquid capital markets, which tend to facilitate financing of their deficits. Further, as discussed earlier, some smaller economies have large banking assets relative to GDP, raising market concerns about potential fiscal costs of financial stabilization. CDS protection may also be being bought as a proxy hedge against macroeconomic risk when local securities markets are too illiquid to sell in size or go short.

Second, the level of CDS spreads appears to be affected in large part by the *increase in funding needs*, arising both from increases in fiscal deficits, and from the funding needs of financial stabilization, as opposed to the size of the current stock of indebtedness. For example, CDS spreads have widened considerably more in the United Kingdom relative to other large economies, despite the fact that the country's current debt is low relative to GDP (Figure 1.35), although in percentage terms it rises sharply (Table 1.8). This suggests that concerns about short-term financing needs, rather than long-term fiscal sustainability, may be driving a large part of CDS spreads.

Although advanced economy governments to date have generally been able to meet their funding needs, there have been some

experience suggests likely losses to governments based on the size of bank balance sheets as well as certain other measures of fiscal management. Second, traded financial instruments provide market estimates of the likelihood of individual bank defaults, given recovery values. These financial instruments provide a market valuation of the government's contingent liability should it decide to cover bank losses.

[47]IMF (2009a) shows calculated costs for a larger set of countries.

[48]Switzerland and Belgium also have relatively large banking sector relative to GDP and markets remain concerned about sovereign risk in these countries. For example, the five-year sovereign credit default swap spread for Switzerland was about 105 basis points on April 13, 2009—wider than Sweden and the Netherlands, but tighter than Ireland and Austria.

[49]Municipal credits have also come under pressure. Although local government authorities in advanced economies generally entered the crisis with comfortable operating fund balances and reserves, the economic downturn is already straining their budget balances. Revenue streams are falling and expenditures are rising, especially among municipalities hardest hit by housing slumps. In addition, borrowing costs in local government debt markets have risen. As such, in contrast to some past credit crises, local government bonds have not functioned as a safe haven.

Table 1.9. Mature Market Sovereign Credit Default Swap Spreads and Debt Outstanding

	Median Credit Default Swap Spread as of April 8, 2009 *(Basis points)*	Median Debt Outstanding as of December 2008 *(Percent of GDP)*
Smaller economies	100	46
Larger economies	64	69

Sources: Bloomberg L.P.; IMF, World Economic Outlook database; and IMF staff estimates.

Note: Larger economies are six mature countries with GDP greater than $2 trillion. Smaller countries are 13 other countries with traded credit default swap contracts.

Table 1.10. Announced Sovereign Guaranteed Bank Debt

	Announced Guaranteed Bank Debt[1] *(Billions of U.S. dollars)*	Relative to Five-Year Average of Net Debt Issuance[2] *(Percent)*
Ireland	641	2,708
Sweden	169	606
Germany	556	576
Belgium	114	537
Austria	108	444
Netherlands	254	310
United Kingdom	375	291

Sources: Bank for International Settlements; and IMF staff estimates.

[1]Net debt issuance combines private and sovereign net issuance averaged from 2003 to 2007 from Bank for International Settlements data.

[2]The numbers for Ireland and Sweden include guarantees for deposits in addition to those for other senior liabilities issued by banks (interbank loans, debt securities). The numbers for other countries exclude deposit insurance.

signs that the demand for government debt is becoming more volatile (Figure 1.36). Even in some major mature markets, auctions have been occasionally undersubscribed or canceled as issuance volumes have increased and the ability of market-makers to take auction risk and provide liquidity has diminished. As home bias and risk aversion have increased, sovereigns are likely to need to depend much more heavily on the domestic investor base until global market conditions improve. They have also needed to shorten the maturity of recent issues, heightening refinancing risk in the future.

In order to address investor concerns, governments need to clearly communicate the potential costs of financial support packages as part of a sustainable medium-term budget framework, including a credible commitment to fiscal correction once economic conditions improve.[50]

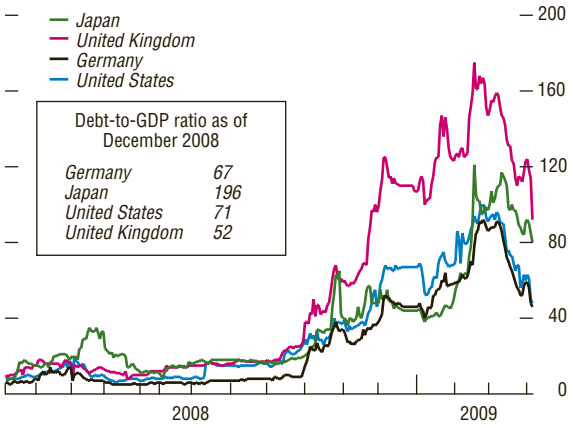
...and raising concerns about market digestion and "crowding out" of borrowers.

Projected issuance of government and government-guaranteed bank securities will be very large in 2009 as a result of increased budget deficits and continuing bank refinancing needs. This leads to potential crowding-out risks. One such risk is that the higher quality of government/government-guaranteed paper in a risk-averse environment will crowd out private sector issuers. Table 1.10 highlights some countries where the announced government-guaranteed debt is greater than three times the average annual total net issuance of private sector and sovereign debt in the past five years. Note that this guaranteed debt issuance will occur over and above the considerable sovereign debt required to be issued to finance fiscal deficits.

A second risk is that the benchmark sovereign issuers squeeze out smaller or weaker sovereign counterparts. For example, based on current fiscal and financial stabilization plans, the United States, Japan, Germany, and the United Kingdom are projected to issue about $4 trillion of net additional government/government-guaranteed debt in 2009, which would amount to about 280 percent of the five-year average net sovereign debt issued by *all* mature economies. This volume of issuance will add to the challenges facing emerging market sovereign and corporate issuers in raising funds, especially in mature market currencies, while markets remain risk-averse.

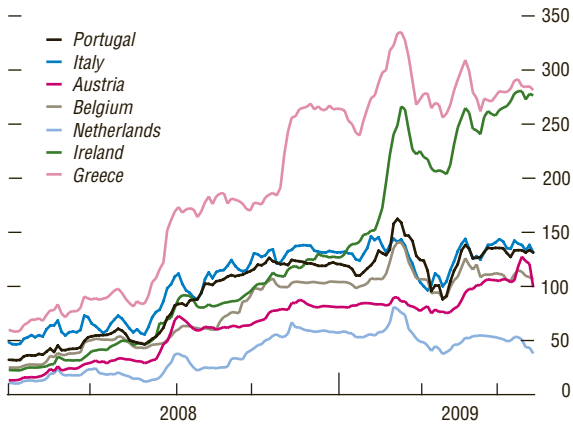
[50]IMF (2009b) sets out four important components of a government strategy during the crisis to maintain market confidence that fiscal solvency is not at risk.

Figure 1.35. Large Economy Credit Default Swap Spreads
(In basis points)



Sources: Bloomberg L.P.; and IMF staff estimates.

Figure 1.36. Benchmark Five-Year Government Bonds
(Spreads over German bunds in basis points)



Source: Bloomberg L.P.

"Pooling" solutions may reduce liquidity premia of government-guaranteed bank debt.

The patchwork of different guarantee schemes across Europe, varying fee structures, and in some cases the lack of clarity over the details of the schemes themselves have strained bank efforts to secure funding and dampened investor interest. At present, investors are pricing guaranteed debt substantially below straight government debt. This reflects several factors. First, the guaranteed bonds may not be as liquid as the sovereign bonds. Second, investors can still suffer mark-to-market writedowns and delays in payments if the bank issuer faces problems and the guarantee needs to be called upon. Third, in some cases the guarantee is from an agency, rather than from the government itself, so the relationship between the agency and the government needs to be checked by the investor. Fourth, the instruments are new and have special terms and conditions, so approvals have to be sought, for example from institutional investors' credit committees.

Pricing of these instruments shows a distinct tiering by country, proximity of the guaranteeing body to the government, and bank. Figure 1.37 highlights that the spread on the issues guaranteed by sovereigns perceived as less capable of backing their guarantee is wider than for those that are deemed well able to stand behind their promises, such as the United States and France. French issuance is especially tightly priced because it is directly issued by a government agency rather than a bank, meaning that bond liquidity is pooled and that the agency, rather than the investor, is exposed to any delays in payment.

Sovereign debt managers should consider extending maturities.

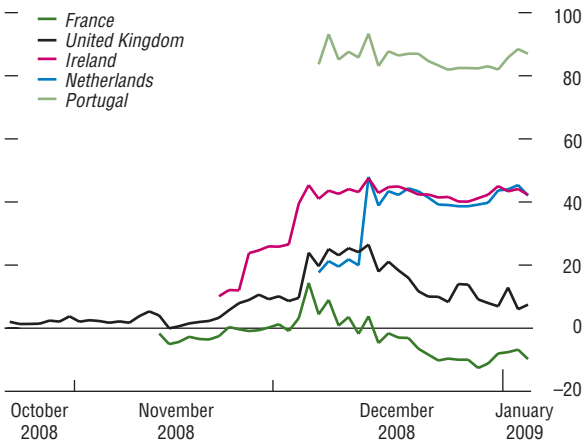
Authorities will need to carefully manage actual and potential public sector debt burdens so that current funding difficulties for banks do not transform into funding and debt sustainability problems for the sovereign. Increased sovereign credit spreads will add to

governments' borrowing costs and debt sustainability issues. To date, falling risk-free interest rates, as benchmark government securities have benefited from a flight to quality and liquidity, have generally offset the effect of increased credit spreads on governments' borrowing costs. However, as liquidity pressures on financial institutions ease, inflation fears return, and the weight of supply builds, borrowing costs may begin to rise. During the crisis, many sovereigns have shortened the average maturity of their issuance in response to increased investor demand for more liquid shorter-dated securities, thus increasing their refinancing risk. Nevertheless, authorities should take the opportunity of the currently low level of real long-term yields to lengthen the maturity of issuance where possible to reduce their refinancing risk.

In sum, policies need to recognize the limits of national sovereign balance sheets, which may call for more regional or global approaches to bring about financial stability.

The size of the fiscal costs is best contained by early, forceful, and effective policy action to stabilize the global financial system. The public sector should ensure viable institutions have sufficient capital when it cannot be raised in the market, accelerate balance sheet cleansing, and refine measures supporting funding markets. Government support, however, could pose risks to fiscal sustainability in more indebted countries. The challenges facing emerging European economies provide a current example. In these economies, the burden of stabilizing economies and financial systems may be too large to be managed solely by national governments and, because of the potential for contagion, solutions will require coordination and outside stabilization support. Furthermore, where the transfer of private to sovereign risks in resolutions may prove too costly in relation to sovereign capacity or benefits, other forms of private sector involvement in restructuring may be called for (see Annex 1.4).

Figure 1.37. Swap Spreads of Government-Guaranteed Bonds
(In basis points)



Source: European Central Bank.

Annex 1.1. Global Financial Stability Map: Construction and Methodology[51]

This annex outlines our choice of indicators for each of the broad risks and conditions in the global financial stability map (see Figure 1.1). To complete the map, these indicators are supplemented by market intelligence and judgment that cannot be adequately represented with available indicators.

To begin construction of the stability map, we determine the percentile rank of the current level of each indicator relative to its history to guide our assessment of current conditions, relative both to the October 2008 GFSR and over a longer horizon. Where possible, we have therefore favored indicators with a reasonable time series history. Events that surpass historical experience raise associated risks or conditions to the boundary in the graphical representation. However, the final choice of positioning on the map is not mechanical and represents the best judgment of IMF staff. Table 1.11 shows how each indicator has changed since the last GFSR and our overall assessment of the movement in each risk and condition.

Monetary and Financial Conditions

The availability and cost of funding linked to global monetary and financial conditions (Figure 1.38). To capture movements in general monetary conditions in mature markets, we begin by examining the cost of short-term liquidity, measured as the average level of real short rates across the G-7. We also take a broad measure of excess liquidity, defined as the difference between broad money growth and estimates for money demand. Realizing that the channels through which the setting of monetary policy is transmitted to financial markets are complex, some researchers have found that including capital market measures more fully captures the effect of financial

[51]This annex was prepared by Ken Miyajima.

Table 1.11. Changes in Risks and Conditions Since the October 2008 *Global Financial Stability Report*

Conditions and Risks	Changes since October 2008 GFSR
Monetary and Financial Conditions	↓
G-7 real short rates	↑
G-3 excess liquidity	↔
Financial conditions index	↓
Growth in official reserves	↔
G-3 lending conditions	↓
Risk Appetite	↓
Investor risk appetite survey	↔
Investor confidence index	↓
Emerging market fund flows	↑
Risk aversion index	↓
Macroeconomic Risks	↑
World Economic Outlook global growth risks	↑
G-3 confidence indices	↑
OECD leading indicators	↑
Implied global trade growth	↑
Global break-even inflation rates	↑
Mature market sovereign credit default swap spreads	↑
Emerging Market Risks	↑↑↑
Fundamental EMBIG spread	↑
Sovereign credit quality	↑
Credit growth	↓
Median inflation volatility	↑
Corporate spreads	↑
Vulnerability to capital flows	↑
Credit Risks	↑
Global corporate bond index spread	↑
Credit quality composition of corporate bond index	↑
Speculative-grade corporate default rate forecast	↑
Banking stability index	↔
Loan delinquencies	↑
Household balance sheet stress	↔
Market and Liquidity Risks	↔
Hedge fund estimated leverage	↔
Net noncommercial positions in futures markets	↑
Common component of asset returns	↑
World implied equity risk premia	↓
Composite volatility measure	↔
Financial market liquidity index	↓

Source: IMF staff estimates.

Note: Changes are defined for each risk/condition such that ↑ signifies higher risk, easier monetary and financial conditions, or greater risk appetite, and ↓ signifies the converse; ↔ indicates no appreciable change. The number of arrows for the six overall conditions and risks corresponds to the scale of moves on the global financial stability map.

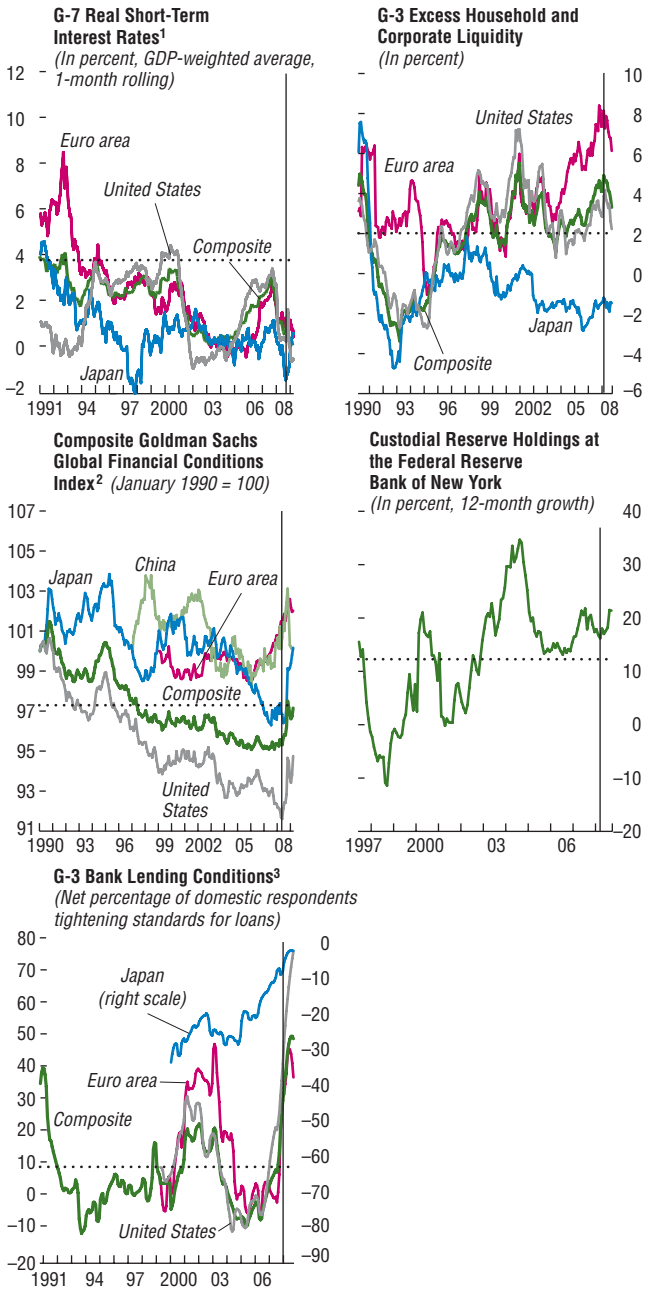
prices and wealth on the economy. We therefore also use a financial conditions index that incorporates movements in real exchange rates, real short- and long-term interest rates, credit spreads, equity returns, and market capitalization. Rapid increases in official reserves held by the central bank create central bank liquidity in the domestic currency and in global markets. In particular, the recycling of dollar reserves in the United States contributes to looser liquidity conditions. To measure this, we look at the growth of official international reserves held at the Federal Reserve. While most of the above measures capture the price effects of monetary and financial conditions, to further examine the quantity effects we incorporate changes in lending conditions, based on senior loan officer surveys in mature markets.

Risk Appetite

The willingness of investors to take on additional risk by increasing exposure to riskier asset classes, and the consequent potential for increased losses (Figure 1.39). We aim to measure the extent to which investors are actively taking on more risk. A direct approach to this exploits survey data. The Merrill Lynch Fund Manager Survey asks around 200 fund managers what level of risk they are currently taking relative to their benchmark. We track the net percentage of investors reporting higher-than-benchmark risk-taking. An alternative approach is to examine institutional holdings and flows into risky assets. The State Street Investor Confidence Index uses changes in equity holdings by large international institutional investors relative to domestic investors to measure relative risk tolerance.[52] The index extracts relative risk tolerance by netting out wealth effects

[52]The estimated changes in relative risk tolerance of institutional investors from Froot and O'Connell (2003) are aggregated using a moving average. The index is scaled and rebased so that 100 corresponds to the year 2000.

Figure 1.38. Global Financial Stability Map: Monetary and Financial Conditions



Sources: Bloomberg L.P.; Goldman Sachs; OECD; lending surveys by Bank of Japan, European Central Bank, and Federal Reserve Board for households and corporates; and IMF staff estimates.

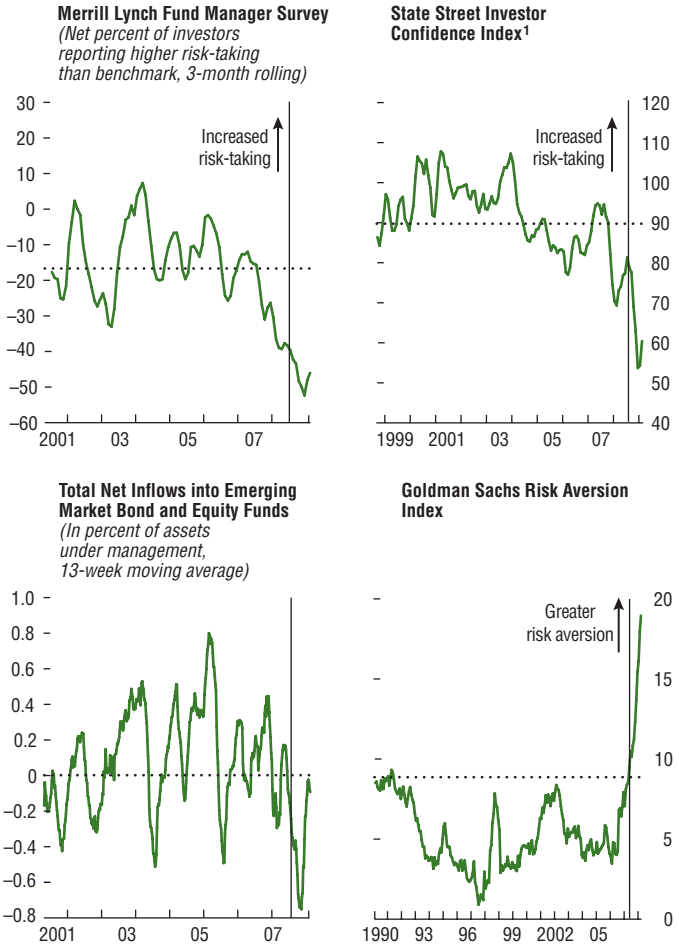
Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

[1]Canada and the United Kingdom are included in the composite but not shown separately.

[2]A GDP-weighted average of China, euro area, Japan, and the United States. Each country index represents a weighted average of variables such as interest rates, credit spreads, exchange rates, and financial wealth.

[3]Monthly interpolated GDP-weighted average. Euro area 1999:Q1 to 2002:Q4 based on values implied by credit growth. Composite and Japan showing up to 2008:Q4.

Figure 1.39. Global Financial Stability Map: Risk Appetite



Sources: Emerging Portfolio Fund Research, Inc.; Goldman Sachs; Merrill Lynch; State Street Global Markets; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

[1]The estimated changes in relative risk tolerance of institutional investors from Froot and O'Connell (2003) are integrated to a level, scaled, and rebased so that 100 corresponds to the average level of the index in the year 2000. 3-month rolling average of the published index.

and assuming that changes in fundamentals symmetrically affect all kinds of investors. We also take account of flows into emerging market bond and equity funds, as these represent another risky asset class. Risk appetite may also be inferred indirectly by examining price or return data. As an example of this approach, the Goldman Sachs Risk Aversion Index measures investors' willingness to invest in risky assets as opposed to risk-free securities, building on the premises of the capital asset pricing model.[53] By comparing returns between government debt and equities, the model allows the level of risk aversion to move over time. Taken together, these measures provide a broad indicator of risk appetite.

Macroeconomic Risks

Macroeconomic shocks with the potential to trigger a sharp market correction, given existing conditions in capital markets (Figure 1.40). Our principal assessment of the macroeconomic risks is based on the analysis contained in the *World Economic Outlook* and is consistent with the overall conclusion reached in that report on the outlook and risks for global growth. We complement that analysis by examining various economic confidence measures. The first of these is a GDP-weighted sum of confidence indices across the major mature markets to determine whether businesses and consumers are optimistic or pessimistic about the economic outlook. Second, recognizing the importance of turning points between expansions and slowdowns of economic activity, we incorporate changes in the Organization for Economic Cooperation and Development's composite leading indicators. Third, in order to gauge inflection points in global trade, we include global trade growth estimates implied by the Baltic Dry Index, a high-frequency indicator based on the freight rates of bulk raw materials that is commonly used as a leading

[53]The index represents the value of the coefficient of risk aversion.

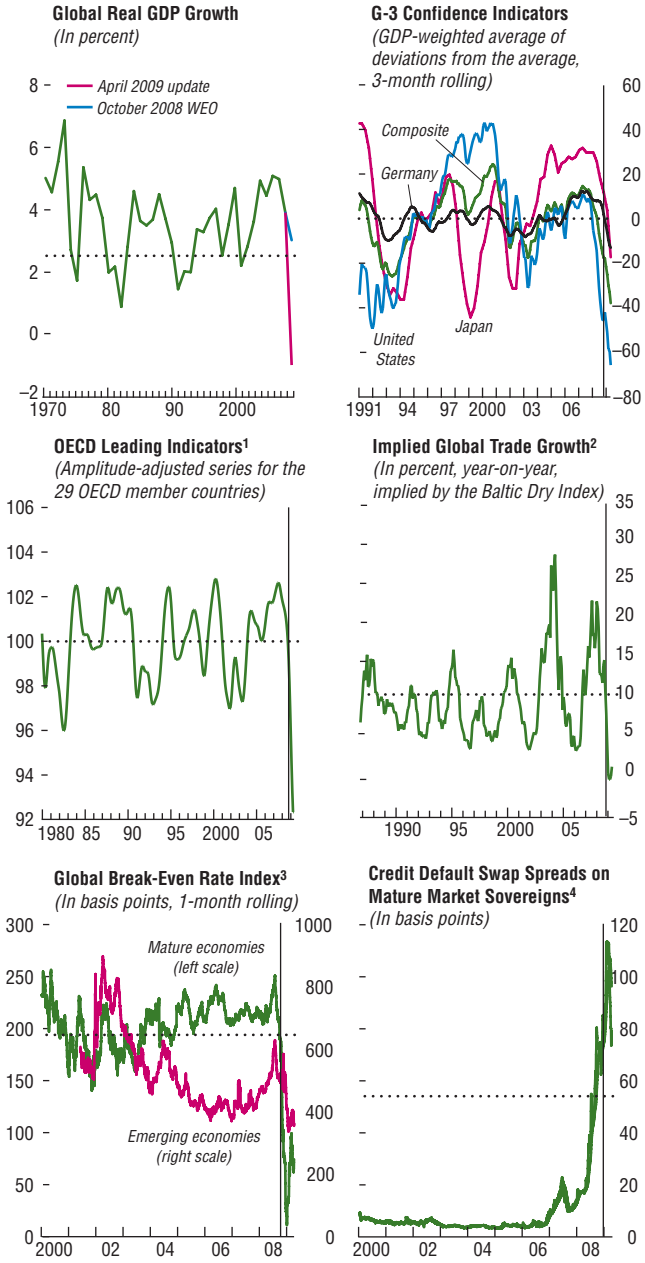
indicator for global trade. The fourth component is market-implied inflation expectations, based on intermediate-dated yield differentials between nominal and inflation-linked domestic bonds. Finally, in order to help assess stress levels on sovereign balance sheets, we examine a GDP-weighted average of the cost that investors need to pay to protect themselves against defaults of selected mature market sovereign debt.

Emerging Market Risks

Risks to global financial stability stemming from emerging market asset classes (Figure 1.41). These risks are closely linked to, but differ from, the macroeconomic risks described above, as the latter measures risks related to growth, inflation, or international trade of the global economy. Using an econometric model of emerging market sovereign spreads, we identify the movement in the Emerging Market Bond Index Global (EMBIG) spreads accounted for by changes in fundamentals, as opposed to the movement in spreads attributable to other factors. Included in the fundamental factors are changes in economic, political, and financial risks within each country.[54] This is complemented with a measure of the trend in sovereign rating actions by credit rating agencies to gauge changes in the macroeconomic environment and progress in reducing vulnerabilities arising from external financing needs. In addition to these factors relating to sovereign debt, we also include an indicator of growth in private sector credit. Other components of the subindex include a

[54]The economic risk rating is the sum of risk points for annual inflation, real GDP growth, the government budget balance as a percentage of GDP, the current account balance as a percentage of GDP, and GDP per capita as a percentage of the world average GDP per capita. The financial risk rating includes foreign debt as a percentage of GDP, debt service as a percentage of GDP, net international reserves as months of import cover, exports of goods and services as a percentage of GDP, and exchange rate depreciation over the last year. The political risk rating is calculated using 12 indicators representing government stability and social conditions.

Figure 1.40. Global Financial Stability Map: Macroeconomic Risks



Sources: The Baltic Exchange; Barclays Capital; Bloomberg L.P.; Datastream; IMF, World Economic Outlook database; OECD; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

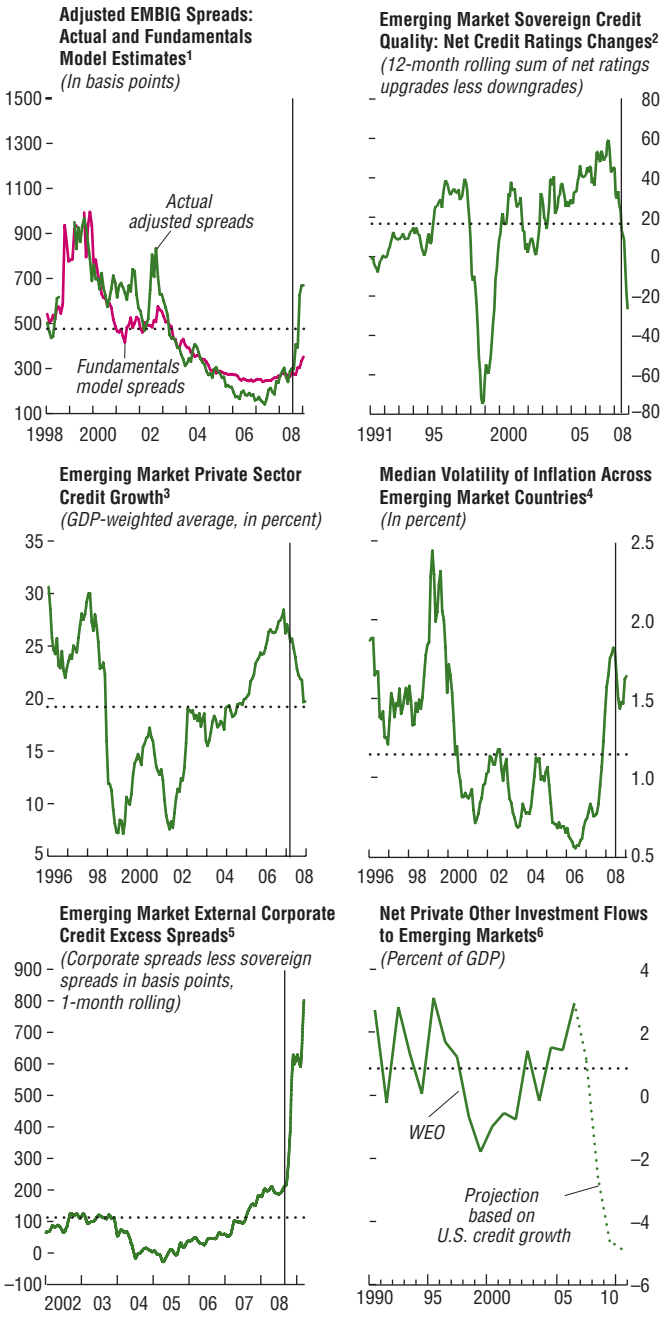
[1]Amplitude adjustment is carried out by adjusting mean to 100 and the amplitude of the raw index to agree with that of the reference series by means of a scaling factor.

[2]The Baltic Dry Index is a shipping and trade index measuring changes in the cost of transporting raw materials such as metals, grains, and fuels by sea.

[3]Tracking GDP-weighted longer-term break-evens, or inflation expectations for Australia, Brazil, Canada, Colombia, France, Germany, Italy, Japan, Korea, Mexico, Poland, South Africa, Sweden, Turkey, the United Kingdom, and the United States. The ranking of the observations is determined by *z*-score in absolute terms relative to their long-run averages.

[4]GDP-weighted average of France, Germany, Italy, Japan, Spain, United Kingdom, and United States.

Figure 1.41. Global Financial Stability Map: Emerging Market Risks



Sources: Bloomberg L.P.; IMF, International Financial Statistics and World Economic Outlook databases; JPMorgan Chase & Co.; The PRS Group; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

[1]The model excludes Argentina because of breaks in the data series related to debt restructuring. Owing to the short data series, the model also excludes Indonesia and several smaller countries. The analysis thus includes 32 countries. EMBIG = Emerging Markets Bond Index Global.

[2]Net actions of upgrades (+1 for each notch), downgrades (–1 for each notch), changes in outlooks (+/– 0.25), reviews and creditwatches (+/–0.5).

[3]44 countries.

[4]Average of 12-month rolling standard deviations of consumer price changes in 36 emerging markets.

[5]Unweighted average of Brazil, China, Colombia, Egypt, Kazakhstan, Mexico, Malaysia, Peru, Russia, and Ukraine.

[6]31 selected emerging economies.

measure of the volatility of inflation rates, and a measure of corporate credit spreads relative to sovereign spreads. Lastly, we forecast econometrically a subcomponent of capital flows to emerging markets from projected credit growth in the United States.

Credit Risks

Changes in, and perceptions of, credit quality that have the potential for creating losses resulting in stress to systemically important financial institutions (Figure 1.42). Spreads on a global corporate bond index provide a market price-based measure of investors' assessment of corporate credit risk. We also examine the credit-quality composition of the high-yield index to identify whether it is increasingly made up of higher- or lower-quality issues, calculating the percentage of the index comprised of CCC or lower rated issues. In addition, we incorporate forecasts of the global speculative-grade default rate produced by Moody's. Another component of the subindex is a banking stability index, which represents the expected number of defaults among large complex financial institutions (LCFIs), given at least one LCFI default (Segoviano and Goodhart, 2009). This index is intended to highlight market perceptions of systemic default risk in the financial sector. To capture broader credit risks, we also include delinquency rates on a wide range of other credit, including residential and commercial mortgages and credit card loans. Also included is a measure of stress on household balance sheets, constructed as the total amount of financial obligations[55] scaled by disposable income for U.S. households.

Market and Liquidity Risks

The potential for instability in pricing risks that could result in broader spillovers and/or mark-to-market losses (Figure 1.43). An indicator attempt-

[55]Estimated payments on outstanding mortgages, consumer debt, auto leases, rental contracts, homeowners' insurance, and property tax.

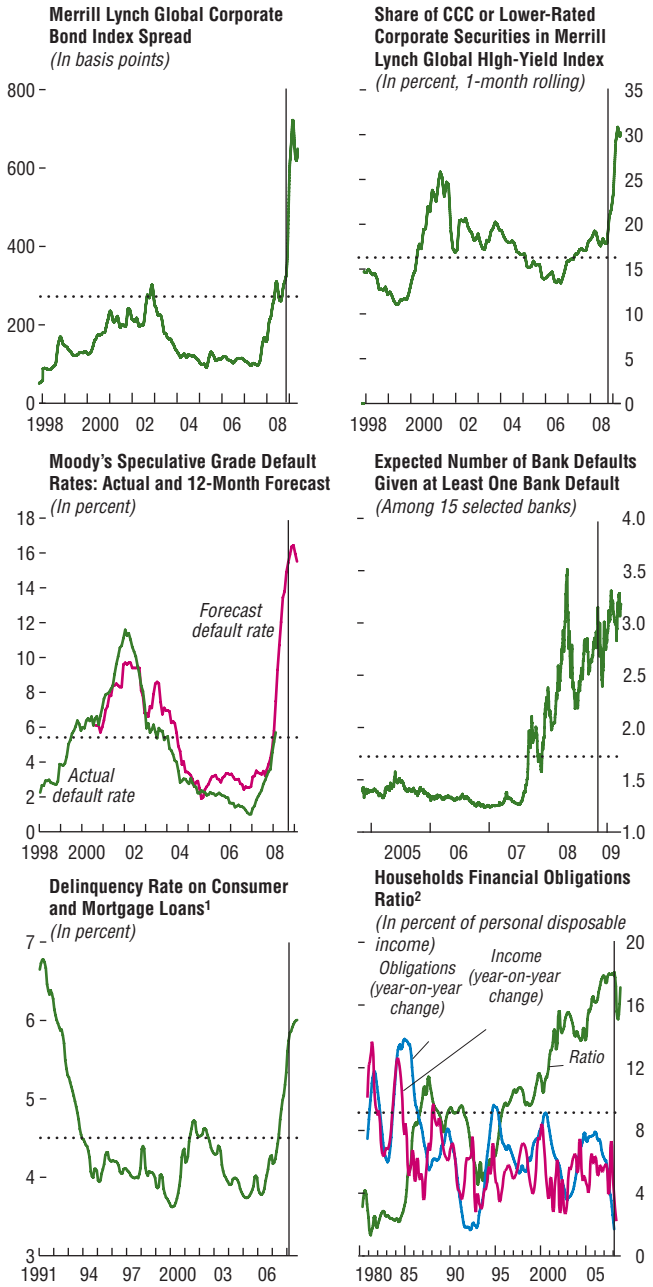
ing to capture the extent of market sensitivity of hedge fund returns provides an indirect measure of institutional susceptibility to asset price changes. The subindex also includes a speculative positions index, constructed from the net noncommercial positions relative to overall open interest for a range of futures contracts as reported to the Commodity Futures Trading Commission. The index typically rises when speculators are taking relatively large positional bets on futures markets, relative to commercial traders. Also included is an estimation of the proportion of variance in returns across a range of asset classes that can be explained by a common factor. The higher the size of a common factor across asset-class returns, the greater the risk of a disorderly correction in the face of a shock. An additional indicator is an estimate of equity risk premia in mature markets using a three-stage dividend discount model. Low equity risk premia may suggest that investors are underestimating the risk attached to equity holdings, thereby increasing potential market risks. There is also a measure of implied volatility across a range of assets. Finally, to capture perceptions of funding conditions, secondary market liquidity, and counterparty risks, we incorporate the spread between major mature-market government securities yields and interbank rates, the spread between interbank rates and expected overnight interest rates, bid-ask spreads on major mature-market currencies, and daily return-to-volume ratios of equity markets.

Annex 1.2. Predicting Private "Other Investment" Flows and Credit Growth in Emerging Markets[56]

To assess the impact of the credit crunch in advanced economies on credit flows to emerging markets, we develop a fixed-effects vector autoregression model with one lag containing the following variables:

[56]This annex was prepared by Kristian Hartelius.

Figure 1.42. Global Financial Stability Map: Credit Risks



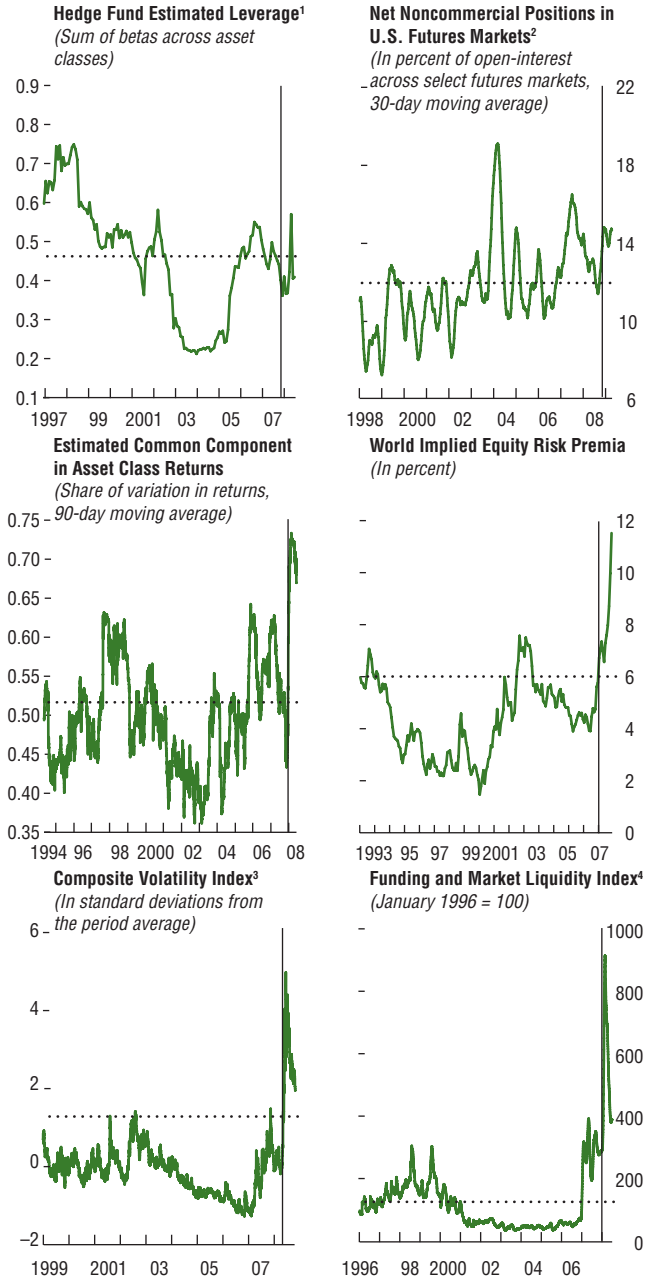
Sources: Bloomberg L.P.; Federal Reserve; Merrill Lynch; Moody's; Mortgage Bankers Association; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

[1]30-, 60-, and 90-day delinquencies for residential and commercial mortgages, and credit card loans in the United States. Quarterly data are extrapolated into monthly frequency.

[2]Financial obligations consist of the estimated required annual payments on outstanding mortgages, consumer debt, automobile lease, rental on tenant-occupied property, homeowners' insurance, and property tax.

Figure 1.43. Global Financial Stability Map: Market and Liquidity Risks



Sources: Bloomberg L.P.; Credit Suisse Tremont Index LLC; IBES; JPMorgan Chase & Co; Morgan Stanley Capital International; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2008 GFSR.

[1]36-month rolling regressions of hedge fund performance versus real asset returns.

[2]Data represent the absolute number of contracts of the net positions taken by noncommercial traders in 17 selected U.S. futures markets. Higher volume is indicative of heavy speculative positioning across markets, either net-long or net-short.

[3]Represents an average *z*-score of the implied volatility derived from options from stock market indices, interest, and exchange rates. A value of 0 indicates the average implied volatility across asset classes is in line with the period average (from 12/31/98 where data are available). Values of +/–1 indicate average implied volatility is one standard deviation above or below the period average.

[4]Based on the spread between yields on government securities and interbank rates, spread between term and overnight interbank rates, currency bid-ask spreads, and daily return-to-volume ratios of equity markets. A higher value indicates tighter market liquidity conditions.

(1) Growth in U.S. domestic credit, year-on-year;

(2) Net private other investment flows to emerging markets, as percent of GDP;

(3) Emerging market real domestic credit growth, year-on-year;

(4) Emerging market real GDP growth, year-on-year.

The data set contains annual observations for 31 emerging markets from 1990 to 2007.[57] The "other investment" category of the financial account contains cross-border bank financing and trade credits and is of particular importance for financial stability over the next few years, given the risks to emerging markets from shrinking global bank balance sheets.

The impulse responses have the expected signs, including positive effects on capital inflows and emerging market credit growth from positive shocks to U.S. credit growth (Figure 1.44).[58] Using the GFSR projection for U.S. credit growth as input (see Figure 1.5), the model yields forecasts for net private other investment flows, emerging market credit growth, and emerging market GDP growth.[59]

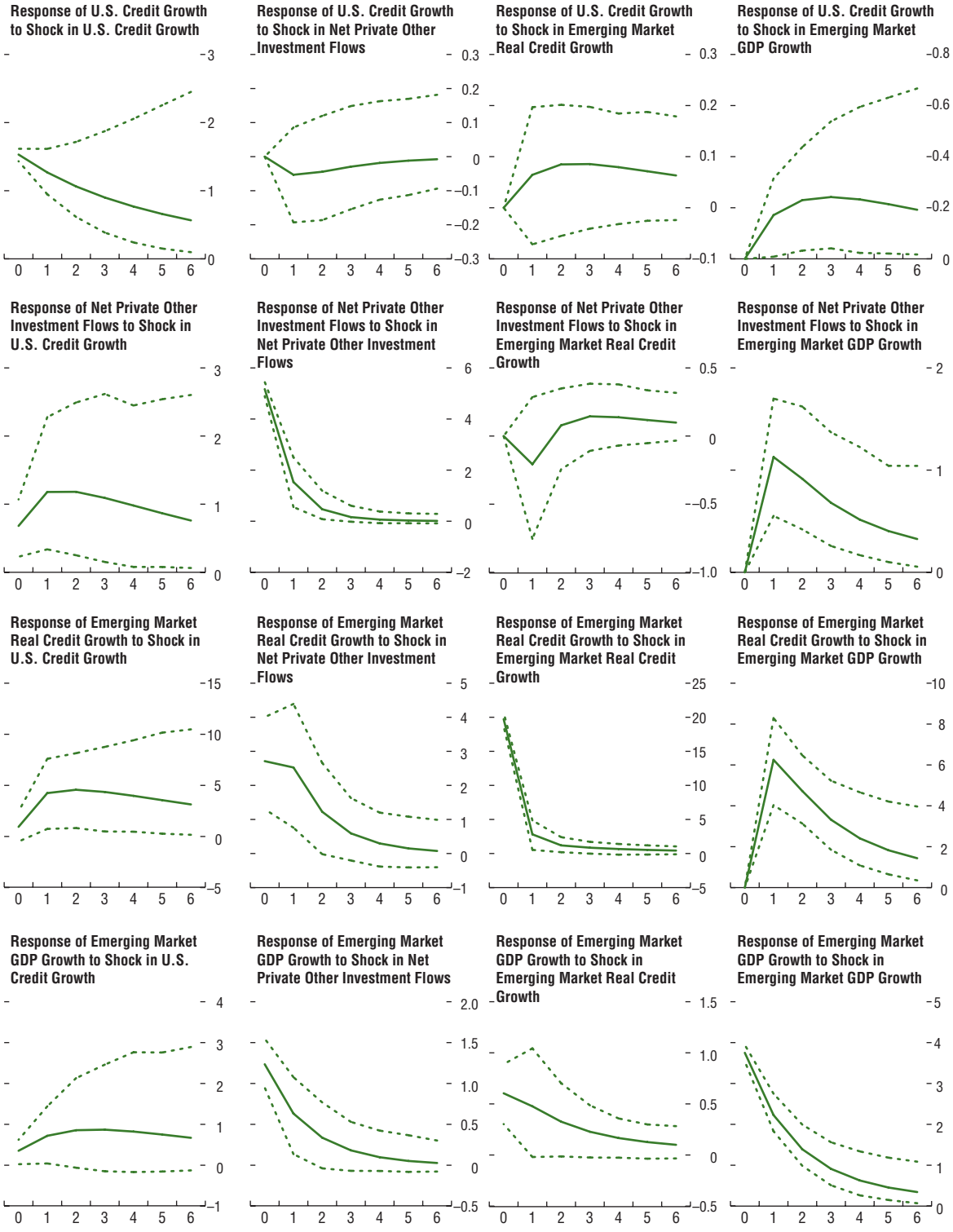
The model's projection of cross-border bank flows to emerging markets implies a "sudden stop," with substantial net outflows of other investment that average around 5 percent of GDP

[57]The code used to estimate the model and produce impulse response functions was written by Inessa Love at the World Bank.

[58]The point estimates of the parameters yield mean reverting model dynamics. There is, however, a potential unit root in any measure of U.S. credit growth between 1990 and 2007. The unit root is not present in a longer sample between 1970 and 2007, and there is no theoretical reason to believe that U.S. credit growth should be nonstationary in the long run. A model with two lags does not exhibit widening error bands, but makes less economic sense. Given that global financial integration increased greatly from around 1990, the preferred model contains one lag and is estimated over the period 1990–2007.

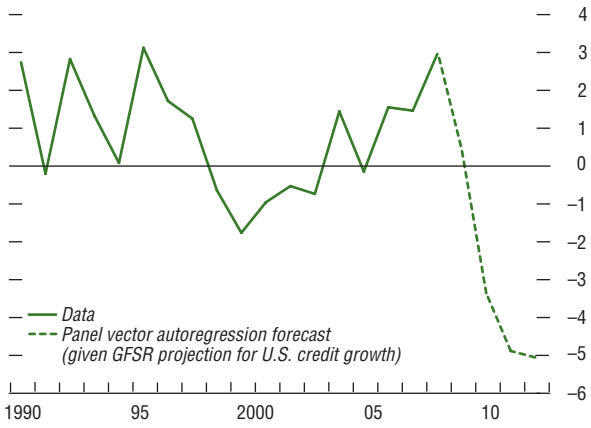
[59]The U.S. credit growth numbers are treated as a series of shocks to the model. The shock in period t is measured as the scaled difference between the GFSR forecast for U.S. credit growth and the model dynamics for U.S. credit growth without a shock in t (but incorporating shocks from previous periods).

Figure 1.44. Impulse Responses



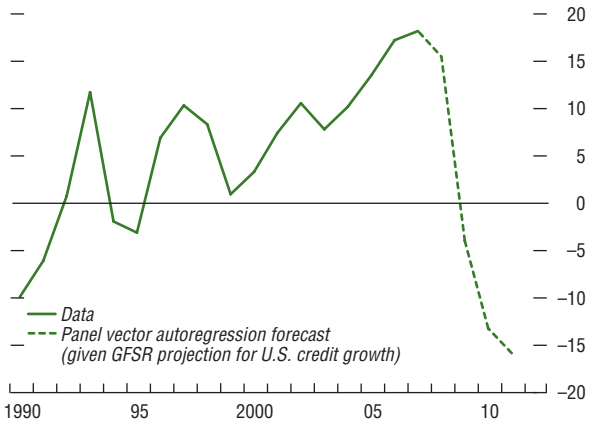
Source: IMF staff estimates.
Note: Dashed lines represent 90 percent confidence bands. One standard deviation Cholesky orthogonal shocks.

Figure 1.45. Net Private Other Investment Flows to Emerging Markets
(Percent of GDP, average in panel)



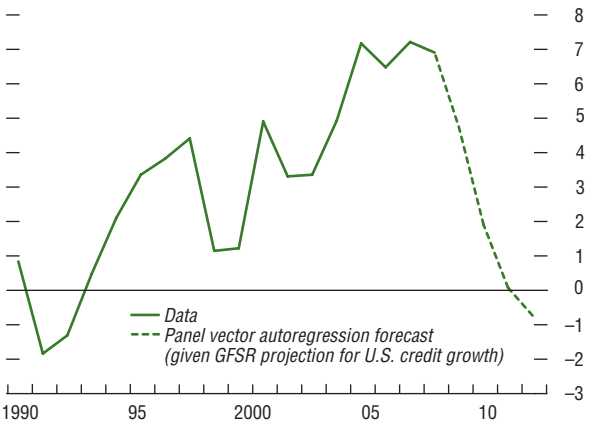
Source: IMF staff estimates.

Figure 1.46. Emerging Market Real Credit Growth
(In percent, year-on-year, average in panel)



Sources: IMF, World Economic Outlook database; and IMF staff estimates.

Figure 1.47. Emerging Market GDP Growth
(Percent year-on-year, average in panel)



Source: IMF staff estimates.

over the next few years (Figure 1.45). Outflows of this magnitude were registered in the late 1990s by several Southeast Asian countries, and in the early 1980s by Latin American countries. In line with the dire outlook for cross-border bank financing, the model predicts that real credit will contract by as much as 15 percent in emerging markets in 2010 and 2011 (Figure 1.46). Again, the predicted magnitudes are similar to credit contractions in previous financial crises in emerging markets. The knock-on effects on GDP growth could be considerable according to the model, with average emerging market growth stalling in 2010 and 2011 (Figure 1.47).

These model projections, however, may be too extreme for many emerging markets for several reasons. First, the model estimates common coefficients for all countries in the sample between 1990 and 2007, and therefore generates forecasts for the "typical" or "average" emerging market country. Second, the model does not take into account the potential in many emerging markets for policy responses that are stronger than the average response in the sample, made possible by historically large international reserves and strong fiscal positions. Third, the global policy response under way, with increased resources for the IMF and other international financial institutions, may mitigate the impact of the financial crisis on emerging markets. Finally, the model does not account for the potential stabilizing effect of parent bank support for lending by their emerging market subsidiaries, to the extent that such support currently is stronger than on average in the sample.

Annex 1.3. Spillovers Between Foreign Banks and Emerging Market Sovereigns[60]

The methodology in Segoviano and Goodhart (2009) analyzes how problems in advanced country banking systems are linked with increasing risks to emerging markets.[61] It uses CDS

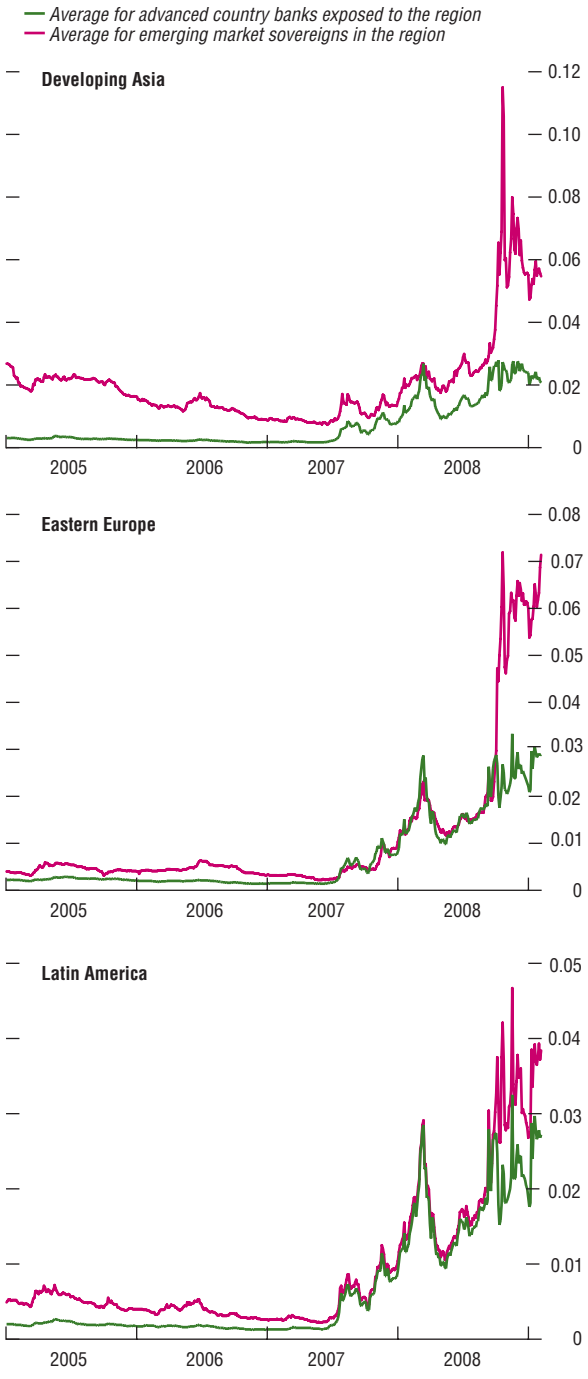
[60]This annex was prepared by Miguel Segoviano.

[61]This approach incorporates recover linear (correlations) and nonlinear distress dependence among the banks and sovereigns included in the analysis. This

spreads on sovereign and bank bonds to derive the probabilities of distress of banks and sovereigns priced into the markets (Figure 1.48). We estimate cross vulnerabilities between Latin American, eastern European, and Asian emerging markets and the advanced country banks with large regional presences in these regions.[62] To illustrate them, we present distress dependence matrices estimated for each of these regions (Table 1.12) at specific dates.[63] These matrices report probabilities that a bank/country in the row will become distressed if the bank/country in the column becomes distressed.[64] In order to analyze how distress dependence has evolved over time, we also estimate the time series of the conditional probabilities of distress of banks/countries if other banks/countries become distressed (Figure 1.49).[65]

The analysis shows that risks in sovereigns and banks increased markedly after October 2008. In the run-up to the crisis, there was little concern about risks to sovereigns and parent banks in eastern Europe, and risk perceptions in Latin America and Asia were falling. From July 2007 to September 2008, both sovereign risk and bank risk increased and moved in tandem, but since

Figure 1.48. Default Probabilities Implied by Credit Default Swap Pricing



Source: IMF staff estimates.

dependence changes throughout the economic cycle, reflecting the fact that dependence increases in periods of distress.

[62]The countries and banks analyzed in Latin America are Brazil, Chile, Colombia, and Mexico, and the banks are BBVA, Citigroup, HSBC, Santander, and Scotia Bank. In eastern Europe, the countries are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, and the Slovak Republic, and the banks are Citigroup, Erste, Intesa, Société Générale, and Unicredito. In Asia, the countries are China, Indonesia, Korea, Malaysia, the Philippines, and Thailand, and the banks are BNP, Citigroup, DBS, Deutsche, HSBC, JP Morgan Chase, and Standard Chartered.

[63]In this example, we chose February 11, 2009.

[64]These matrices can be estimated for each day. They report links across countries (bottom right, quadrant 4), and across banks (top left, quadrant 1). The bottom left (quadrant 3) reports how sovereign distress is conditional on bank problems, while the top right (quadrant 2) indicates the opposite direction.

[65]Note that there is a daily time series for each of the quadrants described in the previous footnote. Each observation in the time series corresponds to the average of the conditional probabilities in each quadrant, on each day.

Table 1.12. Distress Dependence Matrices: Sovereigns and Banks

(As of February 11, 2009)

Latin America

	BBVA	Santander	Citi	HSBC	Row Average		Mexico	Colombia	Brazil	Chile	Row Average
BBVA	1.00	0.73	0.33	0.64	0.67	BBVA	0.28	0.26	0.28	0.36	0.29
Santander	0.73	1.00	0.32	0.63	0.67	Santander	0.28	0.26	0.28	0.36	0.29
Citi	0.75	0.72	1.00	0.78	0.81	Citi	0.59	0.46	0.54	0.64	0.56
HSBC	0.59	0.57	0.31	1.00	0.62	HSBC	0.26	0.23	0.25	0.33	0.27
Column average	0.77	0.76	0.49	0.76	0.69	Column average	0.35	0.30	0.34	0.42	0.35
	BBVA	Santander	Citi	HSBC	Row Average		Mexico	Colombia	Brazil	Chile	Row Average
Mexico	0.87	0.86	0.81	0.87	0.85	Mexico	1.00	0.65	0.80	0.87	0.83
Colombia	0.82	0.82	0.65	0.82	0.78	Colombia	0.66	1.00	0.66	0.75	0.77
Brazil	0.82	0.82	0.70	0.82	0.79	Brazil	0.76	0.61	1.00	0.80	0.79
Chile	0.74	0.73	0.56	0.74	0.69	Chile	0.57	0.48	0.55	1.00	0.65
Column average	0.81	0.81	0.68	0.81	0.78	Column average	0.75	0.69	0.75	0.86	0.76

Eastern Europe

	Intesa	Unicredito	Erste	Société	Citi	Row Average		Bulgaria	Croatia	Hungary	Slovak Rep	Estonia	Czech Rep	Row Average
Intesa	1.00	0.48	0.30	0.45	0.21	0.49	Intesa	0.14	0.18	0.19	0.18	0.17	0.24	0.18
Unicredito	0.60	1.00	0.37	0.55	0.27	0.56	Unicredito	0.18	0.22	0.24	0.23	0.21	0.31	0.23
Erste	0.56	0.54	1.00	0.57	0.34	0.60	Erste	0.26	0.31	0.35	0.28	0.29	0.47	0.33
Société	0.38	0.37	0.27	1.00	0.18	0.44	Société	0.12	0.15	0.15	0.15	0.13	0.20	0.15
Citi	0.52	0.52	0.45	0.53	1.00	0.60	Citi	0.31	0.36	0.38	0.40	0.33	0.44	0.37
Column average	0.61	0.58	0.48	0.62	0.40	0.54	Column average	0.20	0.24	0.26	0.25	0.23	0.33	0.25
	Intesa	Unicredito	Erste	Société	Citi	Row Average		Bulgaria	Croatia	Hungary	Slovakia	Estonia	Czech Rep	Row Average
Bulgaria	0.71	0.72	0.72	0.74	0.63	0.70	Bulgaria	1.00	0.71	0.67	0.76	0.71	0.78	0.77
Croatia	0.80	0.79	0.76	0.77	0.66	0.76	Croatia	0.63	1.00	0.68	0.70	0.68	0.82	0.75
Hungary	0.83	0.81	0.81	0.78	0.66	0.78	Hungary	0.57	0.65	1.00	0.65	0.64	0.85	0.73
Slovak Rep.	0.35	0.36	0.30	0.35	0.33	0.34	Slovakia Rep.	0.30	0.31	0.30	1.00	0.31	0.40	0.44
Estonia	0.69	0.67	0.64	0.64	0.56	0.64	Estonia	0.58	0.62	0.61	0.65	1.00	0.73	0.70
Czech Rep	0.61	0.63	0.64	0.59	0.45	0.58	Czech Rep	0.39	0.46	0.50	0.50	0.45	1.00	0.55
Column average	0.67	0.66	0.64	0.65	0.55	0.63	Column average	0.58	0.62	0.63	0.71	0.63	0.76	0.66

Asia

	HSBC	StdCha	Citi	Deutsche Bank	BNP	DBS	JPMorgan	Row Average		Korea	Malaysia	Thailand	China	Philippines	Indonesia	Row Average
HSBC	1.00	0.40	0.24	0.47	0.59	0.24	0.28	0.46	HSBC	0.20	0.20	0.19	0.22	0.14	0.13	0.18
StdCha	0.73	1.00	0.37	0.65	0.79	0.40	0.42	0.62	StdCha	0.36	0.38	0.35	0.36	0.27	0.24	0.33
Citi	0.60	0.51	1.00	0.68	0.65	0.36	0.85	0.66	Citi	0.34	0.36	0.33	0.36	0.26	0.25	0.32
Deutsche Bank	0.39	0.30	0.23	1.00	0.57	0.18	0.30	0.42	Deutsche Bank	0.15	0.18	0.15	0.16	0.12	0.10	0.14
BNP	0.35	0.25	0.15	0.40	1.00	0.15	0.19	0.36	BNP	0.12	0.14	0.12	0.13	0.09	0.08	0.11
DBS	0.48	0.43	0.28	0.43	0.52	1.00	0.30	0.49	DBS	0.47	0.51	0.44	0.39	0.31	0.31	0.40
JPMorgan	0.27	0.23	0.34	0.36	0.33	0.15	1.00	0.38	JPMorgan	0.13	0.15	0.13	0.15	0.10	0.10	0.13
Column average	0.55	0.45	0.37	0.57	0.63	0.36	0.48	0.49	Column average	0.25	0.27	0.24	0.25	0.18	0.17	0.23
	HSBC	StdCha	Citi	Deutsche Bank	BNP	DBS	JPMorgan	Row Average		Korea	Malaysia	Thailand	China	Philippines	Indonesia	Row Average
Korea	0.59	0.59	0.40	0.55	0.62	0.71	0.40	0.55	Korea	1.00	0.69	0.61	0.61	0.48	0.44	0.64
Malaysia	0.42	0.44	0.31	0.45	0.50	0.55	0.31	0.43	Malaysia	0.49	1.00	0.46	0.46	0.38	0.33	0.52
Thailand	0.41	0.41	0.28	0.37	0.44	0.48	0.28	0.38	Thailand	0.43	0.46	1.00	0.38	0.29	0.30	0.48
China	0.41	0.37	0.27	0.36	0.41	0.38	0.30	0.36	China	0.39	0.42	0.34	1.00	0.28	0.25	0.45
Philippines	0.47	0.51	0.36	0.49	0.53	0.55	0.33	0.46	Philippines	0.57	0.63	0.48	0.51	1.00	0.42	0.60
Indonesia	0.68	0.69	0.52	0.63	0.69	0.83	0.51	0.65	Indonesia	0.78	0.84	0.74	0.70	0.63	1.00	0.78
Column average	0.50	0.50	0.36	0.48	0.53	0.58	0.36	0.47	Column average	0.61	0.67	0.60	0.61	0.51	0.46	0.58

Source: IMF staff estimates.

October 2008, risk in sovereigns has been significantly higher than in banks (Figure 1.48). This may reflect the deepening downturn in emerging economies in late 2008 and the support received by banks in developed countries from their sovereigns.

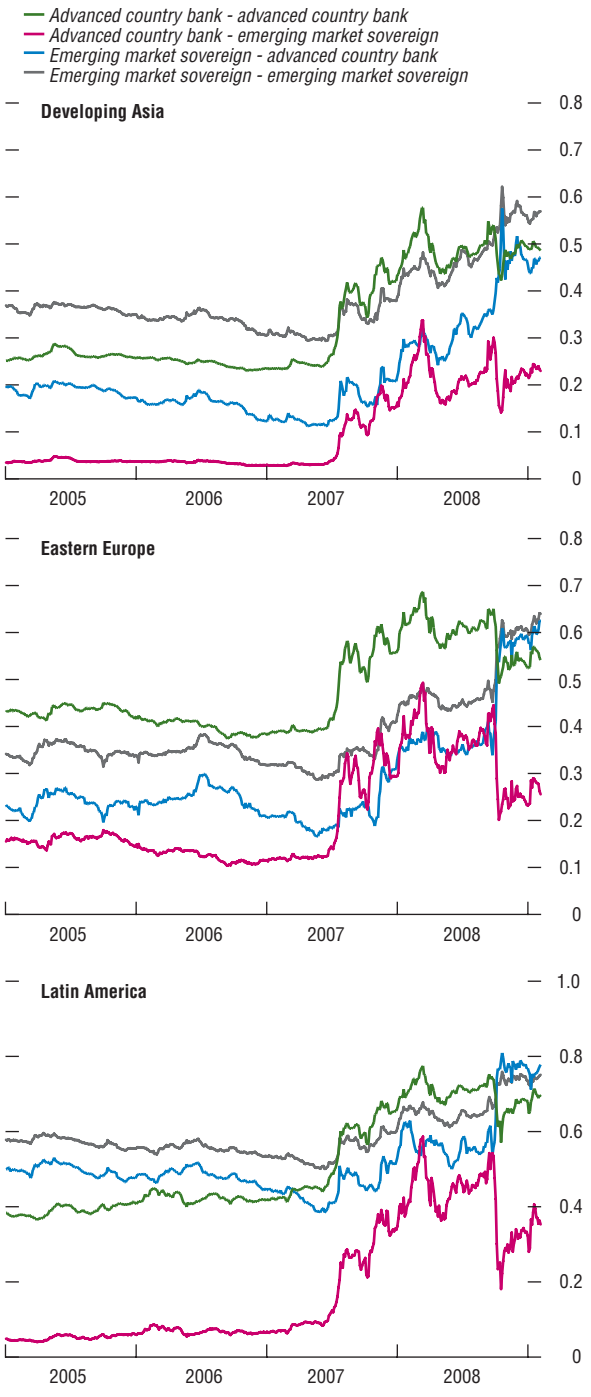
Bank problems appear to have a significant impact on sovereign distress. This is seen by comparing the probability of distress of the emerging market sovereigns conditional on distress in the mature market banks in July 2007, when sovereigns appeared to have low risk of contamination, and in September 2008. In the last quarter of 2008, sovereign risk conditional on bank risk has increased further (Figure 1.49).

Banks' geographical role matters in sovereign distress. Quadrant 3 of the distress dependence matrices shows the distress of Spanish banks to be associated with the highest distress in Latin America. This is also the case for Italian banks in eastern Europe (quadrant 3, column average). These results suggest that geographic roles matter, since these banks have a substantial presence in the respective regions under analysis.

Direct links between banks and countries matter. Distress in countries with a particularly large foreign bank presence—such as Mexico and the Czech Republic—is more strongly associated with potential banking distress (quadrant 2). Direct links from individual banks to countries also matter—for example, distress at Citigroup, Intesa, and DBS are relatively more important for Mexico, Hungary, and Indonesia, respectively, than for other countries (quadrant 3).

The results also illustrate the influence of systemic risk, which constitutes an indirect link especially for Asia, over and above direct regional and bilateral links. Direct ownership and lending by foreign banks is generally lower in Asia than in eastern Europe or Latin America, insulating banking systems somewhat from these direct links, and increasing the relative importance of indirect links involving bank and/or sovereign distress. In addition, links between banks may be somewhat less impor-

Figure 1.49. Distress Dependence
(Average conditional probabilities for the region)



Source: IMF staff estimates.

tant for emerging Asia, as borrowing through debt markets tends to play a larger role in local financial systems. Indirect effects are particularly evident in Korea and Indonesia.[66]

Overall, the results indicate that systemic bank risks and emerging market vulnerabilities appear to be highly dependent. This likely reflects the fact that distress in individual banks is a bellwether for the state of the overall financial system, via direct or indirect links. The bottom line is that policies to limit systemic risks in advanced country financial systems would also sharply reduce risks to emerging markets.

Annex 1.4. Debt Restructuring in Systemic Crises[67]

This annex discusses the principles and options for debt restructuring in response to distress posed by systemic crises.

Principles of Debt Restructuring

Debt restructuring must be part of a comprehensive set of macroeconomic and sectoral policies. Such policies should include measures to stabilize the economic environment so that debtors, creditors, and investors can value transactions. In addition, a program must include an assessment of the scale and nature of corporate distress and a supporting legal, regulatory, and accounting environment.

The effectiveness of debt restructuring will be limited until progress has been made on a variety of critical fronts. First, progress in restructuring the financial sector is needed. Debt restructuring is, in part, about the allocation of losses between creditors and borrowers, and thus the ability of financial institutions to absorb losses must be known. Second, the legal framework should facilitate restructuring. Out-of-court settlements are typically the most effective approach, but a sound and effective bankruptcy framework is a necessary backdrop for the restructuring strategy. Third, the strategy developed by the authorities must be cast within a framework where loss allocation is seen as equitable to all participants.

Restructuring Options in the Current Environment

The current global crisis differs from past cases. The roots of previous systemic crises lay primarily in the gradual impairment of banks' loan portfolios. In the current global crisis, in contrast, broad asset-quality deterioration was initially not the dominant concern, as the distress in the U.S. subprime market was seen as affecting only a subclass of structured products. Market concerns quickly broadened, however, to include all structured products, undermining the banks' "originate-to-distribute" funding model and culminating in serious financial constraints on corporate and household borrowers.

This evolution of the crisis has complicated normal debt restructuring options. Structured products remain in bank portfolios, limiting transparency and carrying the potential for further losses. In addition, the growing economic slowdown is putting pressures on households and corporate asset quality. Restructuring strategies for a variety of asset classes must be identified and implemented.

Restructuring Structured Products

Asset restructuring has become much more complex than in the past because of the reliance on securitization vehicles. In addition to traditional direct loan exposures, banks now also hold tranches of structured securities issued by such vehicles. When securitization structures are downgraded, the banks suffer writedowns in asset values. While banks can manage nonperforming loans, they are merely investors in the structured securities and have few legal rights to restructure the loans underlying these structured products. In

[66]An important strength of our approach is that market prices reflect perceptions of *direct links* and *indirect links*. For the former, market presence might be an important element, as in Latin America and eastern Europe; however, for the latter, liquidity pressures and systemic banking distress/macroeconomic spillovers might play an important role. This feature of our approach appears to be particularly relevant in Asia.

[67]This annex was prepared by David Hoelscher.

addition, the securitization structures themselves have limited legal power to modify the contractual agreements of the underlying loans. While securitization structures are owners of the loans, the modification of securitized loans is only permissible if bondholders continue to be paid according to the original terms of the contract. In addition, securitized structures cannot sell delinquent loans, as typically envisaged in their operational frameworks, because of the absence of liquidity in loan markets.

Currently, resolution options are limited. Typically, the only option is to allow the securitization structure to fail, liquidate the assets, and allocate resources recovered in liquidation to the bondholders in order of priority. Loan restructuring is not an alternative. In the current environment, the liquidation of assets is likely to result in significant discounts and large losses.

One option is to establish a publicly financed special-purpose vehicle (PSPV) as an instrument to remove structured products from bank portfolios. The PSPV, however, cannot just purchase tranches of structured securities and restructure underlying loans because it would only be a bondholder without creditor rights. Rather, to restructure loans, the PSPV would have to buy all assets of the securitization structures. Once it acquired such rights, it would be in a position to restructure underlying loans.

Pricing of either asset portfolios or structured securities is a key policy issue. Any pricing decision carries the risk of either overcompensation or undercompensation of the banks. In addition, the pricing policy will have implications for the restructuring strategy of banks. The pricing process, therefore, must be determined in the context of the overall financial sector strategy and be transparent. One approach would be to price all structured securities using common indices such as the CDX, LCDX, etc. At current prices, this would imply a loss of about 70 percent of the nominal value. Another approach would be to use the book value, subject to review by a specialized accounting firm.

In late 2008, the Swiss government adopted a bank support program that entailed the creation of a new SPV to purchase UBS's distressed or illiquid assets. The SPV purchased assets at book value but will not try to reschedule underlying loans. It also provides long-term liquidity support to UBS, strengthening UBS's balance sheet by reducing risk-weighted assets. UBS retains the first loss position on the transferred assets through a capital participation in the vehicle. The central bank provided the SPV with a loan for the purchase of UBS's assets in an amount exceeding the value of current distressed or illiquid assets, and UBS with capital support equal to its equity participation in the vehicle.

Corporate Restructuring

Lessons for corporate debt have been drawn from a variety of cases in the 1990s, including Brazil, the Czech Republic, Indonesia, Korea, Malaysia, Mexico, Thailand, and Turkey.[68] Two broad approaches have been followed in such experiences:

- A voluntary private sector debt workout between banks and borrowers. In this case, debtors negotiate with a consortium of creditors to establish a mutually agreeable level of debt service and loan maturities.
- Governments take a central role in the restructuring process. The specific role will vary from case to case but is essential in a systemic crisis where insolvencies are large and private coordination difficult.

In voluntary private debt restructuring, debtors and creditors negotiate compatible rescheduling arrangements. While such restructurings are bank-led, government intervention may include orchestrating voluntary workouts, establishing guidelines, or adjusting tax and prudential rules that might otherwise impede finding a common solution. The creditors assess the debtor in terms of its financial strengths. The out-of-court settlement approach allows negotiated rescheduling. A critical feature is an effective insolvency frame-

[68]For examples of these experiences and policy implications, see Pomerleano and Shaw (2005), Stone (2000), and Adams, Litan, and Pomerleano (2000).

work, as all parties understand that the alternative to the out-of-court process is insolvency.

When insolvencies are numerous and coordination among creditors and borrowers difficult, the government may take a more direct role. A range of options exist for government intervention, including:

- *Government mediation.* Mediation between corporations and banks can help organize the restructuring process. The "London approach" is an example, based on principles that (1) banks maintain credit facilities and do not press for bankruptcy; (2) a comprehensive assessment is made of debtor viability; and (3) seniority of claims is recognized but there is an element of shared pain.
- *Government-financed incentive programs.* Financial incentives through such programs can be useful if corporate distress is systemic and market or regulatory failures inhibit restructuring. Such programs may involve insurance or compensation to creditors for lengthening debt maturities and grace periods, interest rate and exchange rate guarantees, and equity injections.
- *Restructuring director.* Appointment of a restructuring director may accelerate the pace of restructuring by defining the goals of restructuring, and marshaling and prioritizing government financial support.
- *Asset management corporations.* Governments may establish special agencies to work out distressed debt in a centralized fashion. Such institutions are useful when there is a large number of troubled corporations and a significant number of relatively homogeneous loans (Song, 2006; and Ingves, Seelig, and He, 2006). Asset management companies may be established to manage assets from intervened and resolved banks or, in limited cases, from open banks. In this latter case, the price for removing the assets is a critical policy issue. In principle, assets should be removed at their market value (or the best estimation of that value) and the banks recapitalized by private investors, a public recapitalization program, or a combination of both.

The global nature of the current crisis has made the restructuring difficult for at least two key reasons. First, corporations have borrowed from cross-border banks that operate in a wide range of jurisdictions where corporate law and in-court settlement frameworks differ, making coordination of debtors and cross-border creditors more difficult. Second, the holders of corporate debt are much more dispersed than in the past both because corporations have financed their activities by issuing bonds in international markets and because many corporate loans have been acquired by securitization structures, with each structure holding a small share of any single corporate's debt.

International coordination of governmental efforts may help to address these limitations. An international body may help by establishing standard guidelines or proposing standardized debt restructuring frameworks for financial institutions and corporates that are active across borders. Such guidelines could limit differences in international creditor treatment across jurisdictions. Moreover, an international body could act as a clearinghouse for information about the scope and holdings of corporate debt and arrange for coordinated negotiations among a wide range of creditors and debtors.

Household Debt Restructuring

During the current crisis, and in light of the deteriorating economy and massive job losses, household debt levels have increased significantly and may be unsustainable in many cases. The run-up in house prices fueled excessive leverage, while subsequent sharp declines left borrowers struggling with payments. Where foreign currency lending was prevalent, borrowers were also subject to the balance sheet effects of currency depreciation.

In such an economic environment, a government-sponsored household debt restructuring program may be necessary. Countries typically apply a combination of resolution strategies—with some more directed toward financial institutions and

others more geared towards borrowers—and in the process often incur substantial fiscal costs. Household debt restructuring involves (1) facilitating voluntary loan workouts between banks and their borrowers by easing loan provisioning, and possibly by offering tax breaks for banks; and (2) recapitalizing financial institutions that are worth saving and facilitating exit of other financial institutions. In situations of large-scale household distress, such voluntary workout programs can be complemented by loan subsidies or tax breaks for households and fiscal stimulus. Finally, in large-scale household distress situations where households default en masse on their loans, a well-designed debt restructuring program becomes an option. This can involve recapitalizing financial institutions worth saving and facilitating exit of others, and social support programs to restore households to financial health.

Annex 1.5. Methodology for Estimating Potential Writedowns[69]

The October 2008 GFSR estimated potential writedowns on U.S.-origin credit for global market participants over 2007–10. The methodology used to estimate those writedowns has been extended to include credit originated in Europe and Japan, as well as in emerging markets. Together with related analysis in the chapter, the estimates here provide a broader assessment of potential global bank writedowns.

Estimation of Global Writedowns on Credit Instruments

Writedowns on loans and securities originated in the United States are calculated based on a set of assets including residential and commercial real estate mortgages, consumer debt, and corporate debt.[70] For credit originated in Europe, we considered a similar set of instruments. For credit originated in Japan, we only examined consumer and corporate debt, as these assets are most significant from the perspective of potential writedowns for holders.

As in past GFSRs, writedowns on debt *securities* were measured as declines in market valuations of representative indexes or deals. Charge-offs for related loans were estimated using a regression type approach for the United States (Box 1.7). For European and Asian loan charge-offs, we used an alternative approach (discussed below), due to data limitations.

Securities

Writedowns on European residential securities were estimated by multiplying the change in spread on residential mortgage-backed securities (RMBS) deals (i.e., France, Germany, Italy, Netherlands, Spain, and the United Kingdom) by their average duration, and then weighting the results by size of issuance and rating. This results in an estimated 14 percent mark-to-market (MTM) loss rate altogether.[71] Writedowns on European commercial real estate and consumer debt were estimated from changes in spreads on commercial mortgage-backed securities (CMBS) and consumer (auto and credit card) debt, respectively. This resulted in estimated MTM loss rates of 17 percent and 7 percent, respectively. Corporate debt was priced using the Barclays Euro-Aggregate corporate index, which suggests a 5 percent loss since the beginning of the credit crisis through mid-March 2009. A similar approach

[69]This annex was prepared by Mustafa Saiyid.

[70]The set of instruments in this analysis has been broadened to include municipal loans to reflect potential deterioration tied to a deeper trough in the credit cycle than previously anticipated.

[71]Admittedly, this is a high figure for the overall European residential securities market, but it is lower than that of U.S. nonagency residential debt, for which the MTM loss rate is estimated at 34 percent. It is also presumably being driven up by market concerns about structured products in general. The U.S. residential mortgage securities market as a whole has an implied MTM loss rate of 14 percent, which is lowered by the inclusion of guaranteed agency debt, comprising more than two-thirds of the total outstanding amount.

Box 1.7. Forecasts for Charge-Offs on U.S. Bank Loans

This box outlines the revised methodology for forecasting bank loan charge-off rates.

A general approach for modeling charge-off rates is described in the October 2008 GFSR (IMF, 2008b, Box 1.6). Charge-off rates for different loan types are modeled as dependent on a set of economic and financial variables. In order to better capture future turning points in the charge-off patterns, levels and log levels (rather than growth rates) are used for the explanatory variables—house prices, GDP, and consumption. Since a recent decline in bank lending standards (net balances) indicates a slower rate of tightening, the use of cumulative net balances for lending standards is warranted. This is to reflect that charge-offs continue to rise despite a slowdown in house price declines and a deceleration in the pace of tightening in lending standards. Despite the slower pace of deterioration, home equity is still declining and banks are becoming more reluctant to lend, pushing delinquency and charge-off rates higher. Furthermore, lags in the charge-off rate are not included in the final estimation equations. Although statistically significant, the high autocorrelation coefficients result in very persistent forecasts, failing to predict a turn in the cycle. Instead, with the forecasting goal in mind, the analysis relies only on the exogenous variables, which project an improvement in economic and financial conditions by 2011.

To deal with nonstationarity in the variables, the empirical Bayesian approach is employed. The estimation is carried out by running 10,000 Markov Chain Monte Carlo simulations using the Gibbs sampler package WinBUGS (Lunn and others, 2000). Convergence is obtained within 1,000 burn-in runs. The estimated coefficients in the presented equations are statistically significant at 5 percent. Lending standards are particular to each loan type.

Residential real estate: log (D_RRE) = 0.9095 + 0.0033*LS – 0.0026*HP, where *D_RRE* is the delinquency rate, *LS* is lending standards, *HP* is Case-Shiller house prices.

Commercial real estate: log(D_CRE) = 62.15 + 0.0032*LS – 7.153*log(C), where *D_CRE* is the delinquency rate, *C* is real private consumption.

Consumer loans: C_CL = 50.12 + 0.0055*LS – 5.347*log(GDP), where *C_CL* is the charge-off rate, *GDP* is real gross domestic product.

Commercial and industrial loans: C_CI = 26.24 + 0.0028*LS – 2.883*log(GDP), where *C_CI* is the charge-off rate.

Note: This box was prepared by Sergei Antoshin.

was used to estimate writedowns on Japanese debt securities. MTM loss rates on Japanese corporates were estimated 2 percent, using the Barclays Asian corporate index. A similar loss rate was assumed for Japanese debt.

Loans

Estimating charge-off rates on European loans is more complicated than for U.S. loans because of data limitations. Available European data are not sufficiently disaggregated and provide too few data points for a meaningful econometric analysis. Instead, we were forced to rely on more indirect methods. The primary approach we followed was to take the charge-off rate for U.S. loans in each credit category and to reduce it by the ratio of mark-to-market losses on European to U.S. securities. In this way we captured market-based expectations regarding differences in European and U.S. credit quality and the impact of the economic cycle. For example, in order to estimate the charge-off rate on European residential mortgage loans, we took the forecasted charge-off rate on U.S. residential mortgage loans of 8.3 percent from

econometric analysis, and multiplied it by the ratio of MTM losses on European RMBS of 14 percent to that of U.S. nonagency mortgage securities of 30 percent. Rounding the ratio of MTMs to 0.5 suggests a cumulative charge-off rate for European residential mortgage loans of 4.1 percent over 2007–10. This charge-off rate is multiplied by the outstanding stock of unsecuritized European residential loans of $4.6 trillion to result in an estimated writedown of $192 billion. This assumes that the relative performance of European loans to U.S. loans will mirror the relative market performance of European securities to U.S. securities in each credit category. For Japan, charge-off rates for commercial and consumer loans on a cumulative basis were assumed to be consistent with the MTM decline in the value of corporate debt securities.

Table 1.13. Estimated Bank Portfolio Composition by Type of Asset
(In percent)

	U.S. Banks	U.K. Banks	Europe excluding U.K. Banks	Asian Banks[1]
Loan Exposures				
Consumer	17	12	13	20
Residential mortgage	52	23	25	26
Commercial mortgage	6	6	5	5
Corporate	15	49	43	27
Other	11	10	14	22
Total	100	100	100	100
Securities Exposures				
Consumer	4	6	5	2
Residential mortgage	42	24	19	5
Commercial mortgage	6	5	5	27
Corporate	32	27	27	60
Other	16	38	43	6
Total	100	100	100	100

Sources: Bank filings; IMF staff estimates.
[1]Asian banks domiciled in Australia, Hong Kong SAR, Japan, New Zealand, and Singapore.

Global Writedowns

Applying the estimated MTM loss rates on debt securities and charge-off rates on loans to the outstanding amounts resulted in an estimated aggregate writedown of $4.1 trillion over 2007–10.[72]

Potential Writedowns for Banks and Their Regional Distribution

In order to account for important regional differences in the composition of bank portfolios, we used two separate sets of exposure matrices: (1) by type of assets held by banks, including, for example, residential mortgage or corporate debt; (2) by geographic origin, specifically for U.S., U.K., Europe excluding the United Kingdom, Japanese, and emerging market assets. These matrices were broken out further into exposure to loans and to securities (Tables 1.13–1.14).[73]

These exposures were then multiplied with corresponding MTM loss rates (for securities) and charge-off rates (for loans) to obtain a matrix of potential writedown estimates by region. For asset classes where charge-off rates were not estimated, the applicable rate was assumed to be the same as for corporates broadly. For securities for which MTM rates were not estimated, the applicable rate was assumed to be zero these were regarded as riskless.

An important modification to the MTM rates on bank holdings of securities is to account for banks holding higher-quality assets relative to the universe of securities. For bank security portfolios with

[72]Actual writedowns taken by market participants globally over the course of the credit cycle will likely be higher because of losses on exposures to equities and to derivative instruments. Derivatives transfer risk from one market participant to another, and although losses net out to zero for the system as a whole, individual market participants would be expected to bear losses on one-sided bets. These losses and resulting potential writedowns are very difficult to quantify with existing public disclosure of exposure.

[73]The estimated exposure of banks in a region to various types of assets, (e.g., U.S. banks to consumer loans) is obtained from filings of a sample of 50 large (global) banks in the United States, Europe, and Japan. The estimated exposure of the banks in a region to loans and securities originated in different regions is derived from Table 9B on foreign claims of banks from the Bank for International Settlements.

Table 1.14. Estimated Bank Portfolio Composition by Origin of Assets

(In percent of total assets)

	U.S. Assets	U.K. Assets	Europe excluding U.K. Assets	Japanese Assets	Emerging Market Assets	Total
U.S. banks	87	3	4	2	4	100
U.K. banks	15	64	12	3	6	100
Europe excluding U.K. banks	12	10	67	2	8	100
Asian banks[1]	10	5	7	76	3	100

Source: Bank for International Settlements, *Quarterly Review,* March 2009.

Note: Assets held in offshore centers have been reallocated to corresponding regions.

[1]Asian banks domiciled in Australia, Hong Kong SAR, Japan, New Zealand, and Singapore.

exposure to European securities, the applicable MTM loss rate was assumed to be only half of the loss rate for the asset class universe. This roughly corresponds to the ratio of MTM declines on high- versus average-quality securities in European residential and consumer sectors. MTM loss rates applicable to bank holdings of securities in other regions are assumed to be closer to those for the overall asset class (95 percent of the average in the United States, 70 percent in the United Kingdom, 50 percent in Asia).

Allocation of Potential Writedowns Between Different Market Participants

Potential writedowns for mature market banks estimated as described above are then used to allocate the remainder of global writedowns on the outstanding stock of loans and securities to other market participants, including insurers, government-sponsored enterprises, pension funds, and hedge funds. The allocation to insurers is based on their percentage share of writedowns thus far, while the allocation to other market participants is a residual of the process.

Results

Of estimated potential writedowns of $4.1 trillion on mature market credit for global market participants, banks are expected to suffer $2.5 trillion. In addition, global banks are expected to take an additional $340 billion of writedowns on exposure to emerging market assets, bringing the total to $2.8 trillion (Table 1.15). The proportion of bank writedowns to the total estimated for all market participants of 61 percent (= 2.5/4.1) is roughly the same as the actual bank share of writedowns reported by market participants. Region-

Table 1.15. Estimated Distribution of Bank Writedowns by Bank Domicile and Cumulative Loss Rates

(In percent)

	U.S. Assets		U.K. Assets		Europe excluding U.K. Assets		Asian Assets		Emerging Markets		Total	
	(Billions of U.S. dollars)	*(Percent)*	*(Billions of U.S. dollars)*	*(Percent)*	*(Billions of U.S. dollars)*	*(Percent)*	*(Billions of U.S. dollars)*	*(Percent)*	*(Billions of U.S. dollars)*	*(Percent)*	*(Billions of U.S. dollars)*	*(Percent)*
Writedowns on Assets												
U.S. banks	966	9.3	22	5.9	24	4.6	3	1.3	35	6.9	1,049	8.8
U.K. banks	72	7.5	174	4.3	30	3.9	2	1.1	37	9.9	316	5.0
Europe excluding U.K. banks	198	7.0	111	4.4	622	3.9	6	1.0	172	8.5	1,109	4.6
Asian banks	116	12.0	33	6.8	29	4.6	141	2.0	16	6.8	337	3.5
Total	1,352	8.9	340	4.6	705	3.9	151	1.9	261	8.2	2,810	5.4
Memorandum item:												
Assets												
U.S. banks	10,364		369		509		191		507		11,940	
U.K. banks	965		4,045		779		160		380		6,329	
Europe excluding U.K. banks	2,839		2,500		16,151		600		2,034		24,124	
Asian banks	968		483		639		7,195		241		9,526	
Total	15,136		7,397		18,078		8,146		3,162		51,919	

Sources: Bank of England; Bankscope; Federal Reserve, *Flow of Funds;* and IMF staff estimates.

Note: Assets include only loans and securities and do not include fixed assets held by banks. For each region, the first column refers to the dollar value of bank writedowns and the second column to cumulative loss rates in percent.

ally, Europe excluding U.K. banks are expected to suffer the bulk of potential writedowns, taking $1.11 trillion (39 percent of the total), compared with $1.05 trillion (37 percent) for U.S. banks. Banks in the United Kingdom and Asia (comprised of Japan, Australia, New Zealand, Hong Kong SAR, and Singapore) are estimated to take roughly similar-sized writedowns of $316 billion and $336 billion, respectively.

Although Europe excluding U.K. banks are expected to suffer a sizable portion of its writedowns on assets within the region, a substantial proportion of the total, 44 percent altogether, is borne on assets outside the region, mostly in the United States, and in emerging European markets. By comparison, U.S. banks are expected to suffer only 8 percent of writedowns on non-U.S. exposure. Similar to continental Europe, U.K. banks suffer 45 percent of writedowns on nondomestic assets. For banks in Asia, potential writedowns on U.S. assets (35 percent) are higher in dollar terms than on any other regional exposure. In each region, the contribution of potential writedowns from loans and securities is roughly the same in dollar terms, but implied loss rates are somewhat higher on securities, reflecting more pronounced market concerns about potential cash flow losses than related loans would suggest.

References

Adams, Charles F., Robert E. Litan, and Michael Pomerleano, 2000, *Managing Financial and Corporate Distress: Lessons from Asia* (Washington: Brookings Institution Press).

Árvai, Z., K. Driessen, and I. Ötker-Robe, 2009, "Regional Financial Interlinkages and Financial Contagion Within Europe," IMF Working Paper 09/6 (Washington: International Monetary Fund).

Froot, Kenneth, and Paul G.J. O'Connell, 2003, "The Risk Tolerance of International Investors," NBER Working Paper No. 10157 (Cambridge, Massachusetts: National Bureau of Economic Research).

Group of Twenty, 2009, Finance Ministers' and Central Bank Governors' Communiqué (Horsham, United Kingdom, March 14). Available via the Internet: www.g20.org/Documents/2009_communique_horsham_uk.pdf.

Hoshi, T., and A. Kashyap, 2008. "Will the U.S. Bank Recapitalization Succeed? Lessons from Japan," NBER Working Paper 14401 (Cambridge, Massachusetts: National Bureau of Economic Research).

Ingves, S., S.A. Seelig, and D. He, 2006, "Issues in the Establishment of Asset Management Companies," in *Bank Restructuring and Resolution,* ed. by David Hoelscher (New York: Palgrave MacMillan).

International Monetary Fund, 2008a, *Global Financial Stability Report,* World Economic and Financial Surveys (Washington, April).

———, 2008b, *Global Financial Stability Report,* World Economic and Financial Surveys (Washington, October).

———, 2009a, "Companion Paper—The State of Public Finances: Outlook and Medium-Term Policies After the 2008 Crisis," March 6, 2009. Available via Internet: www.imf.org/external/np/pp/eng/2009/030609a.pdf.

———, 2009b, "The State of Public Finances: Outlook and Medium-Term Policies After the 2008 Crisis," March 6, 2009. Available via the Internet: www.imf.org/external/np/pp/eng/2009/030609.pdf.

Lunn, D.J., A. Thomas, N. Best, and D. Spiegelhalter, 2000, "WinBUGS—A Bayesian Modelling Framework: Concepts, Structure, and Extensibility," *Statistics and Computing,* Vol. 10, No. 4. pp. 325–37.

Oyama, T., and T. Shiratori, 2001, "Insights into the Low Profitability of Japanese Banks: Some Lessons from the Analysis of Trends in Banks' Margins," Discussion Paper No. 01-E-1, Bank of Japan, Tokyo.

Pomerleano, Michael, and William Shaw, 2005, eds., *Corporate Restructuring: Lessons from Experience* (World Bank Publications).

Segoviano, Miguel, forthcoming, "The CIMDO-Copula. Robust Estimation of Default Dependence under Data Restrictions," IMF Working Paper.

———, and C. Goodhart, 2006, "The Consistent Information Multivariate Density Optimizing Methodology," Discussion Paper 557, Financial Markets Group, London School of Economics.

———, 2009, "Banking Stability Measures," IMF Working Paper 09/04 (Washington: International Monetary Fund).

Song, I., 2006, "Prudential Treatment of Restructured Loans," in *Bank Restructuring and Resolution,* ed. by David Hoelscher (New York: Palgrave MacMillan).

Stone, Mark, 2000, "Large-Scale Post-Crisis Corporate Sector Restructuring," IMF Policy Discussion Paper 00/7 (Washington: International Monetary Fund).